Appendices

Contents

Appendix A: Guideline Development Group Declarations of Interest

A.1 GDG members

Weeliat Chong (Chair)

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14 January 2014)	No changes to record	None
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July 2014)	No changes to record	None
Seventh GDG meeting (5 August 2014)	No changes to record	None
Eigth GDG meeting (25 November 2014)	No changes to record	None

Stephen Dean

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14 January 2014)	No changes to record	None
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July	No changes to record	None

GDG meeting	Declaration of interest	Action taken
2014)		
Seventh GDG meeting (5 August 2014)	No changes to record	None
Eigth GDG meeting (25 November 2014)	No changes to record	None

David Erskine

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14 January 2014)	No changes to record	None
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July 2014)	No changes to record	None
Seventh GDG meeting (5 August 2014)	No changes to record	None
Eigth GDG meeting (25 November 2014)	No changes to record	None

Leslie Galloway (member until end May 2014)

GDG meeting	Declaration of interest	Action taken	Type
Recruitment/ First GDG meeting (27 November 2013)	Presents to members of EMIG and will be asked about medicines optimisation.	Advice given regarding speaking about medicines optimisation. He stated he will not answer questions directly relating to medicines optimisation while on the GDG	Specific personal non-financial
Second GDG meeting (14 January 2014)	No changes to record	None	
Third GDG meeting (4 March 2014)	No changes to record	None	
Fourth GDG	No changes to record	None	

GDG meeting	Declaration of interest	Action taken	Type
meeting (2 April 2014)			
Fifth GDG meeting (29 April 2014)	No changes to record	None	
Withdrew from GDG			

Brian Hawkins

GDG meeting	Declaration of interest	Action taken	Type
Recruitment/ First GDG meeting (27 November 2013)	Presentation at training event for MSD staff - May 2011 Presentation at training event for Lilly staff – June 2011 Employer, Cwm Taf LHB, has received funding for project from TEVA UK ltd and GSK.	None	Non-specific personal non-financial Non-specific personal non-financial Non-specific non-personal financial
Second GDG meeting (14 January 2014)	No changes to record	None	
Third GDG meeting (4 March 2014)	No changes to record	None	
Fourth GDG meeting (2 April 2014)	No changes to record	None	
Fifth GDG meeting (29 April 2014)	No changes to record	None	
Sixth GDG meeting (2 July 2014)	No changes to record	None	
Seventh GDG meeting (5 August 2014)	Asked to be a speaker at the hospital pharmacy Europe conference in Birmingham on 9 September 2014 on the subject of "Optimising medicines management".	Advised he needs to be very careful of the content of the presentation and not discuss the guideline.	Specific personal non-financial
Eigth GDG meeting (25 November 2014)	No changes to record	None	

John Holden

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14	No changes to record	None

GDG meeting	Declaration of interest	Action taken
January 2014)		
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July 2014)	No changes to record	None
Seventh GDG meeting (5 August 2014)	No changes to record	None
Eigth GDG meeting (25 November 2014)	No changes to record	None

Tessa Lewis

GDG meeting	Declaration of interest	Action taken	
Recruitment/ First GDG meeting (27 November 2013)	None	None	
Second GDG meeting (14 January 2014)	No changes to record	None	
Third GDG meeting (4 March 2014)	Wrote an article on medication review.	None at present.	Specific personal non-financial
Fourth GDG meeting (2 April 2014)	No changes to record	None	
Fifth GDG meeting (29 April 2014)	No changes to record	None	
Sixth GDG meeting (2 July 2014)	No changes to record	None	
Seventh GDG meeting (5 August 2014)	No changes to record	None	
Eigth GDG meeting (25 November 2014)	No changes to record	None	

Harriet Lewis

GDG meeting	Declaration of interest	Action taken	Type
Recruitment/ First GDG meeting (27 November 2013)	Employee of Association of British Pharmaceutical Industry (ABPI)	None	Non-specific personal financial
Second GDG meeting (14 January 2014)	No changes to record	None	
Third GDG meeting (4 March 2014)	No changes to record	None	
Fourth GDG meeting (2 April 2014)	No changes to record	None	
Fifth GDG meeting (29 April 2014)	No changes to record	None	
Sixth GDG meeting (2 July 2014)	No changes to record	None	
Seventh GDG meeting (5 August 2014)	No changes to record	None	
Eigth GDG meeting (25 November 2014)	No changes to record	None	

Margaret Ogden

GDG meeting	Declaration of interest	Action taken	Type
Recruitment/ First GDG meeting (27 November 2013)	Sits on a voluntary patient advisory group with a pharmaceutical company Attended a one-to-one meeting with a small pharmaceutical company.	Advised not to discuss the guideline.	Non-specific personal non-financial Non-specific personal non-financial
Second GDG meeting (14 January 2014)	No changes to record	None	
Third GDG meeting (4 March 2014)	No changes to record	None	
Fourth GDG meeting (2 April 2014)	Working with Alzheimer's Society on patient reported outcomes	None at present	Non-specific personal non-financial
Fifth GDG meeting (29 April 2014)	No changes to record	None	
Sixth GDG	Attending a medication safety	None at present	Non-specific personal

GDG meeting	Declaration of interest	Action taken	Type
meeting (2 July 2014)	focus group on 11 July for NIHR Greater Manchester Primary Care Patient Safety Translational Research Centre		non-financial
Seventh GDG meeting (5 August 2014)	No changes to record	None	
Eigth GDG meeting (25 November 2014)	No changes to record	None	

Bunis Packham

GDG meeting	Declaration of interest	Action taken	Type
Recruitment/ First GDG meeting (27 November 2013)	Previously work involved medicines adherence	None	Non-specific personal non-financial
Second GDG meeting (14 January 2014)	No changes to record	None	
Third GDG meeting (4 March 2014)	No changes to record	None	
Fourth GDG meeting (2 April 2014)	No changes to record	None	
Fifth GDG meeting (29 April 2014)	No changes to record	None	
Sixth GDG meeting (2 July 2014)	No changes to record	None	
Seventh GDG meeting (5 August 2014)	No changes to record	None	
Eigth GDG meeting (25 November 2014)	No changes to record	None	

Richard Seal

GDG meeting	Declaration of interest	Action taken	Type
Recruitment/ First GDG meeting (27 November 2013)	Wife is a practice support pharmacist employed by Arden Commissioning Support Unit and also employed as a practice pharmacist by a GP practice.	Advised to be careful when discussing medicines optimisation and to not discuss the guideline.	Non-specific personal financial

GDG meeting	Declaration of interest	Action taken	Type
	Provides advisory support for pharmaceutical journal for which he receives no recompense. Spoken on medicine optimisation at the Pharmacy Management National Seminar.		Non-specific personal non-financial Specific personal non-financial
Second GDG meeting (14 January 2014)	No changes to record	None	
Third GDG meeting (4 March 2014)	Notified the GDG that he is no longer a member of Pharmacy Management	None	NA
Fourth GDG meeting (2 April 2014)	No changes to record	None	
Fifth GDG meeting (29 April 2014)	No changes to record	None	
Sixth GDG meeting (2 July 2014)	No changes to record	None	
Seventh GDG meeting (5 August 2014)	No changes to record	None	
Eigth GDG meeting (25 November 2014)	No changes to record	None	

David Terry

GDG meeting	Declaration of interest	Action taken	Type
Recruitment/ First GDG meeting (27 November 2013)	Presenting at a conference in March 2014.	Advised not to discuss the guideline and be careful of presentation content.	Non-specific personal non-financial
Second GDG meeting (14 January 2014)	No changes to record	None	
Third GDG meeting (4 March 2014)	Co-ownership of NuCo R&D Ltd. NuCo was incorporated as a company on 26th February 2014. It is a research company but may in the future also distribute and or sell medicines. At present does not believe there is anything on NuCo's agenda / portfolio that causes concern with this	None at present but may review at future meetings.	Non-specific personal financial

GDG meeting	Declaration of interest	Action taken	Type
	guideline. NuCo is not currently trading.		
Fourth GDG meeting (2 April 2014)	No changes to record	None	
Fifth GDG meeting (29 April 2014)	Accepted an invitation to take part in The Clinical Pharmacy Congress 2014, 25 – 26 April 2014. He joined a panel, sponsored by Sanofi-Aventis to discuss the subject: The wider role of pharmacists in delivering outcomes in diabetes	None	Non-specific personal non-financial
Sixth GDG meeting (2 July 2014)	No changes to record	None	
Seventh GDG meeting (5 August 2014)	No changes to record	None	
Eigth GDG meeting (25 November 2014)	No changes to record	None	

Katrina Vout

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14 January 2014)	No changes to record	None
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July 2014)	No changes to record	None
Seventh GDG meeting (5 August 2014)	No changes to record	None
Eigth GDG meeting (25 November 2014)	No changes to record	None

Mary Weatherstone

GDG meeting	Declaration of interest	Action taken	Type
Recruitment/ First GDG meeting (27 November 2013)	Member of an NHS England clinical reference group on Medicines Optimisation. Is a NICE MPC Associate	Advised not to discuss the guideline at the reference group.	Specific personal non-financial
Second GDG meeting (14 January 2014)	No changes to record	None	
Third GDG meeting (4 March 2014)	No changes to record	None	
Fourth GDG meeting (2 April 2014)	No changes to record	None	
Fifth GDG meeting (29 April 2014)	No changes to record	None	
Sixth GDG meeting (2 July 2014)	No changes to record	None	
Seventh GDG meeting (5 August 2014)	No changes to record	None	
Eigth GDG meeting (25 November 2014)	No changes to record	None	

Nigel Westwood

GDG meeting	Declaration of interest	Action taken	Type
Recruitment/ First GDG meeting (27 November 2013)	Received travel expenses and attendance fees from a number of pharmaceutical companies when attending meetings (Abbott, Proctor and Gamble, Kinetic Concepts Inc., UCB and Warner Chillcott) as a speaker on patient experience to pharmaceutical staff, trainee medical professionals and specialist registrars.	Advised not to discuss the guideline.	Non-specific personal financial
Second GDG meeting (14 January 2014)	No changes to record	None	
Third GDG meeting (4 March 2014)	No changes to record	None	
Fourth GDG meeting (2	No changes to record	None	

GDG meeting	Declaration of interest	Action taken	Type
April 2014)			
Fifth GDG meeting (29 April 2014)	No changes to record	None	
Sixth GDG meeting (2 July 2014)	No changes to record	None	
Seventh GDG meeting (5 August 2014)	No changes to record	None	
Eigth GDG meeting (25 November 2014)	No changes to record	None	

A.2 NICE Medicines prescribing centre team and additional GDG meeting attendees

Elizabeth Barret

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14 January 2014)	No changes to record	None
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July 2014)	No changes to record	None
Seventh GDG meeting (5 August 2014)	No changes to record	None
Eigth GDG meeting (25 November 2014)	No changes to record	None

Jasdeep Hayre

GDG meeting	Declaration of interest	Action taken	
Recruitment/ First GDG meeting (27	Employed by the University of Nottingham between 2009 and 2010 for modelling the cost-	Will leave the GDG meeting during relevant discussions at the	Specific personal non-financial

GDG meeting	Declaration of interest	Action taken	
November 2013)	effectiveness of the PINCER trial. Not involved in the results of clinical trial, or the Lancet paper. He was involved in a more complex substantive economic model to assess the PINCER intervention's cost-effectiveness; the paper is yet to be published, but it will do so during the guideline development.	Chair's discretion.	Specific personal non-financial
Second GDG meeting (14 January 2014)	No changes to record	None	
Third GDG meeting (4 March 2014)	No changes to record	None	
Fourth GDG meeting (2 April 2014)	No changes to record	None	
Fifth GDG meeting (29 April 2014)	No changes to record	None	
Did not attend any later GDG meetings and was no longer involved in the guideline development.			

Johanna Hulme

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14 January 2014)	No changes to record	None
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July 2014)	No changes to record	None
Seventh GDG meeting (5 August 2014)	No changes to record	None
Eigth GDG meeting (25 November 2014)	No changes to record	None

Michelle Jenks

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14 January 2014)	No changes to record	None
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July 2014)	No changes to record	None
Seventh GDG meeting (5 August 2014)	No changes to record	None
Eigth GDG meeting (25 November 2014)	No changes to record	None

James Mahon

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14 January 2014)	No changes to record	None
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July 2014)	No changes to record	None
Seventh GDG meeting (5 August 2014)	No changes to record	None
Eigth GDG meeting (25 November 2014)	No changes to record	None

CliffordMiddleton

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14 January 2014)	No changes to record	None
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July 2014)	No changes to record	None
Seventh GDG meeting (5 August 2014)	No changes to record	None
Did not attend any later GDG meetings and was no longer involved in the guideline development.		

Greg Moran (attended seventh GDG meeting)

GDG meeting	Declaration of interest	Action taken
Seventh GDG meeting (5 August 2014)	None	None

Shelly Patel

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14 January 2014)	No changes to record	None
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July 2014)	No changes to record	None
Seventh GDG meeting (5 August 2014)	No changes to record	None

GDG meeting	Declaration of interest	Action taken
Eigth GDG meeting (25 November 2014)	No changes to record	None

Louise Picton

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14 January 2014)	No changes to record	None
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July 2014)	No changes to record	None
Seventh GDG meeting (5 August 2014)	No changes to record	None
Eigth GDG meeting (25 November 2014)	No changes to record	None

Ian Pye

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14 January 2014)	No changes to record	None
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July 2014)	No changes to record	None
Seventh GDG meeting (5 August	No changes to record	None

GDG meeting	Declaration of interest	Action taken
2014)		
Eigth GDG meeting (25 November 2014)	No changes to record	None

Rebekah Robinson

GDG meeting	Declaration of interest	Action taken
Recruitment/ First GDG meeting (27 November 2013)	None	None
Second GDG meeting (14 January 2014)	No changes to record	None
Third GDG meeting (4 March 2014)	No changes to record	None
Fourth GDG meeting (2 April 2014)	No changes to record	None
Fifth GDG meeting (29 April 2014)	No changes to record	None
Sixth GDG meeting (2 July 2014)	No changes to record	None
Seventh GDG meeting (5 August 2014)	No changes to record	None
Did not attend any later GDG meetings and was no longer involved in the guideline development.		

Joline Wiseman (attended sixth GDG)

GDG meeting	Declaration of interest	Action taken
Sixth GDG meeting (2 July 2014)	None	None

Appendix B: Scope

Guideline title

Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes

Short title

Medicines optimisation.

The remit

The Department of Health has asked NICE to develop guidance on medicines optimisation.

Need for the guideline

Medicines optimisation has not been formally defined in the published literature. For the purpose of this guidance, medicines optimisation is defined as: 'a person-centred approach to safe and effective medicines use, enabling people to obtain the best possible outcomes from their medicines'.

Medicines management considers the systems of processes and behaviours determining how medicines are used by patients and the NHS. Medicines management has primarily been led by pharmacy teams and is the term that has been used historically in the NHS for managing people's medicines.

Medicines management is an important enabler of medicines optimisation. However, medicines optimisation focuses on actions taken by all health and social care practitioners and requires greater patient engagement and professional collaboration across health and social care settings.

Liberating the NHS white paper (2010) emphasised the need to improve the outcomes of healthcare for all, to deliver care that is safer, more effective, and that provides a better experience for patients. It established improvement in quality and healthcare outcomes as the primary purpose of all NHS-funded care.

The Francis Report (2013) emphasised the need to put patients first at all times, and that they must be protected from avoidable harm. The Berwick report (2013) recommends 4 guiding principles for improving patient safety, including:

- place the quality and safety of patient care above all other aims for the NHS
- engage, empower, and hear patients and carers throughout the entire system, and at all times.

The NHS constitution for England (2013) gives people the right to be involved in discussions and decisions about their health and care, and to be given information to enable them to do this.

Medicines are the most common intervention in healthcare. Over 1 billion prescription items were dispensed in the community in England in 2012, at a cost of £8.5 billion.

The cost of waste prescription medicines in primary and community care in England is estimated to be £300 million a year, with up to half of that figure likely to be avoidable. An estimated £90 million worth of unused prescription medicines are retained in people's homes at any one time.

Patients and their carers often have inadequate information about their medicines. Up to half of all patients may not be taking their medicines as recommended by the prescriber.

Adverse events of medicines represent a considerable burden on the NHS and have a significant impact on patients. Approximately 5% to 8% of all hospital admissions are due to preventable adverse events of medicines.

When patients transfer between different care providers, such as at the time of hospital admission or discharge, there is a greater risk of poor communication and unintended changes to medicines. 30% to 70% of patients have an error or unintentional change to their medicines when they move from one care setting to another.

An analysis of the prevalence and causes of prescribing errors in general practice found that 1 in 20 prescription items contained either a prescribing or monitoring error, which affected 1 in 8 patients. In the National Diabetes Inpatient Audit (2012) of hospitals in England and Wales, almost one in three patients with diabetes experienced at least 1 medication error in the previous 7 days of their hospital stay.

NICE develops national evidence-based guidance to improve health and social care. There is variation in the uptake of NICE-approved medicines and implementation of NICE guidance.

There are still wide variations in prescribing across primary care organisations. Limited data on secondary care prescribing also shows variation, but these data are not routinely available.

This guideline aims to provide further clarity on medicines optimisation to ensure NHS patients get the best possible outcomes from their medicines.

The guideline

The guideline development process is described in detail on the NICE website (see section 6, 'Further information').

This scope defines what the guideline will (and will not) examine, and what the guideline developers will consider. The scope is based on the referral from the Department of Health.

The areas that will be addressed by the guideline are described in the following sections.

Population

1.1.1 Groups that will be covered

All children, young people and adults using medicines.[a]

All children, young people and adults who are receiving sub-optimal benefit from medicines, for example, not receiving a medicine when they should or could benefit from medicines.

All practitioners who prescribe, supply and/or administer medicines.

1.1.2 Groups that will not be covered

None.

Setting

All publicly-funded health and social care commissioned or provided by NHS organisations, local authorities (in England), independent organisations or independent contractors.

This guidance will be relevant to health and social care practitioners, and organisations commissioning or providing health and/or social care for children, young people and adults that involves medicines use.

Key issues

1.1.3 Areas that will be covered

1. Reducing medicines-related patient safety incidents

This will cover the following interventions to reduce medicines-related patient safety incidents, such as potentially avoidable medicines-related hospital admissions and re-admissions, prescribing errors, dispensing errors, administration errors, monitoring errors and near misses:

a) Systems for monitoring medicines-related patient safety incidents.

b) Medication reviews.

[a] The term 'medicines' covers all healthcare treatments, such as oral medicines, topical medicines, inhaled products, injections, wound care products, appliances and vaccines.

c) Medicines reconciliation.

2. Evidence-informed decision making

This will cover the following interventions to support evidence-informed decision making, including patient-centred care, patient choice, patient experience and patient and carer engagement:

a) Decision support.

b) Shared-decision aids in consultations.

c) Self-management plans.

3. Professional collaboration

This will cover the following interventions to support collaboration and communication within individual professional groups, across multidisciplinary teams, across different providers at critical points in the care pathway (e.g. out of hours) and with the pharmaceutical industry:

a) Models of profession-led and multidisciplinary team-led collaborative working.

b) Models of cross-organisational collaborative working, such as between health and social care, with the pharmaceutical and homecare industries.

c) Communication systems relating to medicines when patients move from one care setting to another.

1.1.4 Areas that will not be covered

Specific named medicines.

Specific clinical conditions.

Patient consent (see CG138 – Patient experience in adult NHS services: improving the experience of care for people using adult NHS services).

Patient and service user experience (see CG138 – Patient experience in adult NHS services and CG136 – Service user experience in adult mental health).

Patient education.

Public information campaigns.

Medicines adherence (see CG76 – Medicines adherence: Involving patients in decisions about prescribed medicines and supporting adherence).

Shared care arrangements for medicines used across primary and secondary care - identified for good practice guidance development.

Repeat dispensing and repeat prescribing systems.

Access to medicines, including local-decision making for drugs not included on local formularies.

Medicines shortages, including supply issues and discontinued medicines.

Prescription charges

Waste medicines.

Education and training of health and social care practitioners.

Main outcomes

Mortality

Clinical outcomes.

Hospitalisation and health and social care utilisation.

Planned and unplanned contacts.

Medicines-related problems, such as prescribing errors, administration errors, dispensing errors, monitoring errors, near misses and adverse effects.

Health and social care related quality of life.

Patient-reported outcomes, such as medicines adherence, patient experience, patient satisfaction with decision-making.

Economic aspects

Developers will take into account both clinical and cost effectiveness when making recommendations involving a choice between alternative interventions. A review of the economic evidence will be conducted and analyses will be carried out as appropriate. The preferred unit of effectiveness is the quality-adjusted life year (QALY), and the costs considered will usually be only from an NHS and personal social services (PSS) perspective. Further detail on the methods can be found in 'The guidelines manual' (see 'Further information').

Status

1.1.5 Scope

This is the final scope.

1.1.6 Timing

The development of the guideline recommendations will begin in November 2013.

Related NICE guidance

Published guidance

1.1.7 Other related NICE guidance

Medicines optimisation incorporates many other NICE guidance, particularly condition specific guidelines. For this reason all related condition specific guidance is not included in this section.

- ***Good practice guidance***
  - Patient Group Directions. NICE good practice guidance 2 (2013)
  - Developing and updating local formularies. NICE good practice guidance 1 (2012)
- ***Clinical guidelines and quality standards***
  - Medicines adherence. NICE clinical guideline 76 (2009).
  - Service user experience in adult mental health. NICE clinical guideline 136 and quality standard 14 (2011)
  - Patient experience in adult NHS services. NICE clinical guideline 138 and quality standard 15 (2012).
- ***Patient safety guidance***

- Technical patient safety solutions for medicines reconciliation on admission of adults to hospital. NICE patient safety guidance 1 (2007).

Guidance under development

NICE is currently developing the following related guidance (details available from the NICE website):

- Managing medicines in care homes. NICE good practice guidance. Publication expected March 2014.
- Drug allergy. NICE clinical guideline. Publication expected October 2014.
- Safe use and management of controlled drugs. NICE good practice guidance. Publication expected January 2015.
- Domiciliary care. NICE social care guidance. Publication expected July 2015.
- Older people with long-term conditions. Publication expected September 2015.
- Multi-morbidities: system integration to meet population needs. Publication expected [TBC].

Further information

Information on the guideline development process is provided in the following documents, available from the NICE website:

- 'How NICE clinical guidelines are developed: an overview for stakeholders the public and the NHS'
- 'The guidelines manual'.

Information on the progress of the guideline will also be available from the NICE website.

Appendix C: How this guideline was developed

C.1 Search strategies for the Medicines Optimisation guideline

C.1.1 Scoping searches

Scoping searches were undertaken on the following websites and databases (listed in alphabetical order) in July 2013 to provide information for scope development and project planning. Browsing or simple search strategies were employed.

Guidelines/websites	Systematic reviews/economic evaluations
Canadian Medical Association Infobase	Cochrane Database of Systematic Reviews
Clinical Knowledge Summaries	DARE
COMET (Core Outcome Measures in Effectiveness Trials)	DUETS (UK Database of Uncertainties about the Effects of Treatment)
Department of Health	HEED
General Pharmaceutical Council	HTA Database
Guidelines International Network (GIN)	National Institute for Health

Guidelines/websites	Systematic reviews/economic evaluations
Healthtalk Online Map of Medicine Ministry of Health NZ National Health and Medical Research Council (Australia) NHS England NICE NICE Evidence Patient UK Royal Pharmaceutical Society SIGN TRIP US National Guideline Clearing House	Research (NIHR) Health Technology Assessment Programme NHS EED The NIHR Health Services and Delivery Research (HS&DR) Prospero TRIP

C.1.2 Main searches

Sources searched for the guideline

- ASSIA (Proquest)
- CINAHL (HDAS)
- Cochrane Database of Systematic Reviews – CDSR (Wiley)
- Cochrane Central Register of Controlled Trials – CENTRAL (Wiley)
- Database of Abstracts of Reviews of Effects – DARE (Wiley)
- Health Technology Assessment Database – HTA (Wiley)
- EMBASE (Ovid)
- MEDLINE (Ovid)
- MEDLINE In-Process (Ovid)
- Social Care Online
- Social Policy and Practice (Ovid)
- Social Service Abstracts (Proquest)
- Sociological Abstracts (Proquest)

Identification of evidence for clinical questions

The searches were conducted between November 2013 and May 2014.The aim of the searches was to identify evidence for each of the clinical questions. The MEDLINE search strategies and details of sources searched for each question are presented below. They were translated for use in all other databases.

C.1.2.1 Identifying, reporting and learning from medicines-related patient safety incidents

What systems for identifying, reporting and learning from medicines-related patient safety incidents are effective and cost-effective in reducing medicines-related patient safety incidents, compared to usual care?

Database: Ovid MEDLINE(R) <1946 to November Week 3 2013> Search Strategy:

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1 ((report* or learn* or identif*) adj2 (system* or process* or procedure* or practice* or method*)).tw. 107203

2 NRLS.tw. 54

3 "Root Cause Analysis"/ 79

4 (root cause adj4 analy*).tw. 456

5 Pharmacists/og or Pharmaceutical services/og 1926

6 exp Quality Improvement/ 4666

7 exp Quality Assurance, Health Care/ 257873

8 exp "Outcome and Process Assessment (Health Care)"/ 737693

9 ((serious* or significan*) adj2 (event* or incident*) adj2 (audit* or analy* or report*)).tw. 1687

10 Safety Management/ 16686

11 (safe* adj4 manage*).tw. 5728

12 ((computer* or electronic) adj2 alert*).tw. 271

13 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 1089591

14 exp Adverse Drug Reaction Reporting Systems/ 5830

15 (avoid* or prevent* or uninten* or unexpected).tw. 1182647

16 14 and 15 875

17 (medication* adj4 thermomet*).tw.2

18 ((Stop* or start) adj4 (tool* or screen*) adj4 (medic* or vaccin* or pharmaceutical*)).tw. 5

19 ((PINCER adj4 (medic* or vaccin* or pharmaceutical*)) or "pharmacist - led information technology for medication errors").tw. 2

20 (beer* criteria or beer* list).tw. 248

21 16 or 17 or 18 or 19 or 20 1125

22 exp Patient Admission/ 18672

23 exp Patient Readmission/ 7975

24 22 or 23 26227

25 exp Pharmaceutical preparations/ 648195

26 24 and 25 384

27 ((admission* or readmission*) adj2 (medic* or vaccin* or pharmaceutical*)).tw. 2563

28 26 or 27 2927

29 28 and 15 369

30 exp Medication Errors/ 11216

31 ((prescri* or medic* or vaccin* or pharmaceutical* or dispens* or monitor*) adj4 (error* or incident* or mistake* or harm*)).tw.11722

32 (adverse adj4 (effect* or event*) adj4 (medic* or vaccin* or pharmaceutical*)).tw.5374

33 32 and 15 1263

34 ((missed or forgot* or forget) adj4 (medic* or vaccin* or pharmaceutical*)).tw. 836

35 (near miss adj4 (medic* or vaccin* or pharmaceutical*)).tw. 20

36 29 or 30 or 31 or 33 or 34 or 35 21564

37 13 and 36 5719

38 37 or 21 6662

39 animals/ not humans/ 3974347

40 38 not 39 6643

41 limit 40 to (english language and yr="2000 -Current") 5532

Additionally searched in Medline-in- Process, CDSR, CENTRAL, DARE, HTA and Embase

C.1.2.2 Medicines-related communication systems when patients move from one care setting to another

What communication systems are effective and cost-effective in reducing sub-optimal use of medicines and improving patient outcomes from medicines when patients move from one care setting to another, compared to usual care, or other intervention?

Database: Ovid MEDLINE(R) <1946 to January Week 4 2014>

Search Strategy:

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1 Patient Transfer/ 5610

2 exp "Continuity of Patient Care"/ 14254

3 ((transfer* or move* or moving or continuity or transition* or hando*) adj4 (hospital* or "primary care" or "secondary care" or "tertiary care" or "respite care" or "social care" or ward* or theatre* or theater* or hospice* or "care home" or home* or community)).tw. 10129

4 (patient* adj4 (transfer* or move* or moving or continuity or transition* or hando*)).tw. 24555 pat

5 ((interfacilit* or inter facilit*or intrafacilit* or intra facilit*or inter hospital* or interhospital* or intrahospital* or intra hospital*) adj4 (transfer*or move* or moving)).tw. 1

6 1 or 2 or 3 or 4 or 5 48562

7 Patient Discharge/ 18191

8 exp Medical Records/ 82840

9 Patient access to records/ 797

10 exp Telemedicine/ 14924

11 (discharge* adj4 (summar* or counsell* or letter* or plan*)).tw. 4440

12 (summar* adj1 care adj1 record*).tw. 24

13 ((core or standard*) adj1 data).tw. 2924

14 (standard* adj1 template*).tw. 246

15 ((patient*adj2 held adj2 record*) or (patient* adj2 passport*)).tw. 14

16 (telemedicine or telehealth or ehealth or (mobile adj1 health)).tw. 7233

17 (case* adj4 meeting*).tw. 705

18 ((communicat* or record* or document*) adj2 (system* or process* or method*)).tw. 32870

19 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 149150

20 6 and 19 5014

21 limit 20 to (english language and yr="2000 -Current") 3181

Additionally searched in Medline-in- Process, CDSR, CENTRAL, DARE, HTA Embase, CINAHL, Social Care Online, Social Policy and Practice, ASSIA, Social Service Abstracts and Sociological Abstracts.

C.1.2.3 Medication review and Medicines reconciliation

The search for the following review questions was combined:

What is the effectiveness and cost-effectiveness of medication reviews to reduce sub-optimal use of medicines and medicines-related patient safety incidents, compared to usual care?

What is the effectiveness and cost-effectiveness of medicines reconciliation to reduce sub-optimal use of medicines and medicines-related patient safety incidents, compared to usual care?

Database: Ovid MEDLINE(R) <1946 to January Week 1 2014>

Search Strategy:-

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1 exp "Drug Utilization Review"/ 2899

2 ("medication* review*" or "medicine* review*").tw. 752

3 "drug* utili?ation* review*".tw. 269

4 "drug* use review*".tw. 120

5 ("medication* regimen* review*" or "medicine* regimen* review*").tw. 13

6 1 or 2 or 3 or 4 or 5 3810

7 exp Medication Reconciliation/ 251

8 ("medication reconcil*" or "medicine* reconcil*").tw. 384

9 7 or 8 503

10 6 or 9 4266

Additionally searched in Medline-in- Process, CDSR, CENTRAL, DARE, HTA and Embase

C.1.2.4 Self-management plans

What is the effectiveness and cost-effectiveness of using self-management plans to improve patient outcomes from medicines, compared to usual care?

Database: Ovid MEDLINE(R) <1946 to March Week 4 2014>

Search Strategy:

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1 *self care / 12073

2 ((action or individual or written or personal) adj1 plan*).tw. 4656

3 ((self manage* or self care or self monitor*) adj1 (plan* or program* or solution* or education or support or intervention*)).tw. 2513

4 (expert adj1 patient* adj1 program*).tw. 43

5 1 or 2 or 3 or 4 17302

Additionally searched in Medline-in- Process, CDSR, CENTRAL, DARE, HTA and Embase

C.1.2.5 Patient decision aids used in consultations about medicines

What is the effectiveness and cost-effectiveness of using patient decision aids in consultations involving medicines use to improve patient outcomes, compared to usual care or other intervention?

Database: Ovid MEDLINE(R) <1946 to March Week 3 2014> Search Strategy:

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1 decision support techniques/ 11825

2 Decision Support Systems, Clinical/ 4675

3 Decision Trees/ 8662

4 Decision Making/ 66713

5 choice behavior/ 21027

6 ((decision* or decid*) adj1 (support* or aid* or tool* or algorithm* or board* or guide* or counsel*)).tw. 10551

7 Decision Making, Computer-Assisted/ 2379

8 (comput* adj2 decision making).tw. 168

9 ((tool* or method* or support* or aid* or tool* or algorithm* or interactiv* or evidence based) adj3 (risk information* or risk communication* or risk presentation* or risk graphic*)).tw. 124

10 (share* adj1 decision*).tw. 2010

11 (inform* adj (choice* or decision* or decide* or consent* or behavio?r)).tw. 25750

12 adaptive conjoint analys?s.tw. 28

13 ((decision* or option*) adj1 grid*).tw. 12

14 patient medication knowledge/ 49

15 patient education as topic/ 69194

16 patient education handout/ 3930

17 informed consent/ 30932

18 patient-centered care/ 10330

19 health behavior/ 32666

20 or/1-19 265725

21 drug prescriptions/ 21755

22 prescription drugs/ 2746

23 medication therapy management/ 640

24 self medication/ 3941

25 inappropriate prescribing/ 661

26 pharmaceutical preparations/ 41957

27 pharmacy/ 7819

28 pharmacists/ 10451

29 ((patient* or consumer* or key worker* or keyworker* or care giver* or caregiver* or client*) adj4 (pharmacist* or pharmacy or pharmacies or drug* or medication* or medicine* or vaccin* or pharmaceutical* or prescription* or prescribe or prescribing or prescribed)).tw.99502

30 or/21-29 177020

31 20 and 30 8605

Additionally searched in Medline-in- Process, CDSR, CENTRAL, DARE, HTA Embase and CINAHL.

C.1.2.6 Clinical decision support

What is the effectiveness and cost-effectiveness of using clinical decision support to reduce sub-optimal use of medicines and improve patient outcomes from medicines, compared to usual care or other intervention?

Database: Ovid MEDLINE(R) <1946 to April wk 5 2014>

Search Strategy:

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1 Decision Support Systems, Clinical/ 4734

2 Decision Making, Computer-Assisted/ 2385

3 ((computer* or clinical*) adj2 decision* adj2 (support* or system*)).tw. 2606

4 (decision* adj2 support* adj2 system*).tw. 3010

5 (CDSS or CCDS).tw. 1106

6 1 or 2 or 3 or 4 or 5 10027

Additionally searched in Medline-in- Process, CDSR, CENTRAL, DARE, HTA and Embase

C.1.2.7 Medicines-related models of organisational and cross-sector working

What models of organisational and cross-sector working are effective and cost-effective in reducing sub-optimal use of medicines and improving patient outcomes from medicines, compared to usual care, or other intervention?

Database: Ovid MEDLINE(R) <1946 to February Week 4 2014>

Search Strategy:

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1 patient care team/ 51480

2 professional role/ 8025

3 interprofessional relations/ 42833

4 professional patient relations/ 21163

5 interdisciplinary communication/ 10000

6 "Delivery of Health Care, Integrated"/ 8129

7 "Continuity of Patient Care"/ 14137

8 cooperative behavior/ 27980

9 models,organizational/ 14734

10 models, theoretical/ 102172

11 program, evaluation/ 44976

12 program, development/ 22130

13 models,educational/ 7530

14 organizational case studies/ 9729

15 case management/8192

16 (multidisciplinary or multi-disciplinary or mdt or multipartner* or multi-partner* or multisector or multi-sector or multi-agency or multiagency or multiprofessional or multi-professional or intraprofressional or intra-professional or interprofessional or inter-professional or transdisciplinary or trans-disciplinary or interdisciplinary or inter-disciplinary or intradisciplinary or intra-disciplinary).tw.65414

17 (multiple adj1 disciplin*).tw. 524

18 (crosssector or cross-sector or across sector or intersector or inter-sector or inter-organi?ation* or cross organi?ation* or across organi?sation* or cross disciplin* or across disciplin*).tw. 1688

19 (interagency or inter-agency).tw. 1526

20 ((sector* or organi?ation* or profession*) adj2 (boundar* or led)).tw. 1018

21 ((nurse* or pharmac* or "social care" or "key worker*") adj2 led).tw. 2288

22 ((integrat* or combined or collaborat*or continuity) adj2 (care* or team* or service* or network* or system*)).tw. 21028

23 (partnership adj2 (work* or training)).tw. 754

24 ("whole system* approach*" or "whole system* working").tw. 71

25 ("managed clinical network*" or "one-stop shop" or "chain of care" or "whole health economy" or "case conferencing").tw. 334

26 ((organi?ation* or care or work*) adj2 model*).tw. 13380

27 or/1-26 414991

28 medication errors/ 10087

29 Inappropriate prescribing/ 649

30 Medication Adherence/ 6771

31 medication therapy management/ 636

32 ((appropriate or optim* or inappropriat* or suboptim* or sub-optim* or unnecessary or incorrect* or in-correct* or excessive or multiple or concurrent* or adher* or compli* or dexter* or inadequate) adj2 (medicine* or medicat* or prescrip* or prescrib* or drug* or vaccin*)).tw. 33239

33 (underdos* or under-dos* or underprescrib* or underprescrip* or (under adj1 prescript*)).tw. 1538

34 (overdos* or over-dos* or overprescrib* or overprescrip* or (over adj1 prescript*)).tw. 14852

35 "medication appropriateness index".tw. 59

36 (quality adj2 (prescrib* or prescrip* or medicat*)).tw. 790

37 (improv* adj2 (prescrib* or prescrip* or pharmaco*)).tw. 3762

38 Prescription drugs/ 2725

39 Drug therapy/ 27732

40 Community pharmacy services/ 2704

41 Pharmacy service, hospital/ 9715

42 Pharmacies/ 3807

43 Pharmaceutical services/ 4153

44 Pharmaceutical care/ 4153

45 or/28-44 112246

46 27 and 45 7840

Additionally searched in Medline-in- Process, CDSR, CENTRAL, DARE, HTA Embase, CINAHL, Social Care Online, Social Policy and Practice, ASSIA, Social Service Abstracts and Sociological Abstracts.

C.1.3 Study design filters

The MEDLINE systematic reviews and RCT search filters that were used for the review questions above are presented below. They were translated for use in the MEDLINE In-Process, Embase , CINAHL, ASSIA, Social Service Abstracts and Sociological Abstracts databases.

C.1.3.1 Systematic reviews filter

1. Meta-Analysis.pt.

2. Meta-Analysis as Topic/

3. Review.pt.

4. exp Review Literature as Topic/

5. (metaanaly$ or metanaly$ or (meta adj3 analy$)).tw.

6. (review$ or overview$).ti.

7. (systematic$ adj5 (review$ or overview$)).tw.

8. ((quantitative$ or qualitative$) adj5 (review$ or overview$)).tw.

9. ((studies or trial$) adj2 (review$ or overview$)).tw.

10. (integrat$ adj3 (research or review$ or literature)).tw.

11. (pool$ adj2 (analy$ or data)).tw.

12. (handsearch$ or (hand adj3 search$)).tw.

13. (manual$ adj3 search$).tw.

14. or/1-13

15. animals/ not humans/

16. 14 not 15

C.1.3.2 RCT filter

1. Randomized Controlled Trial.pt.

2. Controlled Clinical Trial.pt.

3. Clinical Trial.pt.

4. exp Clinical Trials as Topic/

5. Placebos/

6. Random Allocation/

7. Double-Blind Method/

8. Single-Blind Method/

9. Cross-Over Studies/

10. ((random$ or control$ or clinical$) adj3 (trial$ or stud$)).tw.

11. (random$ adj3 allocat$).tw.

12. placebo$.tw.

13. ((singl$ or doubl$ or trebl$ or tripl$) adj (blind$ or mask$)).tw.

14. (crossover$ or (cross adj over$)).tw.

15. or/1-14

16. animals/ not humans/

17. 15 not 16

C.1.4 Economic evaluations and quality of life data

Sources searched to identify economic evaluations

- NHS Economic Evaluation Database – NHS EED (Wiley)
- Health Economic Evaluations Database – HEED (Wiley)
- Embase (Ovid)
- MEDLINE (Ovid)
- MEDLINE In-Process (Ovid)

Health economics studies

Economic searches were undertaken for all review questions. Filters were applied to the clinical search strategy. The searches were carried out within the same time period as the clinical searches.

Health economics filters

The MEDLINE economic evaluations and quality of life search filters are presented below. They were translated for use in the MEDLINE In-Process and Embase databases.

Economic evaluations filter

1. Economics/

2. exp "Costs and Cost Analysis"/

3. Economics, Dental/

4. exp Economics, Hospital/

5. exp Economics, Medical/

6. Economics, Nursing/

7. Economics, Pharmaceutical/

8. Budgets/

9. exp Models, Economic/

10. Markov Chains/

11. Monte Carlo Method/

12. Decision Trees/

13. econom$.tw.

14. cba.tw.

15. cea.tw.

16. cua.tw.

17. markov$.tw.

18. (monte adj carlo).tw.

19. (decision adj3 (tree$ or analys$)).tw.

20. (cost or costs or costing$ or costly or costed).tw.

21. (price$ or pricing$).tw.

22. budget$.tw.

23. expenditure$.tw.

24. (value adj3 (money or monetary)).tw.

25. (pharmacoeconomic$ or (pharmaco adj economic$)).tw.

26. or/1-25

Quality of life filter

1. "Quality of Life"/

2. quality of life.tw.

3. "Value of Life"/

4. Quality-Adjusted Life Years/

5. quality adjusted life.tw.

6. (qaly$ or qald$ or qale$ or qtime$).tw.

7. disability adjusted life.tw.

8. daly$.tw.

9. Health Status Indicators/

10. (sf36 or sf 36 or short form 36 or shortform 36 or sf thirtysix or sf thirty six or shortform thirtysix or shortform thirty six or short form thirtysix or short form thirty six).tw.

11. (sf6 or sf 6 or short form 6 or shortform 6 or sf six or sfsix or shortform six or short form six).tw.

12. (sf12 or sf 12 or short form 12 or shortform 12 or sf twelve or sftwelve or shortform twelve or short form twelve).tw.

13. (sf16 or sf 16 or short form 16 or shortform 16 or sf sixteen or sfsixteen or shortform sixteen or short form sixteen).tw.

14. (sf20 or sf 20 or short form 20 or shortform 20 or sf twenty or sftwenty or shortform twenty or short form twenty).tw.

15. (euroqol or euro qol or eq5d or eq 5d).tw.

16. (qol or hql or hqol or hrqol).tw.

17. (hye or hyes).tw.

18. health$ year$ equivalent$.tw.

19. utilit$.tw.

20. (hui or hui1 or hui2 or hui3).tw.

21. disutili$.tw.

22. rosser.tw.

23. quality of wellbeing.tw.

24. quality of well-being.tw.

25. qwb.tw.

26. willingness to pay.tw.

27. standard gamble$.tw.

28. time trade off.tw.

29. time tradeoff.tw.

30. tto.tw.

31. or/1-30

C.2 Review questions and review protocols

C.2.1 Identifying, reporting and learning from medicines-related patient safety incidents

	Details
Review question a)	What systems for identifying, reporting and learning from medicines-related patient safety incidents are effective and cost-effective in reducing medicines-related patient safety incidents, compared to usual care?
Objectives	To determine the effectiveness and cost-effectiveness of systems for identifying, reporting and learning from medicines-related patient safety incidents to reduce medicines-related patient safety incidents, compared to usual care. Medicines-related patient safety incidents are **unintended or unexpected incidents** that were specifically related to medicines use, which could have, or did, lead to patient harm. These include: • potentially avoidable medicines-related hospital admissions and re-admissions • prescribing errors • dispensing errors • administration errors • monitoring errors • potentially avoidable adverse events • missed doses of medicines • near misses (a prevented medicines-related patient safety incident which could have led to patient harm)
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials

	• Observational studies
Status	Published papers only (full text) If insufficient evidence is available progress to: Conference abstracts
Population	All children, young people and adults using medicines.
Intervention	Systems for identifying, reporting and learning from medicines-related patient safety incidents including, but not limited to: • Pharmacist-led information technology intervention (PINCER) • National Reporting and Learning System (NRLS) • Significant event audits • Medication safety thermometer • Serious incident reporting • Computerised alert systems • Root cause analysis • STOPP/START screening tool • Beers criteria
Comparator	Standard care, usual care or no intervention
Outcomes	Critical outcomes: • Mortality • Patient reported outcomes, such as medicines adherence, patient experience and patient satisfaction • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste Important outcomes: • Clinical outcomes as reported in the study • Health and social care utilisation • Planned and unplanned contacts • Health and social care related quality of life, for example long-term harm, disability
Other criteria for inclusion / exclusion of studies	Exclusion: • Papers published before 2000 • Studies investigating the causes or prevalence of medicines-related patient safety incidents • Studies investigating patient safety incidents (including hospital admissions and re-admissions, errors and near misses) that are not directly related to medicines use, for example due to inadequate staffing levels • Studies investigating expected or predicted medicines-related patient safety incidents • Studies investigating adverse effects that are not potentially avoidable
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:** Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.

Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Polypharmacy and medicines optimisation: making it safe and sound **Observational studies** GMC. An in depth investigation into causes of prescribing errors by foundation trainees in relation to their medical education – EQUIP study (2009) The King's Fund. Polypharmacy and medicines optimisation: making it safe and sound (2013)
Identified papers from scoping search that addresses the review question	**Systematic reviews** Interventions to reduce medication errors in adult intensive care: a systematic review (Provisional abstract) (2012) Lainer M, Mann E, Sönnichsen A. Information technology interventions to improve medication safety in primary care: a systematic review. Int J Qual Health Care (2013) 25 (5): 590-598 Interventions to optimise prescribing for older people in care homes (2013) **RCTs** NHS EED. A pharmacist led information technology intervention for medication errors (PINCER): a multicentre, cluster randomised, controlled trial and cost effectiveness analysis (Structured abstract) (2012) **Observational studies** GMC. Investigating the prevalence and causes of prescribing errors in general practice: The PRACtICe study. A report for the GMC (2012) Cousins DH, Gerrett D, Warner B. A review of medication incidents reported to the National Reporting and Learning System in England and Wales over 6 years (2005-2010). Br J Clin Pharmacol. 2012 Oct;74(4):597-604 A tiered approach is more cost-effective than traditional pharmacist-based review for classifying computer-detected signals as adverse events. (2013) **Others** NHS EED. Modelling the expected net benefits of interventions to reduce the burden of medication errors (Structured abstract) (2008) Mitigation of medication mishaps via medication therapy management (Provisional abstract) (2009) On ward participation of a hospital pharmacist in a Dutch intensive care unit reduces prescribing errors and related patient harm: an intervention study (Provisional abstract) (2010) Reported medication errors in the community residences for Individuals with mental retardation: a quality review (1999)

C.2.2 Medicines-related communication systems when patients move from one care setting to another

	Details
Review question i)	What communication systems are effective and cost-effective in reducing sub-optimal use of medicines and improving patient outcomes from medicines when patients move from one care setting to another, compared to usual care, or other intervention?
Objectives	To determine the effectiveness and cost-effectiveness of communication systems in reducing sub-optimal use of medicines and improving patient outcomes from medicines when patients move from one care setting to another, compared to usual care, or other intervention. Patient's moving from one care setting to another includes, but is not limited

	to: • Transfer to or from hospital • Transfer from one hospital ward to another, or to theatre • Transfer to or from respite care Communication systems relating to medicines may be electronic, written or verbal and includes, but is not limited to: • Discharge summaries • Discharge counselling • Immediate discharge letters • Summary care records • Standard templates/core datasets • Patient handheld records • Patient 'passports' • Telemedicine • Case meetings Sub-optimal use of medicines includes, but is not limited to: • sub-optimal prescribing • inappropriate prescribing • poor prescribing • over-prescribing • under-prescribing • unnecessary prescribing • inadequate prescribing • under-dosing • over-dosing • patient choice/intentional non-adherence • inability of patient to use medicines as intended, for example due to dexterity problems
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand. If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text)
Population	All children, young people and adults using medicines.
Intervention	Communication systems
Comparator	Standard care, usual care, no intervention or other intervention
Outcomes	Critical outcomes: • Mortality • Clinical outcomes as reported in the study • Health and social care utilisation • Patient reported outcomes, such as medicines adherence, concordance,

	compliance, patient experience and patient satisfaction Important outcomes: • Practitioner reported outcomes, such as reduced workload, professional satisfaction • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste • Health and social care related quality of life for example long-term harm, disability • Sub-optimal medicines use
Other criteria for inclusion / exclusion of studies	Exclusion: • Papers published before 2000 • Communication systems that are not medicines-related or reproducible.
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:** Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Royal Pharmaceutical Society(2013) Medicines Optimisation: Helping patients to make the most of medicines Royal Pharmaceutical Society (2012) Keeping patients safe when they transfer between care providers – getting the medicines right. Good practice guidance for health professionals.
Identified papers from scoping search that addresses the review question	**Systematic review** Improving patient handovers from hospital to primary care (2012) **Economic evaluation** A cost effectiveness evaluation of hospital discharge counseling by pharmacists (Provisional abstract) (2012) **Other** Enabling medication management through health information technology (2011) Agency for Healthcare Research and Quality

C.2.3 Medicines reconciliation

	Details
Review question c)	What is the effectiveness and cost-effectiveness of medicines reconciliation to reduce sub-optimal use of medicines and medicines-related patient safety incidents, compared to usual care?
Objectives	To determine the effectiveness and cost-effectiveness of medicines reconciliation to reduce sub-optimal use of medicines and medicines-related patient safety incidents, compared to usual care. Medicines reconciliation is defined as: 'the process of identifying the most accurate list of a patient's current medicines – including the name, dosage,

	frequency and route – and comparing them to the current list in use, recognising any discrepancies, and documenting any changes, thus resulting in a complete list of medications, accurately communicated' (Institute for Healthcare Improvement). Sub-optimal use of medicines includes, but is not limited to: • sub-optimal prescribing • inappropriate prescribing • poor prescribing • over-prescribing • under-prescribing • unnecessary prescribing • inadequate prescribing • under-dosing • over-dosing • patient choice/intentional non-adherence • inability of patient to use medicines as intended, for example due to dexterity problems Medicines-related patient safety incidents are unintended or unexpected incidents that were specifically related to medicines use, which could have, or did, lead to patient harm. These include: • potentially avoidable medicines-related hospital admissions and re admissions • prescribing errors • dispensing errors • administration errors • monitoring errors • potentially avoidable adverse events • missed doses of medicines • near misses (a prevented medicines related patient safety incident which could have led to patient harm)
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text) If insufficient evidence is available progress to: Conference abstracts
Population	All children, young people and adults using medicines
Intervention	Medicines reconciliation, as defined above
Comparator	No intervention
Outcomes	Critical outcomes: • Mortality • Medicines-related problems, such as potentially avoidable hospital admissions and

	re admissions, errors, potentially avoidable adverse effects and medicines waste • Patient reported outcomes, such as medicines adherence, patient experience and patient satisfaction Important outcomes: • Clinical outcomes as reported in the study • Health and social care utilisation • Planned and unplanned contacts • Health and social care related quality of life
Other criteria for inclusion / exclusion of studies	Exclusion: • Papers published before 2000 • Studies investigating patient safety incidents (including hospital admissions and re admissions, errors and near misses) that are not related to medicines use, for example inadequate staffing levels • Studies investigating specific named medicines • Studies investigating shared care arrangements for medicines used across primary and secondary care. • Studies primarily investigating patient education in relation to medicines reconciliation • Studies primarily investigating education and training of health and social care practitioners in relation to medicines reconciliation
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:** Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Technical patient safety solutions for medicines reconciliation on admission of adults to hospital. NICE patient safety guidance 1 (2007) National Prescribing Centre. Medicines reconciliation: a guide to implementation (2008) The King's Fund. Polypharmacy and medicines optimisation: making it safe and sound
Identified papers from scoping search that addresses the review question	**Systematic reviews** CRD. Pharmacy led medicine reconciliation (MR) services in hospital care: a systematic review (2012) Hospital-based medication reconciliation practices (2012) Nurse pharmacist collaboration on medication reconciliation prevents potential harm (Provisional abstract) (2012) **RCTs** A randomized controlled trial of a pharmacist consultation program for family physicians and their elderly patients (Structured abstract) (2003) **Observational study** Brownlee K, et al. Medication reconciliation by a pharmacy technician in a mental health assessment unit. Int J Clin Pharm (November 2013)

C.2.4 Medication review

	Details
Review question b)	What is the effectiveness and cost-effectiveness of medication reviews to reduce sub-optimal use of medicines and medicines-related patient safety incidents, compared to usual care?
Objectives	To determine the effectiveness and cost effectiveness of medication reviews to reduce sub-optimal use of medicines and medicines-related patient safety incidents, compared to usual care. Medication review is defined as: 'a structured, critical examination of a patient's medicines with the objective of reaching an agreement with the patient about treatment, optimising the impact of medicines, minimising the number of medication-related problems and reducing waste' (NPC 2008). This includes, but is not limited to: • multidisciplinary medication reviews • medicines use reviews • clinical medication reviews • opportunistic (ad-hoc) medication reviews Sub-optimal use of medicines includes, but is not limited to: • sub-optimal prescribing • inappropriate prescribing • poor prescribing • over-prescribing • under-prescribing • unnecessary prescribing • inadequate prescribing • under-dosing • over-dosing • patient choice/intentional non-adherence • inability of patient to use medicines as intended, for example due to dexterity problems Medicines-related patient safety incidents are **unintended or unexpected incidents** that were specifically related to medicines use, which could have, or did, lead to patient harm. These include: • potentially avoidable medicines-related hospital admissions and re admissions • prescribing errors • dispensing errors • administration errors • monitoring errors • potentially avoidable adverse events • missed doses of medicines • near misses (a prevented medicines related patient safety incident which could have led to patient harm)
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar

	developed health systems, for example Australia, Canada and New Zealand If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text) If insufficient evidence is available progress to: Conference abstracts
Population	• All children, young people and adults using medicines • All children, young people and adults who are receiving sub-optimal benefit from medicines, for example, not receiving a medicine when they should or could benefit from medicines, or receiving a sub-optimal dose of a medicine.
Intervention	Medication reviews (as defined above) including, but not limited to: • multidisciplinary medication reviews • medicines use reviews • clinical medication reviews • opportunistic (ad-hoc) medication reviews
Comparator	No intervention
Outcomes	Critical outcomes: • Mortality • Clinical outcomes as reported in the study • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste • Patient reported outcomes, such as medicines adherence, concordance, compliance, patient experience and patient satisfaction Important outcomes: • Health and social care utilisation • Planned and unplanned contacts • Health and social care related quality of life for example long-term harm, disability
Other criteria for inclusion / exclusion of studies	Exclusion: • Papers published before 2000 • Studies investigating patient safety incidents (including hospital admissions and re admissions, errors and near misses) that are not specifically related to medicines use, for example due to inadequate staffing levels • Studies investigating specific named medicines • Studies that primarily investigate patient education in relation to medication reviews • Studies that primarily investigate education and training of health and social care practitioners in relation to medication reviews
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible.

	Synthesis of data: Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** NICE. Medicines Adherence CG76 (2009) Department of Health Action plan for improving the use of medicines and reducing waste (2012) National Prescribing Centre. A guide to medication review (2008) Royal Pharmaceutical Society. Medicines Optimisation: Helping patients to make the most of medicines (2013) The King's Fund. Polypharmacy and medicines optimisation: making it safe and sound (2013)
Identified papers from scoping search that addresses the review question	**Systematic reviews** Interventions to optimise prescribing for older people in care homes (2013) Medication review in hospitalised patients to reduce morbidity and mortality (2013) Consumer-oriented interventions for evidence-based prescribing and medicines use: an overview of systematic reviews (2012) Interventions to improve the appropriate use of polypharmacy for older people (2012) Does pharmacist-led medication review help to reduce hospital admissions and deaths in older people: a systematic review and meta-analysis (Structured abstract) (2008) Clinical pharmacists and inpatient medical care: a systematic review Is pharmacist-led medication review effective for chronic pain management among adult patients? A systematic review Reduction of polypharmacy in the elderly: a systematic review of the role of the pharmacist (Structured abstract) (2003) **RCTs** Clinical medication review by a pharmacist of elderly people living in care homes: randomised controlled trial (Structured abstract) Targeting suboptimal prescribing in the elderly: a review of the impact of pharmacy services (Structured abstract) **Economic evaluations** Community pharmacy based provision of pharmaceutical care to older patients (Structured abstract) Health economic evaluation of the Lund Integrated Medicines Management Model (LIMM) in elderly patients admitted to hospital (2013) The MEDMAN study: a randomized controlled trial of community pharmacy led medicines management for patients with coronary heart disease (Structured abstract) **Observational study** Multidisciplinary medication review: evaluation of a pharmaceutical care model for nursing homes (2011) Pharmacy management intervention for optimising drug therapy for nursing home patients (2004) **Other** Multidisciplinary case conference reviews: improving outcomes for nursing home residents, carers and health professionals (2001)

C.2.5 Self-management plans

	Details
Review question f)	What is the effectiveness and cost-effectiveness of using self-management plans to improve patient outcomes from medicines, compared to usual care?
Objectives	To determine the effectiveness and cost-effectiveness of using self-management plans to improve patient outcomes from medicines, compared to usual care. For the purpose of this review question, self-management plans are structured, documented plans that are developed to support an individual patient's self-management of their condition. Self-management plans are often used for patients with specific long-term conditions, such as asthma or chronic obstructive pulmonary disease. It includes patient or profession-led self-management plans.
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand. If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text)
Population	All children, young people and adults using medicines.
Intervention	Self-management plan
Comparator	Standard care, usual care or no intervention
Outcomes	Critical outcomes: • Mortality • Clinical outcomes as reported in the study • Health and social care utilisation • Patient reported outcomes, such as medicines adherence, concordance, compliance, patient experience and patient satisfaction Important outcomes: • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste • Health and social care related quality of life for example improved management of long-term condition
Other criteria for inclusion / exclusion of studies	Inclusion: • Self-management plans • Self-monitoring plans • Action plans/individualised action plans Exclusion: • Papers published before 2000 • Self-management plans that are not medicines-related • Multi-faceted interventions in which a self-management plan is combined

	with other elements such as an education programme, exercise programme or outreach visits • Self-management plans that are not documented or not reproducible, such as verbal self-management information • Other self-management support interventions that do not include use of a self-management plan, such as monitored dosage systems, compliance aids or self-management education programmes.
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:** Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Medicines Adherence CG76 Towards personalising medicines management
Identified papers from scoping search that addresses the review question	**Systematic reviews** Consumer-oriented interventions for evidence-based prescribing and medicines use: an overview of systematic reviews (2012) What are the most clinically effective and cost-effective methods of addressing patient and carer concerns about strong opioids, including anticipating and managing adverse effects and engaging patients in prescribing decisions? A systematic review of quantitative and qualitative research on the role and effectiveness of written information available to patients about individual medicines (2007) The impact of informing psychiatric patients about their medication: a systematic review (Structured abstract) (2006) Inpatient pharmacist interventions: impact on ED visits, readmissions, length of stay, mortality, patient knowledge, medication adherence, and patient satisfaction (Structured abstract) (2012) The effect of medicine self-management programmes on hospital patient self-administration: a systematic review of the literature

C.2.6 Patient decision aids used in consultations about medicines

	Details
Review question e)	What is the effectiveness and cost-effectiveness of using patient decision aids in consultations involving medicines use to improve patient outcomes, compared to usual care or other intervention?
Objectives	To determine the effectiveness and cost-effectiveness of using patient decision aids in consultations involving medicines use to improve patient outcomes, compared to usual care. A patient decision aid is an intervention designed to support patients' decision-making by providing information about treatment or screening options and their associated outcomes, compared to usual care and/or alternative interventions. They describe the options available and help

	people to understand these options as well as the possible benefits and harms. This allows patients to consider the options from a personal view, prepares them to participate with their health professional in making a decision. Patient decision aids may be electronic or paper-based tools.
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand. If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text)
Population	All children, young people and adults using medicines.
Intervention	Patient decision aid, as described above.
Comparator	Standard care, usual care, no intervention or other intervention
Outcomes	Critical outcomes: • Mortality • Clinical outcomes as reported in the study • Health and social care utilisation • Patient reported outcomes, such as medicines adherence, concordance, compliance, patient experience and patient satisfaction Important outcomes: • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste • Health and social care related quality of life for example long-term harm, disability.
Other criteria for inclusion / exclusion of studies	Inclusion: • Patient decision aid • Shared decision aid • Decision grid/option grid Exclusion: • Papers published before 2000 • Patient decision aids in which participants are not making an active treatment decision about a medicine, such as patient decision aids for screening or diagnostic tests • Compliance aids • Patient information leaflets • Health education materials
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible.

	Synthesis of data: Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Medicines Adherence CG76 Polypharmacy and medicines optimisation: making it safe and sound
Identified papers from scoping search that addresses the review question	**Systematic reviews** Consumer-oriented interventions for evidence-based prescribing and medicines use: an overview of systematic reviews (2012) What are the most clinically effective and cost-effective methods of addressing patient and carer concerns about strong opioids, including anticipating and managing adverse effects and engaging patients in prescribing decisions? A systematic review of quantitative and qualitative research on the role and effectiveness of written information available to patients about individual medicines (2007) The impact of informing psychiatric patients about their medication: a systematic review (Structured abstract) (2006)

C.2.7 Clinical decision support

	Details
Review question d)	What is the effectiveness and cost-effectiveness of using clinical decision support to reduce sub-optimal use of medicines and improve patient outcomes from medicines, compared to usual care or other intervention?
Objectives	To determine the effectiveness and cost-effectiveness of clinical decision support to reduce sub-optimal use of medicines and improve patient outcomes from medicines, compared to usual care or other interventions. For the purpose of this review question, clinical decision support is an active, computerised intervention that occurs at the time and location of prescribing, to support prescribers with decision-making. Sub-optimal use of medicines includes, but is not limited to: • sub-optimal prescribing • inappropriate prescribing • poor prescribing • over-prescribing • under-prescribing • unnecessary prescribing • inadequate prescribing • under-dosing • over-dosing • patient choice/intentional non-adherence • inability of patient to use medicines as intended, for example due to dexterity problems.
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs

	• National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand. If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text)
Population	All children, young people and adults using medicines.
Intervention	Clinical decision support, as described above.
Comparator	Standard care, usual care, no intervention or other intervention
Outcomes	Critical outcomes: • Mortality • Clinical outcomes as reported in the study • Health and social care utilisation • Patient reported outcomes, such as medicines adherence, concordance, compliance, patient experience and patient satisfaction Important outcomes: • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste • Health and social care related quality of life for example long-term harm, disability • Sub-optimal medicines use
Other criteria for inclusion / exclusion of studies	Inclusion: • Clinical decision support • Computerised decision support Exclusion: • Papers published before 2000 • Patient-decision aids / shared-decision aids • Clinical decision support that does not occur at the time and location of prescribing. • Passive interventions at the point of prescribing e.g. use of evidence resources on medicines • Electronic prescribing, unless it specifically considers clinical decision support integrated within electronic prescribing systems • Computerised physician order entry systems, unless it specifically considers clinical decision support • Near patient testing • Remote patient monitoring
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:** Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data

	cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Polypharmacy and medicines optimisation: making it safe and sound **Systematic reviews** A tiered approach is more cost effective than traditional pharmacist based review for classifying computer detected signals as adverse drug events (Structured abstract)
Identified papers from scoping search that addresses the review question	**Systematic reviews** Computerized clinical decision support systems for drug prescribing and management: a decision maker researcher partnership systematic review (Structured abstract) (2011) The impact of pharmacy computerised clinical decision support on prescribing, clinical and patient outcomes: a systematic review of the literature (Structured abstract) (2010) Interventions to improve the appropriate use of polypharmacy for older people (2012) Computerized advice on drug dosage to improve prescribing practice (2008) A systematic review of the social and cognitive influences on prescribing decision-making among non-medical prescribers **Observational studies** Measuring prevalence, reliability and variation in high risk prescribing in general practice using multilevel modelling in a population database (2011) **Other** Enabling medication management through health information technology (2011) Agency for Healthcare Research and Quality

C.2.8 Medicines-related models of organisational and cross-sector working

	Details
Review question g)	What models of organisational and cross-sector working are effective and cost-effective in reducing sub-optimal use of medicines and improving patient outcomes from medicines, compared to usual care, or other intervention?
Objectives	To determine the effectiveness and cost-effectiveness of models of organisational and cross-sector working in reducing sub-optimal use of medicines and improving patient outcomes from medicines, compared to usual care. For the purpose of this review question, this includes, but is not limited to: • Health profession-led working • Social care practitioner-led working, e.g. a key worker or care co-ordinator • Multidisciplinary team-led working • Cross-sector working between health and social care providers • Cross-sector working between healthcare and pharmaceutical or homecare industries. Sub-optimal use of medicines includes, but is not limited to: • sub-optimal prescribing • inappropriate prescribing • poor prescribing • over-prescribing • under-prescribing

	• unnecessary prescribing • inadequate prescribing • under-dosing • over-dosing • patient choice/intentional non-adherence • inability of patient to use medicines as intended, for example due to dexterity problems.
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand. If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text)
Population	All children, young people and adults using medicines.
Intervention	Profession-led or multidisciplinary team-led working, including but not limited to those as described above.
Comparator	Standard care, usual care or no intervention, or other intervention
Outcomes	Critical outcomes: • Mortality • Clinical outcomes as reported in the study • Health and social care utilisation • Patient reported outcomes, such as medicines adherence, concordance, compliance, patient experience and patient satisfaction Important outcomes: • Practitioner reported outcomes, such as reduced workload, professional satisfaction • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste • Health and social care related quality of life for example long-term harm, disability • Sub-optimal medicines use
Other criteria for inclusion / exclusion of studies	Exclusion: • Papers published before 2000 • Studies not designed to consider the review question, such as studies that were primarily set up to measure the effect of an intervention, not how the intervention was delivered
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:**

	Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Royal Pharmaceutical Society(2013) Medicines Optimisation: Helping patients to make the most of medicines
Identified papers from scoping search that addresses the review question	**Systematic reviews** Interventions to optimise prescribing for older people in care homes (2013) Interventions to improve the appropriate use of polypharmacy for older people (2012) Effect of outpatient pharmacists' non-dispensing roles on patient outcomes and prescribing patterns (2010) US pharmacists' effect as team members on patient care: systematic review and meta analyses (Structured abstract) (2010) Targeting suboptimal prescribing in the elderly: a review of the impact of pharmacy services (Structured abstract) (2009) Does pharmacist-led medication review help to reduce hospital admissions and deaths in older people: a systematic review and meta-analysis (Structured abstract) (2008) Clinical pharmacists and inpatient medical care: a systematic review (Structured abstract) (2006) Reduction of polypharmacy in the elderly: a systematic review of the role of the pharmacist (Structured abstract) (2003) Inpatient pharmacist interventions: impact on ED visits, readmissions, length of stay, mortality, patient knowledge, medication adherence, and patient satisfaction (Structured abstract) (2012) Is pharmacist-led medication review effective for chronic pain management among adult patients? A systematic review Pharmacy led medicine reconciliation (MR) services in hospital care: a systematic review Nurse pharmacist collaboration on medication reconciliation prevents potential harm (Provisional abstract) (2012) How effective and cost-effective are pharmacy-based minor ailments schemes? A systematic review Evaluating the impact of pharmacists in mental health: a systematic review (Provisional abstract) (2003) Interventions of hospital pharmacists in improving drug therapy in children a systematic literature review (Provisional abstract) (2006) **RCTs** Clinical pharmacists on medical care of pediatric inpatients: A single center randomized controlled trial (Provisional abstract) (2012) The MEDMAN study: a randomized controlled trial of community pharmacy led medicines management for patients with coronary heart disease (Structured abstract) (2007) Clinical medication review by a pharmacist of elderly people living in care homes: randomised controlled trial (Structured abstract) (2006) **Economic evaluations** A cost effectiveness analysis of an in hospital clinical pharmacist service (Provisional abstract) (2012) On ward participation of a hospital pharmacist in a Dutch intensive care unit reduces prescribing errors and related patient harm: an intervention study (Provisional abstract) (2010)

	Clinical and economic outcomes of medication therapy management services: the Minnesota experience (Provisional abstract) (2008) Community pharmacy based provision of pharmaceutical care to older patients (Structured abstract) (2003) Health economic evaluation of the Lund Integrated Medicines Management Model (LIMM) in elderly patients admitted to hospital (2013) A cost effectiveness evaluation of hospital discharge counseling by pharmacists (Provisional abstract) (2012) Evaluating the impact of pharmacists in mental health: a systematic review (Provisional abstract) (2003)

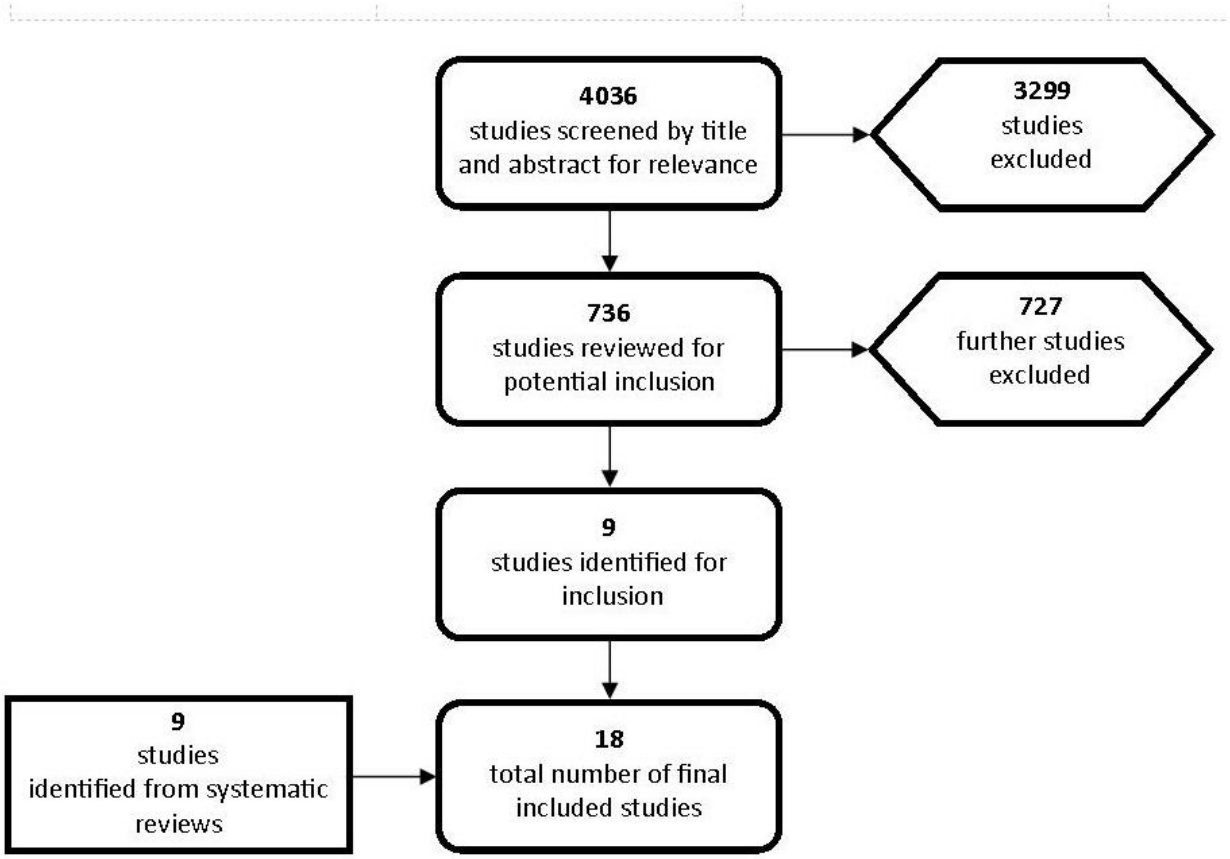
C.2.9 Economic review protocol

Review question	**All questions – health economic evidence**
Objectives	To identify economic evaluations relevant to the review questions
Criteria	• Populations, interventions and comparators must be as specified in the individual review protocols above. • Studies must be of a relevant economic study design (cost–utility analysis, cost–benefit analysis, cost-effectiveness analysis, cost–consequence analysis, comparative cost analysis). • Studies must not be an abstract only, a letter, editorial or commentary, or a review of economic evaluations.[(a)] Unpublished reports will not be considered unless submitted as part of a call for evidence. • Studies must be in English.
Search strategy	An economic study search will be undertaken using an economic study filter – see Appendix C.1.
Review strategy	Each study fulfilling the criteria above will be assessed for applicability and methodological limitations using the NICE economic evaluation checklist which can be found in Appendix G of the NICE guidelines manual (2012). **Inclusion and exclusion criteria** • If a study is rated as both 'Directly applicable' and with 'Minor limitations' then it will be included in the guideline. An economic evidence table will be completed and it will be included in the economic evidence profile. • If a study is rated as either 'Not applicable' or with 'Very serious limitations' then it will usually be excluded from the guideline. If it is excluded then an economic evidence table will not be completed and it will not be included in the economic evidence profile. • If a study is rated as 'Partially applicable', with 'Potentially serious limitations' or both then there is discretion over whether it should be included. **Where there is discretion** The health economist will make a decision based on the relative applicability and quality of the available evidence for that question, in discussion with the GDG if required. The ultimate aim is to include studies that are helpful for decision-making in the context of the guideline and the current NHS setting. If several studies are considered of sufficiently high applicability and methodological quality that they could all be included, then the health economist, in discussion with the GDG if required, may decide to include only the most applicable studies and to selectively exclude the remaining studies. All studies excluded on the basis of applicability or methodological limitations will be listed with explanation as excluded economic studies in Appendix C.6. The health economist will be guided by the following hierarchies. *Setting:* • UK NHS • OECD countries with predominantly public health insurance systems (for example, France, Germany, Sweden) • OECD countries with predominantly private health insurance systems (for example, USA, Switzerland) • non-OECD settings (always 'Not applicable').

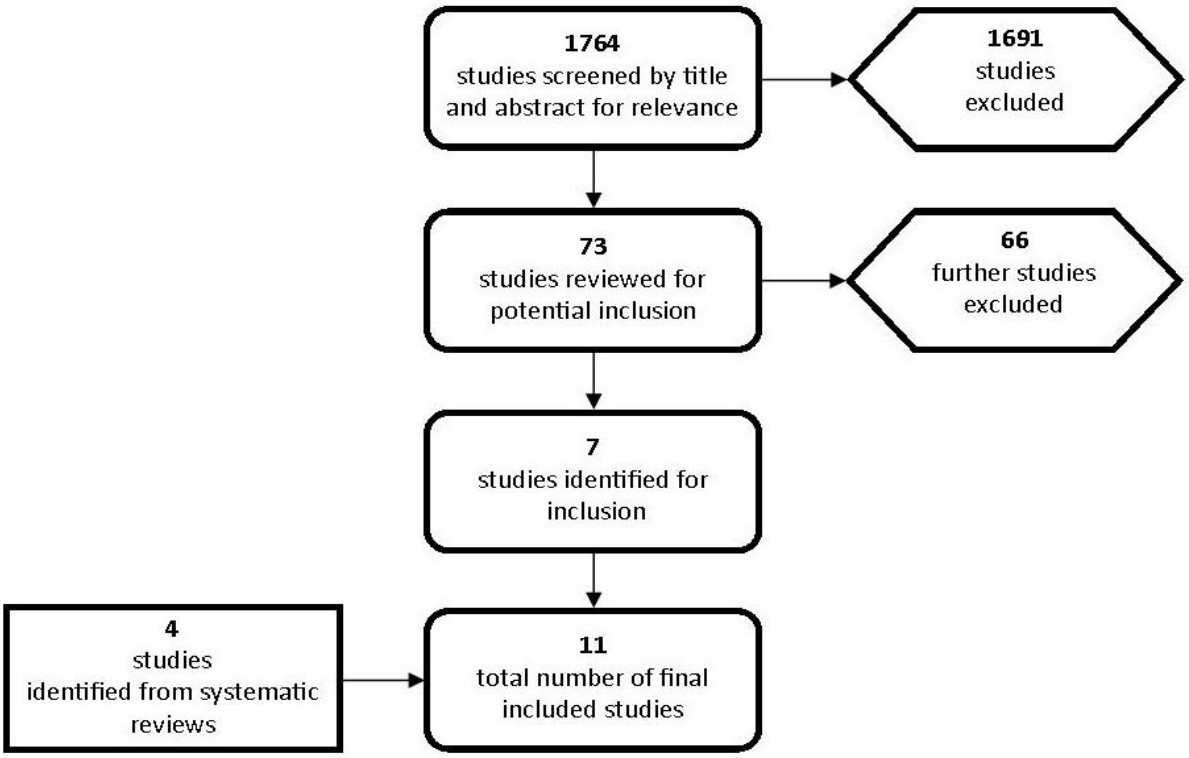
	Economic study type: • cost–utility analysis • other type of full economic evaluation (cost–benefit analysis, cost-effectiveness analysis, cost–consequence analysis) • comparative cost analysis • non-comparative cost analyses including cost-of-illness studies (always 'Not applicable'). *Year of analysis:* • The more recent the study, the more applicable it is. *Quality and relevance of effectiveness data used in the economic analysis:* • The more closely the effectiveness data used in the economic analysis matches with the outcomes of the studies included in the clinical review the more useful the analysis will be for decision-making in the guideline.

C.3 Clinical consort diagrams

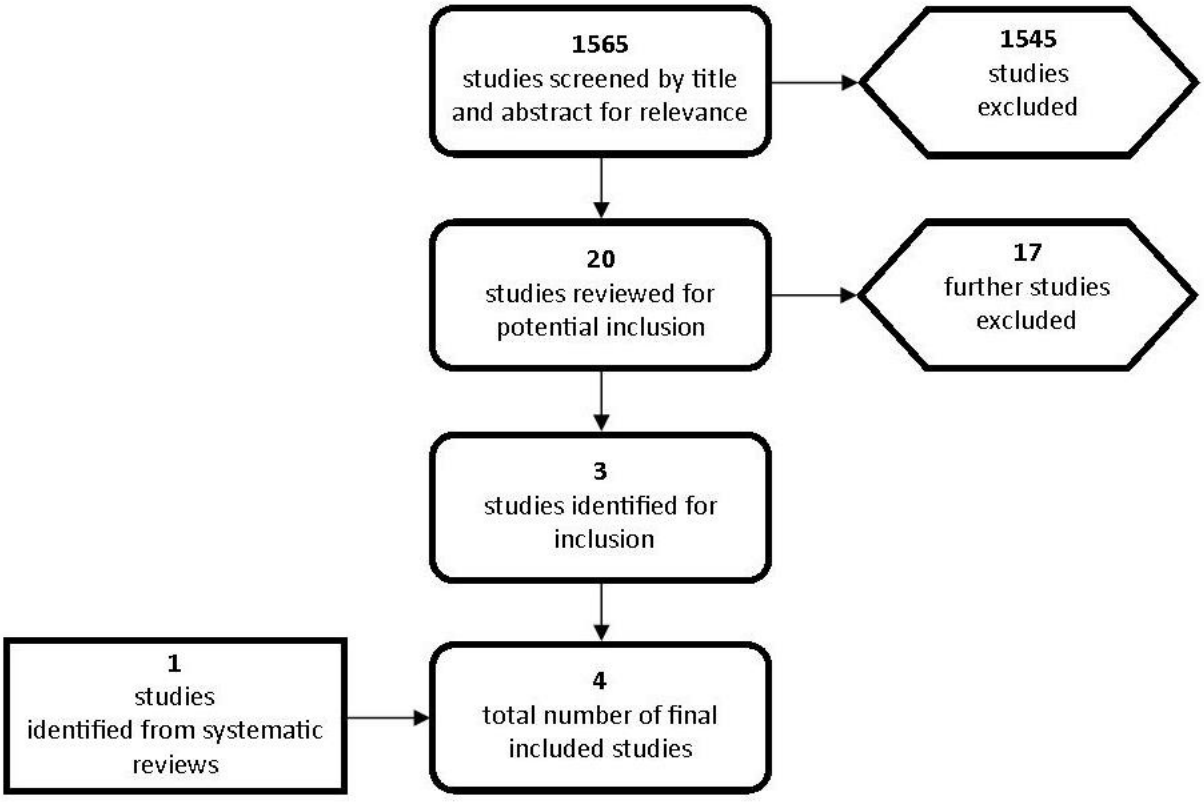
C.3.1 Identifying, reporting and learning from medicines-related patient safety incidents



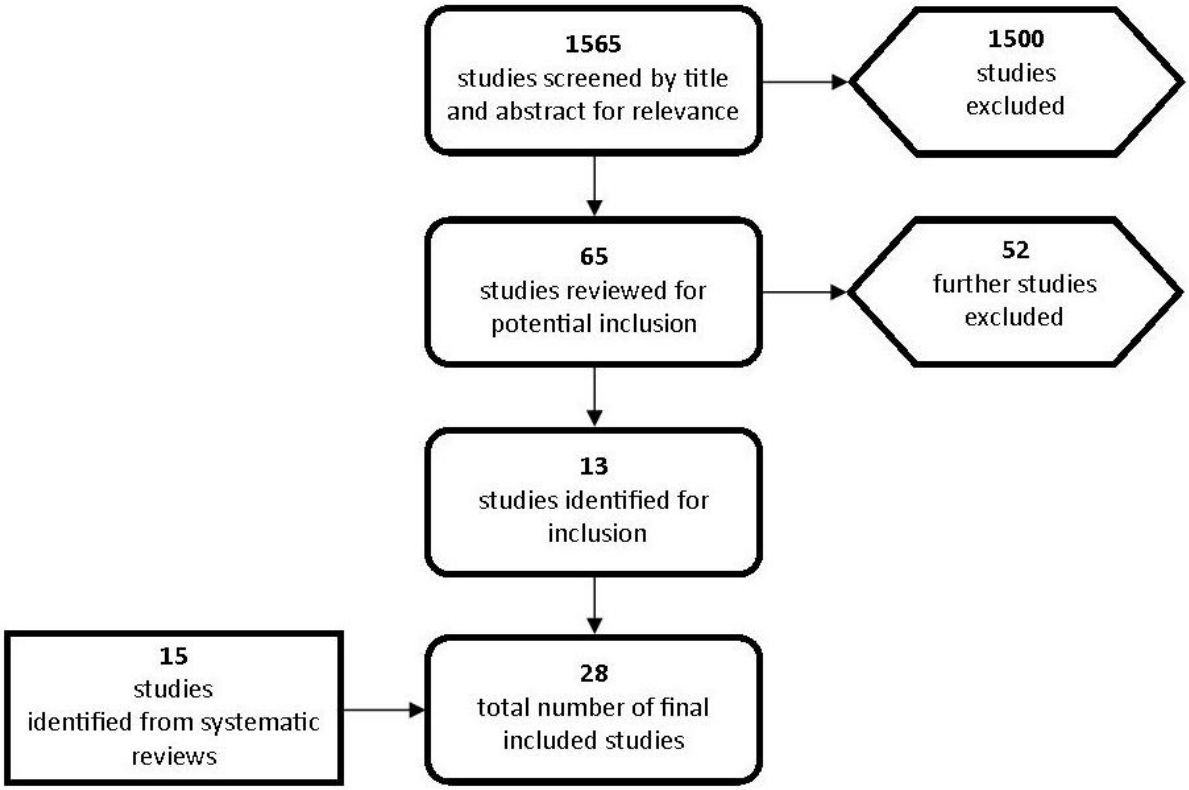
C.3.2 Medicines-related communication systems when patients move from one care setting to another



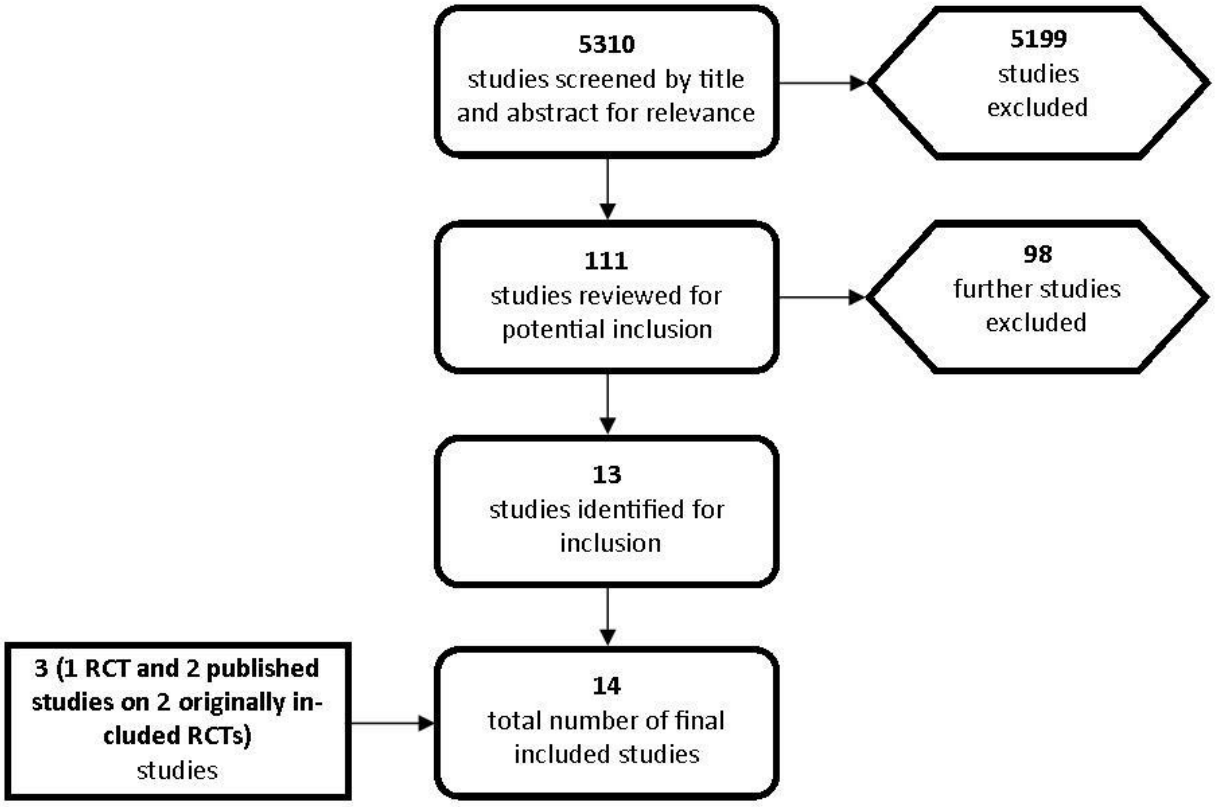
C.3.3 Medicines reconciliation



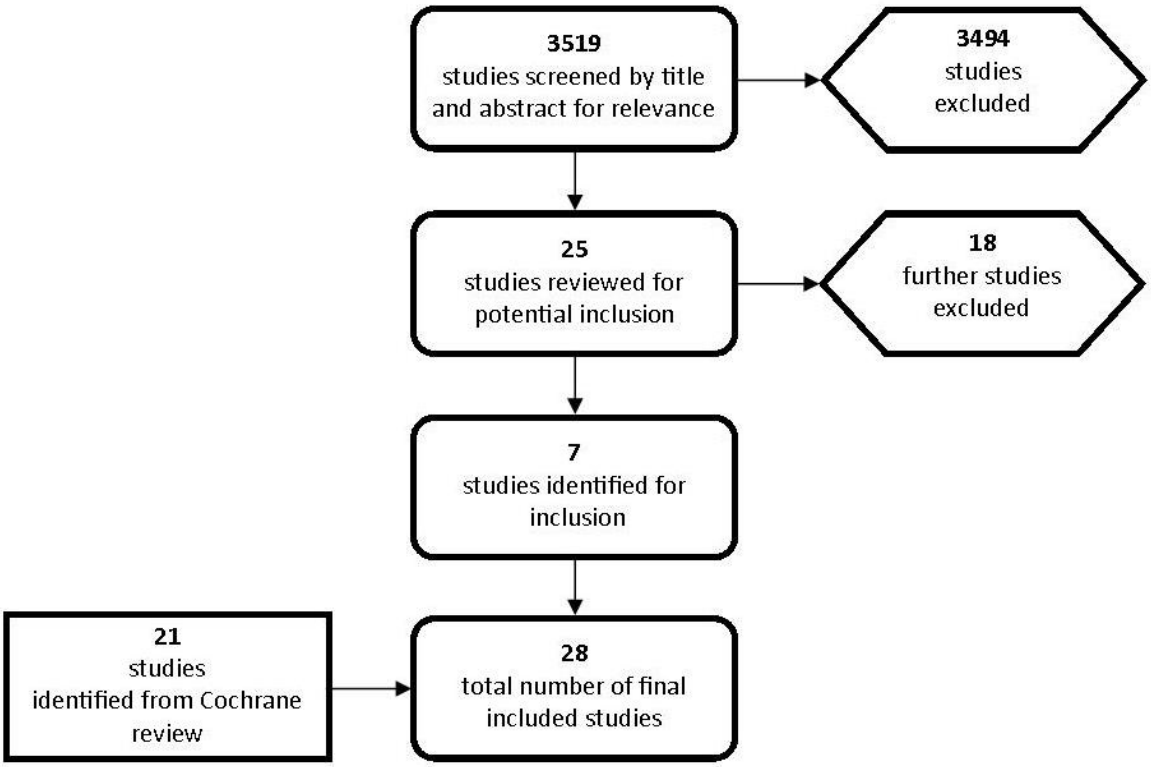
C.3.4 Medication review



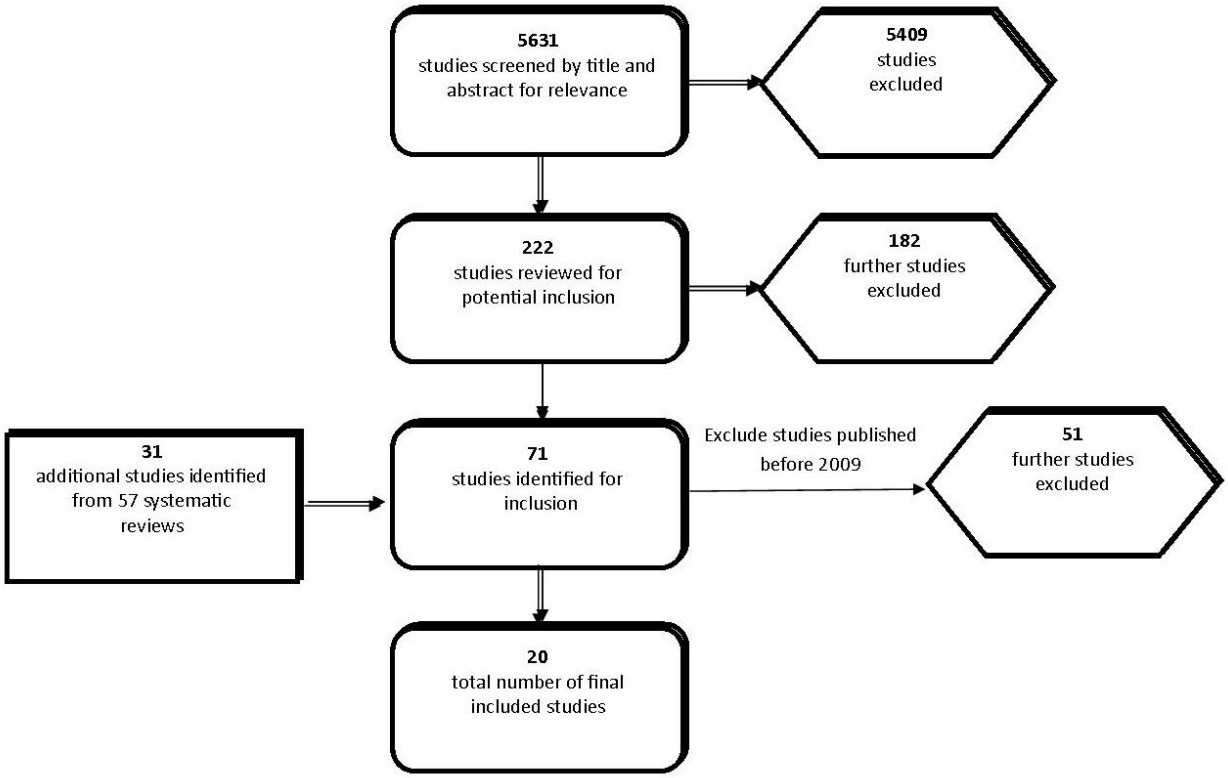
C.3.5 Self-management plans



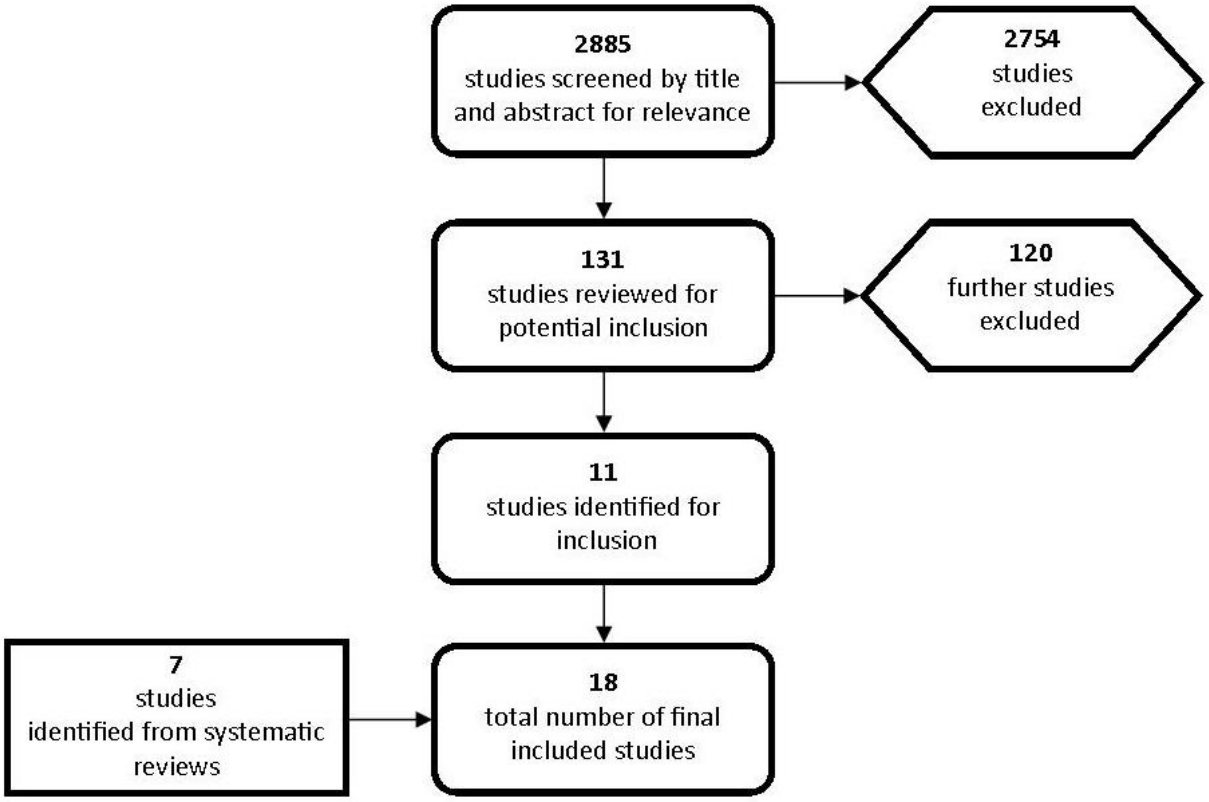
C.3.6 Patient decision aids used in consultations about medicines



C.3.7 Clinical decision support

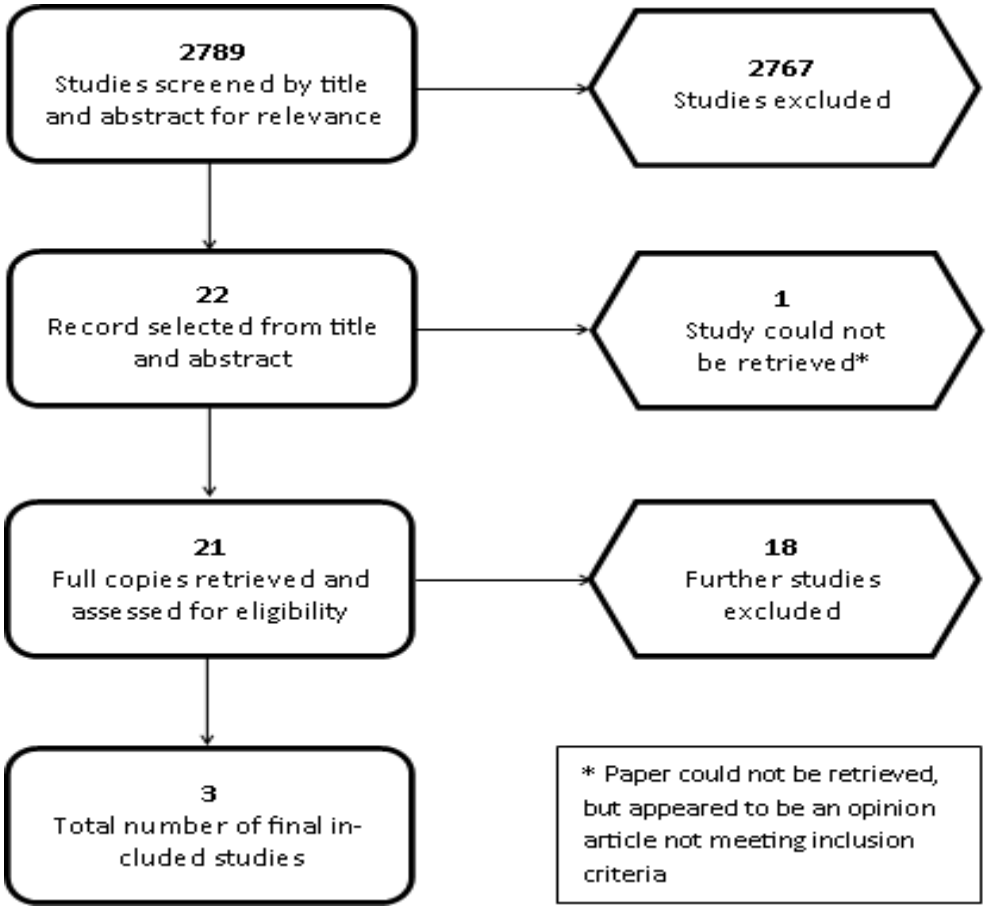


C.3.8 Medicines-related models of organisational and cross-sector working

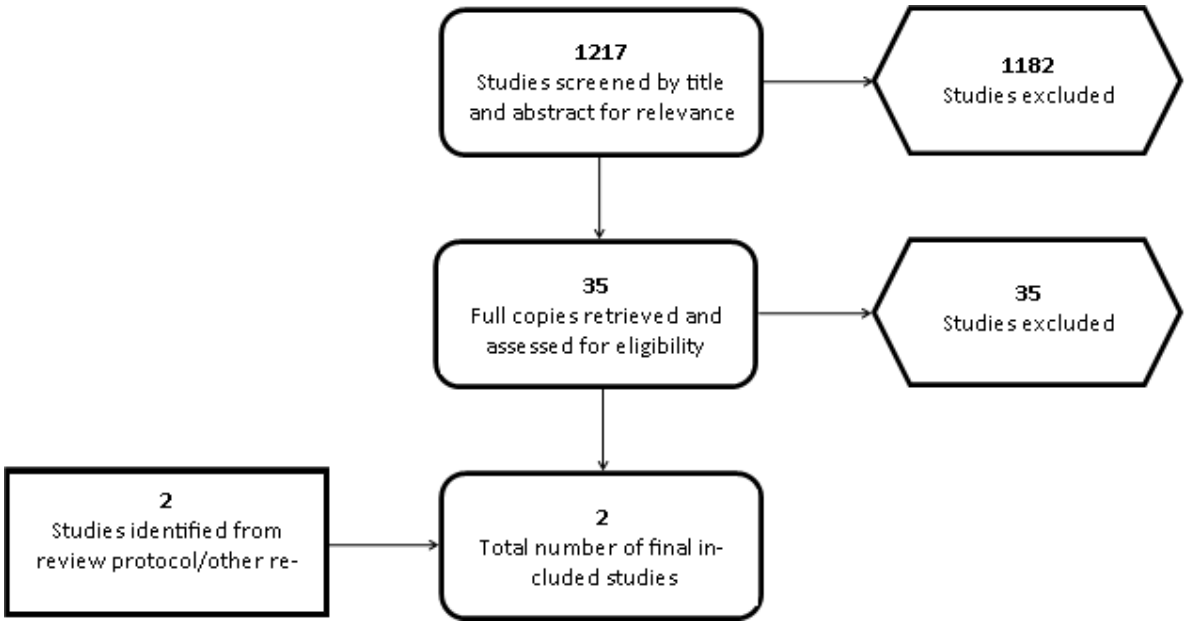


C.4 Economic consort diagrams

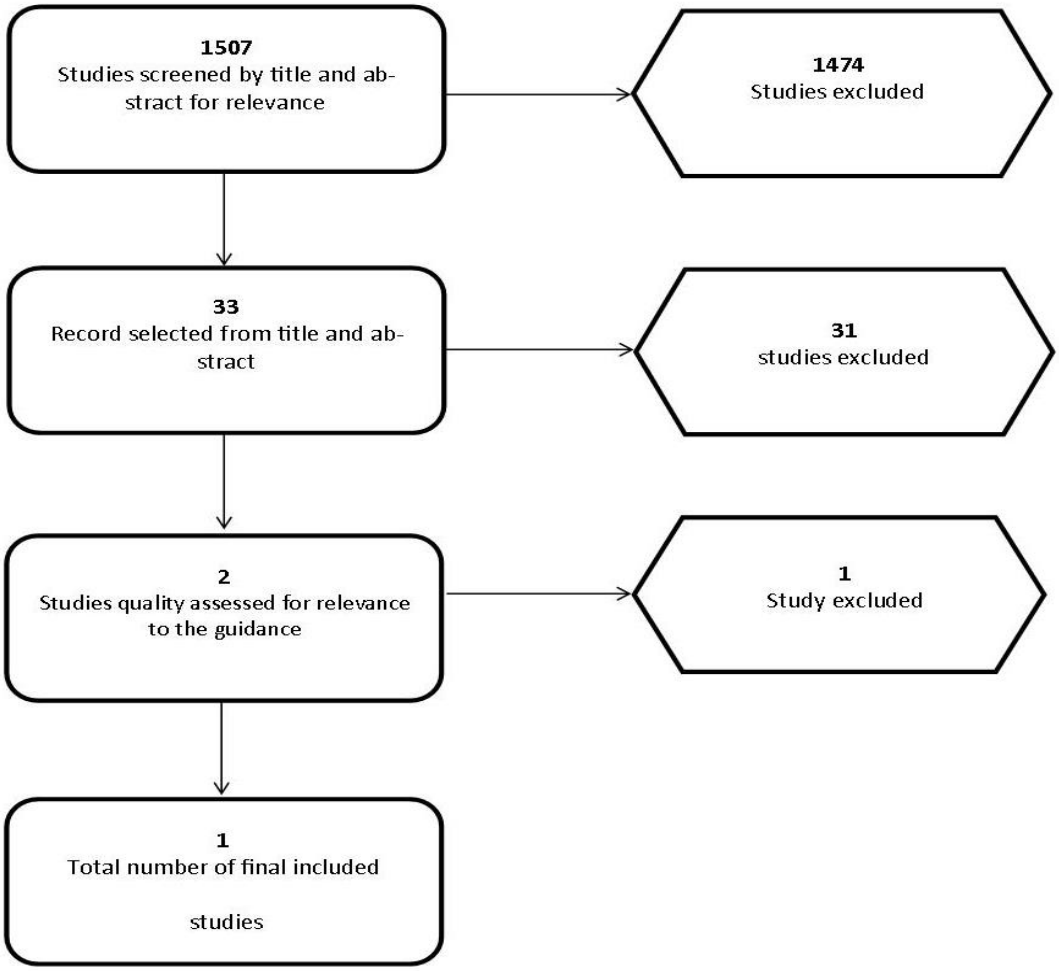
C.4.1 Identifying, reporting and learning from medicines-related patient safety incidents



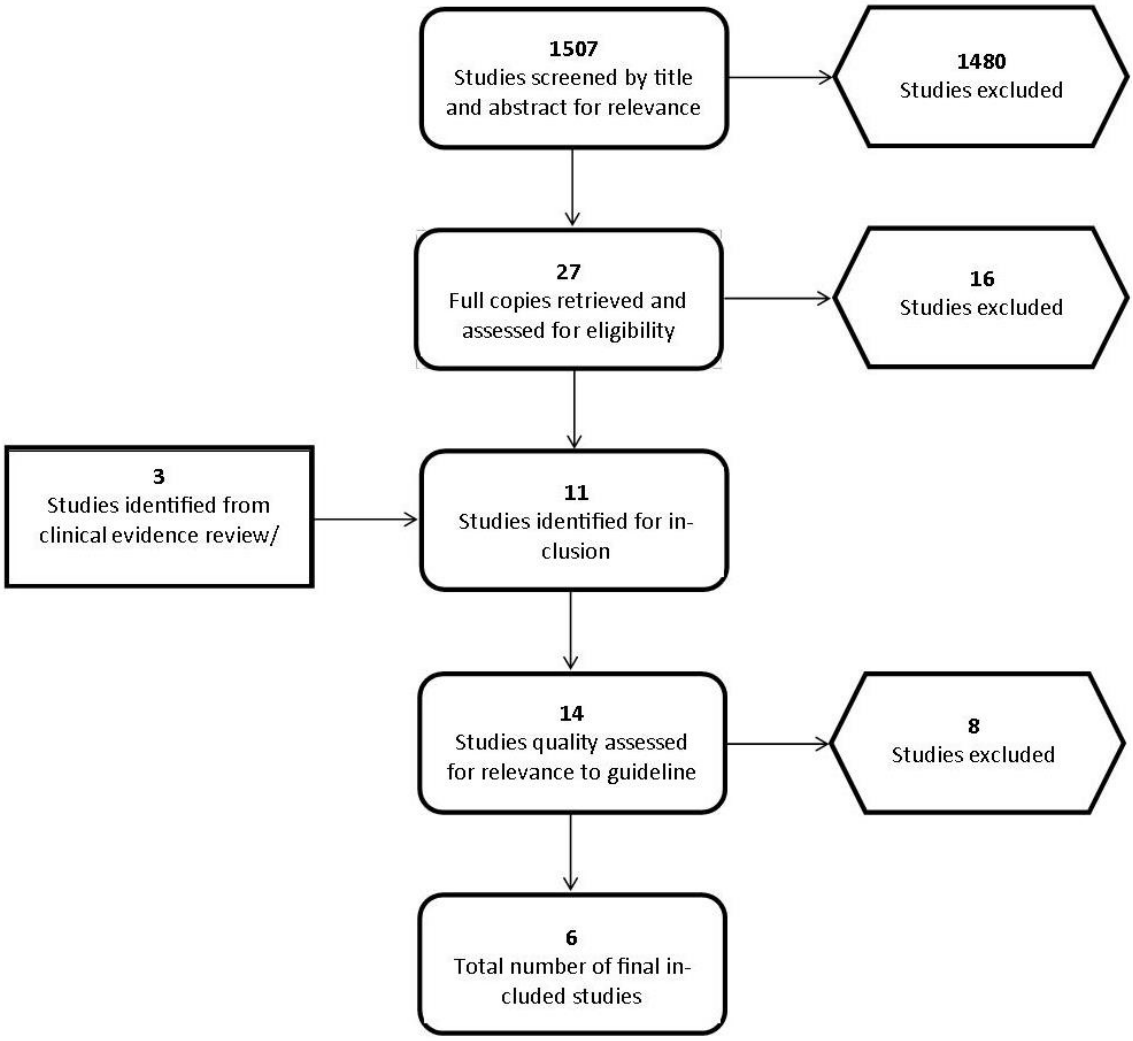
C.4.2 Medicines-related communication systems when patients move from one care setting to another



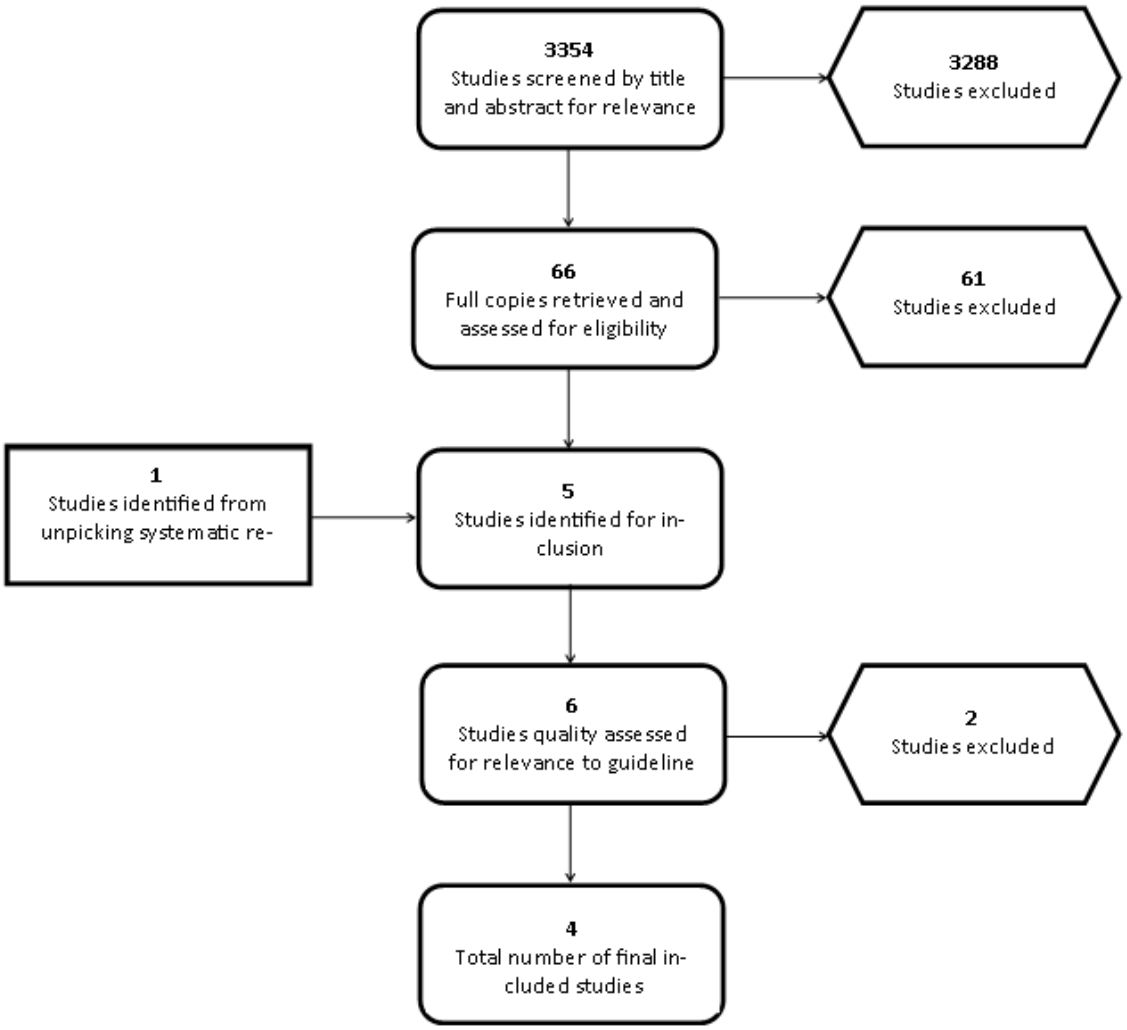
C.4.3 Medicines reconciliation



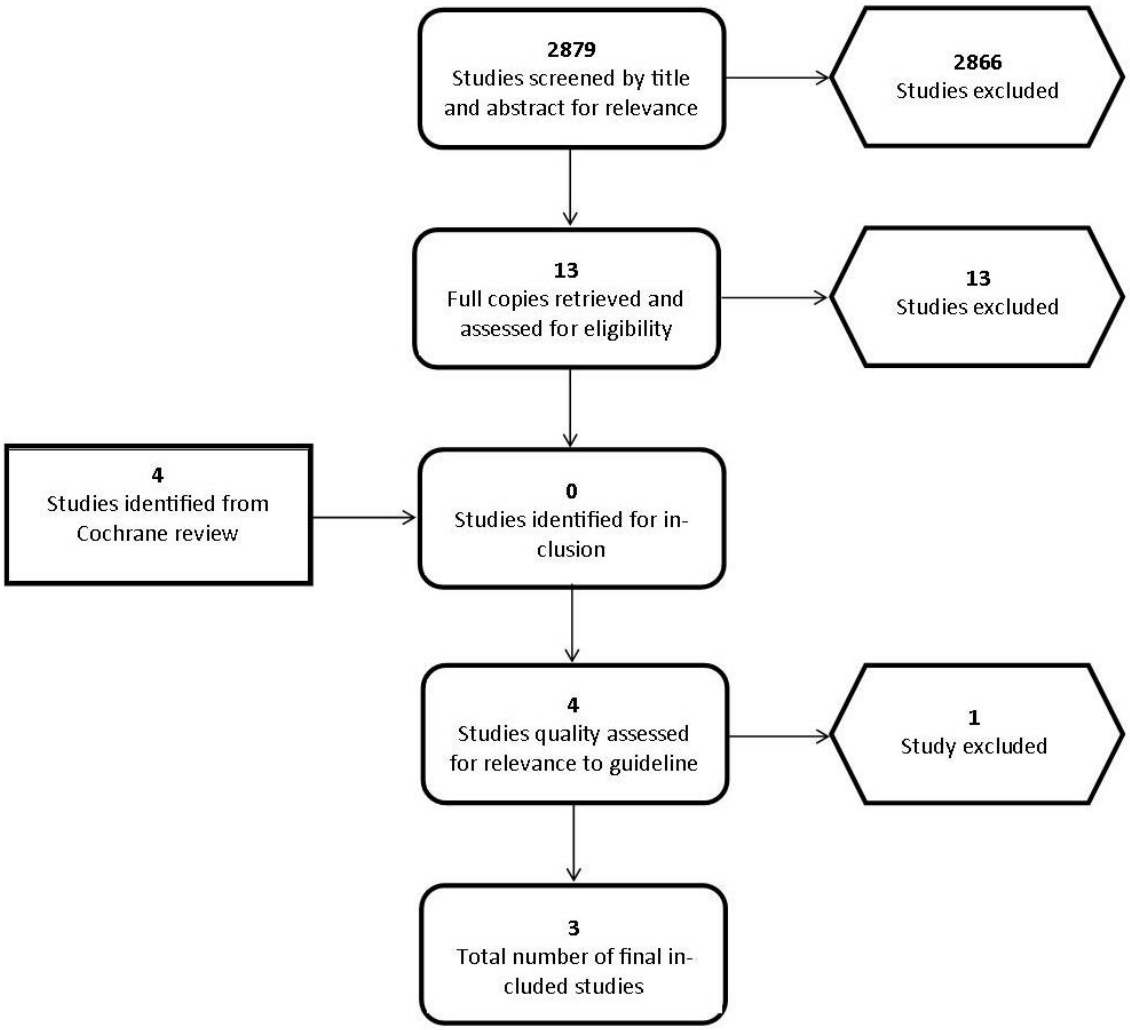
C.4.4 Medication review



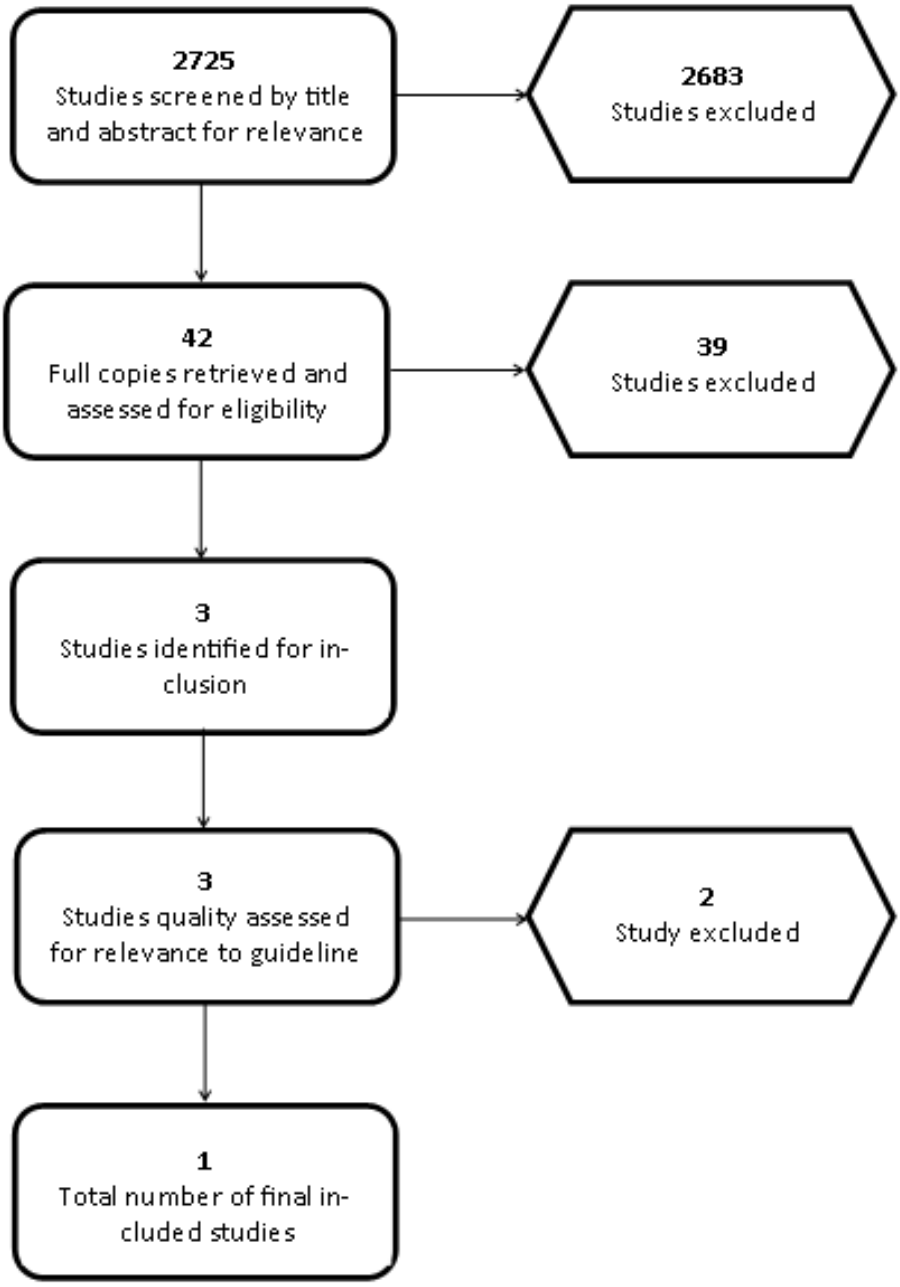
C.4.5 Self-management plans



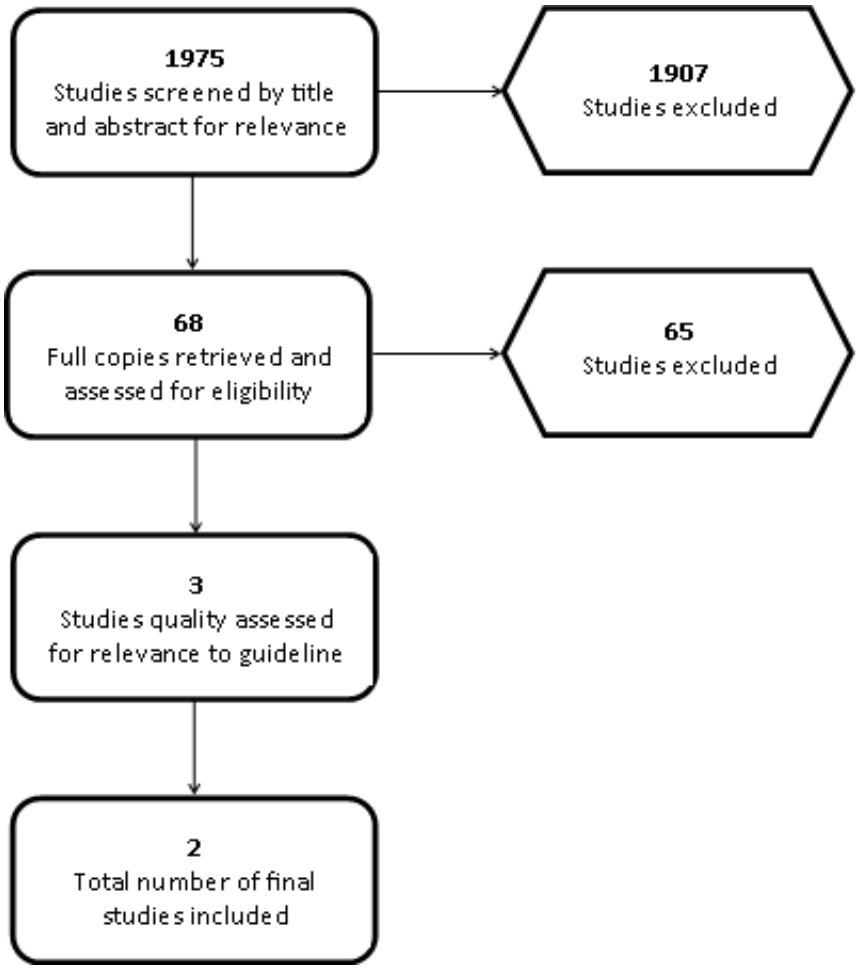
C.4.6 Patient decision aids used in consultations about medicines



C.4.7 Clinical decision support



C.4.8 Medicines-related models of organisational and cross-sector working



C.5 Clinical excluded studies

C.5.1 Identifying, reporting and learning from medicines-related patient safety incidents

Author	Reason for exclusion
Aagaard L, Hansen EH. (2009) Information about ADRs explored by pharmacovigilance approaches: a qualitative review of studies on antibiotics, SSRIs and NSAIDs. BMC Clinical Pharmacology 9: 4	Reason for exclusion: Not relevant intervention
Aagaard L, Soendergaard B, Stenver DI, et al. (2008) Knowledge creation about ADRs, turning the perspective from the rear mirror to the projector? British Journal of Clinical Pharmacology 65(3): 364-76	Reason for exclusion: Not relevant intervention
Aagaard L, Soendergaard B, Stenver DI, et al. (2008) Knowledge creation about ADRs, turning the perspective from the rear mirror to the projector? British Journal of Clinical Pharmacology 65(3): 364-76	Reason for exclusion: Not relevant intervention
Abeysekera A, Bergman IJ, Kluger MT, et al. (2005) Drug error in anaesthetic practice: A review of 896 reports from the Australian Incident Monitoring Study database Anaesthesia 60(3): 220-27	Reason for exclusion: Not relevant study
Abramson EL, Kaushal R. (2012) Computerized provider entry and patient safety. Pediatric Clinics of North America 59(6): 1247-55	Reason for exclusion: Not relevant

Author	Reason for exclusion
Abramson EL, Malhotra S, Fischer K, et al. (2011) Transitioning between electronic health records: Effects on ambulatory prescribing safety Journal of General Internal Medicine 26 (8): 868-74	Reason for exclusion: Not relevant
Abramson EL, Malhotra S, Osorio SN, et al. (2013) A long-term follow-up evaluation of electronic health record prescribing safety. Journal of the American Medical Informatics Association 20(e1): e52-58	Reason for exclusion: Unable to source study
Ahmed A, Giri J, Singh B, et al. (2012) The outcome of adverse events and medical errors in intensive care unit: A systematic review and meta-analysis Critical Care. Medicine 40(121): 158	Reason for exclusion: Abstract only
Aita M, Belvedere O, De CE, et al. (2010) Computerized physician order entry systems and chemotherapy (CT) prescription errors. Annals of Oncology 21: viii338	Reason for exclusion: Abstract only
Aita M, Belvedere O, De PF, et al. (2010) Information technology (IT) and chemotherapy (CT) prescribing errors. Journal of Clinical Oncology 28 (15 Suppl 1)	Reason for exclusion: Not relevant intervention
Al-Ansari MA, Hijazi MH. (2006) Medical errors and adverse events: Focus on the intensive care unit. Clinical Intensive Care 17(1-2): 9-17	Reason for exclusion: Not relevant
Alassaad A, Gillespie U, Bertilsson M, et al. (2013) Prescription and transcription errors in multidose-dispensed medications on discharge from hospital: An observational and interventional study. Journal of Evaluation in Clinical Practice 19(1): 185-91	Reason for exclusion: Not relevant intervention
Aldred J, Borgert A. (2013) Medication administration errors and In-Hospital Complications for Patients with Parkinson's disease: A Retrospective Review Journal of Parkinson's Disease 3: 158-59	Reason for exclusion: Unable to source study
Alexander GL, Stone TT. (2000) System review: a method for investigating medical errors in healthcare settings. Lippincott's Case Management 5(5): 202-13	Reason for exclusion: No relevant outcomes
Al-Khaja KA, Sequeira RP, Damanhori AH.(2012) Medication prescribing errors pertaining to cardiovascular/anti diabetic medications: a prescription audit in primary care. Fundamental & Clinical Pharmacology 26(3): 410-17	Reason for exclusion: Not relevant intervention
Alldred DP, Raynor DK, Hughes C, et al. (2013) Interventions to optimise prescribing for older people in care homes. Cochrane Database of Systematic Reviews 2: Art. No: CD009095. DOI:10.1002/14651858.CD009095.pub2	Reason for exclusion: Not relevant intervention
Allen AS, Sequist TD. (2012) Pharmacy dispensing of electronically discontinued medications. Annals of Internal Medicine 157(10): 700-05	Reason for exclusion: Not relevant intervention
Alsulami Z, Conroy S, Choonara I. (2012) A systematic review of the effectiveness of double checking in preventing medication errors. Archives of Disease in Childhood. 97(5): e2	Reason for exclusion: Abstract only
Alsulami Z, Conroy S, Choonara I. (2013) Medication errors in the Middle East countries: a systematic review of the literature. European Journal of Clinical Pharmacology. 69(4): 995-1008	Reason for exclusion: Not relevant intervention
Alvarado MM, Ntaimo L, Banerjee A, et al. (2012) Reducing paediatric medication errors: A survey and taxonomy. IIE Transactions on Healthcare Systems Engineering 2(2): 142-55	Reason for exclusion: Not relevant
Amalberti R, Auroy Y, Berwick D, et al. (2005) Five system barriers to achieving ultrasafe health care. Annals of Internal Medicine 142(9): 756-64	Reason for exclusion: Not relevant intervention
Ambrosio L, Pumar-Mendez MJ. (2013) The role of work context factors in medication administration errors. Anales del Sistema	Reason for exclusion: Not relevant intervention

Author	Reason for exclusion
Sanitario de Navarra. 36(1): 77-85	
Ameer A, Ghaleb M, Dhillon S. (2013) Epidemiology, nature and interventions of hospital medication administration errors in paediatrics: a systematic review. International Journal of Pharmacy Practice 21: 43-4	Reason for exclusion: Not relevant
American Geriatrics Society. (2012) American Geriatrics Society updated Beers Criteria for potentially inappropriate medication use in older adults. Journal of the American Geriatrics Society 60(4): 616-31	Reason for exclusion: Not relevant
Amori RE, Pittas AG, Siegel RD, et al. (2008) Inpatient medical errors involving glucose-lowering medications and their impact on patients: review of 2,598 incidents from a voluntary electronic error-reporting database. Endocrine Practice 14(5): 535-42	Reason for exclusion: Not relevant
Anathhanam S, Powis RA, Cracknell AL, et al. (2012) Impact of prescribed medications on patient safety in older people Therapeutic Advances in Drug Safety 3(4): 165-74	Reason for exclusion: Not relevant
Anderegg SV, Demik DE, Carter BL, et al. (2013) Acceptance of recommendations by inpatient pharmacy case managers: Unintended consequences of hospitalist and specialist care Pharmacotherapy 33(1): 11-21	Reason for exclusion: No relevant intervention
Anderson JG (2003). A systems approach to preventing adverse drug events. Studies in Health Technology & Informatics 92: 95-102	Reason for exclusion: Not relevant
Anderson JG. (2003) A framework for considering business models. Studies in Health Technology & Informatics 92: 3-11	Reason for exclusion: Not relevant
Anderson JG. (2004) Information technology for detecting medication errors and adverse drug events. Expert Opinion on Drug Safety 3(5): 449-55	Reason for exclusion: Not relevant study
Andrus CH, Villasenor EG, and Kettelle JB, et al. (2003) “To Err Is Human”: uniformly reporting medical errors and near misses, a naive, costly, and misdirected goal. Journal of the American College of Surgeons 196(6): 911-18	Reason for exclusion: Not relevant
Anon. (2001) Making health care safer: a critical analysis of patient safety practices (Structured abstract) Health Technology Assessment Database (4)	Reason for exclusion: Not relevant
Anon. (2002) ASHP guidelines on preventing medication errors with antineoplastic agents American Journal of Health-System Pharmacy 59(17): 1648-68	Reason for exclusion: Not relevant
Anon. (2002) Comprehensive surveillance of adverse drug reactions in hospital provides important data to inform the safe use of drug therapy Drugs and Therapy Perspectives 18 (12): 14-16	Reason for exclusion: Not relevant
Anon. (2002) New drugs: watch out for unexpected adverse effects Prescrire International 11 (61): 150-51	Reason for exclusion: Not relevant study
Anon. (2003) CPOE Bedside technology and patient safety: A roundtable discussion. American Journal of Health-System Pharmacy 60(12): 1219-28	Reason for exclusion: Not relevant
Anon. (2003) Prevention of medication errors in the paediatric inpatient setting. Paediatrics 112(2): 431-36	Reason for exclusion: Not relevant
Anon. (2004) Disclosure of errors preferred by patients. Journal of Family Practice 53(7): 525-26	Reason for exclusion: Not relevant
Anon. (2005) 33% of fatal med errors involve insulin therapy. Healthcare Benchmarks & Quality Improvement 12 (3): 31-32	Reason for exclusion: Not relevant
Anon. (2005) Incidence of errors in intensive care: effects of increased awareness and of improved communication by the introduction of explicit daily goals (Project record) Health	Reason for exclusion: Not relevant intervention

Author	Reason for exclusion
Technology Assessment Database (4)	
Anon. (2005) Patient safety/medication safety: the impact of computerized physician order entry on medication error prevention in hospitalized patients. Health Technology Assessment Database (4)	Reason for exclusion: Economic evaluation
Anon. (2006) Elderly patients need ongoing assessment and support to avoid risk of medication-related problems Drugs and Therapy Perspectives 22(4): 23-26	Reason for exclusion: Not relevant
Anon. (2006) Patient safety in the ED, Hospitals and Health Networks 80(5): 49-56	Reason for exclusion: Not relevant
Anon. (2006) Proposed universal definitions for drug safety terminology based on existing ones. Drugs and Therapy Perspectives 22(7): 22-26	Reason for exclusion: Not relevant
Anon. (2006) Safe use of medication. Obstetrics and Gynaecology 107(4): 969-72	Reason for exclusion: Unable to source study
Anon. (2010) Food and drug administration's safe use initiative collaborating to reduce preventable harm from medications. Journal of Pain and Palliative Care Pharmacotherapy 24(1): 76-93	Reason for exclusion: Not relevant
Anon. (2011) Current explicit criteria offer little consensus on which medications are potentially inappropriate in older adults. Drugs and Therapy Perspectives 27(4): 23-6	Reason for exclusion: Not relevant
Anon. (2012) Abstracts of Papers Presented at the Health Services Research and Pharmacy Practice Conference. International Journal of Pharmacy Practice 20	Reason for exclusion: Abstract only
Anon. (2012) Committee opinion No. 531: Improving medication safety. Obstetrics and Gynaecology 120: 406-10	Reason for exclusion: Not relevant study
Anon. (2012) CPNP's 15th Annual Meeting Journal of Pharmacy Practice 25(2)	Reason for exclusion: Abstract only
Anon. (2013) Selected Abstracts Presented at the 9th Annual Meeting of the Hematology/ Oncology Pharmacy Association. HOPA Journal of Oncology Pharmacy Practice 19	Reason for exclusion: Abstract only
Aparasu RR, Mort JR (2000) Inappropriate prescribing for the elderly: beers criteria-based review. Annals of Pharmacotherapy 34(3): 338-46	Reason for exclusion: Not relevant intervention
Armitage G (2008) Double checking medicines: Defence against error or contributory factor? Journal of Evaluation in Clinical Practice 14(4): 513-19	Reason for exclusion: Not relevant
Aronson JK (2009) Medication errors: what they are, how they happen, and how to avoid them. QJM 102(8): 513-21	Reason for exclusion: Not relevant
Ash JS, Berg M, Coiera E (2004) Some Unintended Consequences of Information Technology in Health Care: The Nature of Patient Care Information System-related Errors. Journal of the American Medical Informatics Association 11(2): 104-12	Reason for exclusion: Not relevant
Avery AJ, Ghaleb M, Barber N, et al. (2013) The prevalence and nature of prescribing and monitoring errors in English general practice: A retrospective case note review. British Journal of General Practice 63 (613): e543-e553	Reason for exclusion: Not relevant
Avery AJ, Rodgers Cantrill JA (2012) Erratum: A pharmacist led information technology intervention for medication errors (PINCER): A multicentre, cluster randomised, controlled trial and cost-effectiveness analysis. Lancet 379 (1310-19) (9833): 2242	Reason for exclusion: Duplicate study
Avery AJ, Rodgers S, Cantrill JA, et al (2009) Protocol for the PINCER trial: a cluster randomised trial comparing the effectiveness of a pharmacist-led IT based intervention with simple	Reason for exclusion: Not relevant study

Author	Reason for exclusion
feedback in reducing rates of clinically important errors in medicines management in general practices. Trials 10: 28	
Avery AJ, Rodgers S, Cantrill JA, et al. (2010) Assessing the effectiveness of an IT-based pharmacist-led intervention aimed at reducing portions of patients at risk of medication errors in family practice: The PINCER trial [Abstract]. Pharmacoepidemiology and drug safety. 19(Suppl S1): S97	Reason for exclusion: Duplicate study
Avery AJ, Sheikh A, Hurwitz B, et al. (2002) Safer medicines management in primary care. British Journal of General Practice 52 (Suppl): S17-S22	Reason for exclusion: Not relevant
Bain KT, Holmes HM, Beers MH, et al. (2008) Discontinuing medications: A novel approach for revising the prescribing stage of the medication-use process Journal of the American Geriatrics Society 56(10): 1946-52	Reason for exclusion: Not relevant
Baker GR, Norton P (2001) Making patients safer! Reducing error in Canadian healthcare. Healthcare papers 2(1): 10-31	Reason for exclusion: Not relevant
Baker M (2005) Patient safety incidents in primary care: Reporting, learning and finding solutions. Clinical Risk 11(4): 145-47	Reason for exclusion: Not relevant
Bakken S (2006) Informatics for patient safety: a nursing research perspective. Annual Review of Nursing Research 24: 219-54	Reason for exclusion: Not relevant
Baldwin FD (2000) Culture clash on medical errors. Postgraduate Medicine 107 (3): 29-35	Reason for exclusion: Not relevant
Balka E, Doyle-Waters M, Lecznarowicz D, et al. (2007) Technology, governance and patient safety: systems issues in technology and patient safety. International Journal of Medical Informatics 76: Suppl-47	Reason for exclusion: Not relevant
Balka E, Kahnamoui N, Nutland K. (2007) Who is in charge of patient safety? Work practice, work processes and utopian views of automatic drug dispensing systems International Journal of Medical Informatics 76: Suppl-57	Reason for exclusion: Not relevant
Balkrishnan R, Foss CE, Pawaskar M, et al. (2009) Monitoring for medication errors in outpatient settings. Journal of Dermatological Treatment 20(4): 229-32	Reason for exclusion: No relevant intervention
Ball MJ, Douglas JV. (2002) IT, patient safety and quality care. Journal of Healthcare Information Management 16(1): 28-33	Reason for exclusion: Not relevant
Ball MJ, Douglas JV. (2002) Redefining and improving patient safety. Methods of Information in Medicine 41(4): 271-76	Reason for exclusion: Not relevant
Ball MJ, Garets DE, Handler TJ. (2003) Leveraging Information Technology towards enhancing patient care and a culture of safety in the U.S. Methods of Information in Medicine 42(5): 503-08	Reason for exclusion: Not relevant
Ballentine NH. (2008) Polypharmacy in the elderly: maximizing benefit, minimizing harm. Critical Care Nursing Quarterly 31(1): 40-5	Reason for exclusion: Not relevant
Banning M. (2006) Medication errors: professional issues and concerns. Nursing Older People 18(3): 27-32	Reason for exclusion: Not relevant
Barach P, Small SD. (2000) Reporting and preventing medical mishaps: lessons from non-medical near miss reporting systems. BMJ 320(7237): 759-63	Reason for exclusion: Not relevant
Barata IA, Benjamin LS, Mace SE, et al. (2007) Pediatric patient safety in the prehospital/emergency department setting. Pediatric Emergency Care 23(6): 412-18	Reason for exclusion: Not relevant
Barber N, Rawlins M, Dean-Franklin B. (2003) Reducing prescribing error: competence, control and culture. Quality and Safety in Health	Reason for exclusion: Not relevant intervention

Author	Reason for exclusion
Care. 12 Suppl 1: i29-32	
Barry PJ, Gallagher P, Ryan C (2008) Inappropriate prescribing in geriatric patients. Current Psychiatry Reports 10(1): 37-43	Reason for exclusion: Not relevant
Basanta WE. (2003) Changing the culture of patient safety and medical errors: a symposium introduction and overview. Journal of Legal Medicine 24(1): 1-6	Reason for exclusion: Not relevant
Bates DW, Cohen M, Leape LL, et al. (2001) Reducing the frequency of errors in medicine using information technology. Journal of the American Medical Informatics Association. 8(4): 299-308	Reason for exclusion: Not relevant
Bates DW, Gawande AA. (2000) Error in medicine: What have we learned? Annals of Internal Medicine. 132(9): 763-67	Reason for exclusion: Not relevant intervention
Bates DW. (2007) Preventing medication errors: a summary. American Journal of Health System Pharmacy 64(14:Suppl 9)	Reason for exclusion: Not relevant
Baysari MT, Westbrook J, Braithwaite J, et al. (2011) The role of computerized decision support in reducing errors in selecting medicines for prescription: Narrative review. Drug Safety 34(4): 289-98	Reason for exclusion: Not relevant intervention
Beckett RD, Sheehan AH, Reddan JG. (2012) Factors associated with reported preventable adverse drug events: A retrospective, case-control study. Annals of Pharmacotherapy 46(5): 634-41	Reason for exclusion: Not relevant intervention
Beckmann U, Bohringer C, Carless R, et al. (2003) Evaluation of two methods for quality improvement in intensive care: facilitated incident monitoring and retrospective medical chart review. Critical Care Medicine 31(4): 1006-11	Reason for exclusion: No relevant outcomes
Beckwith MC, Tyler LS. (2000) Preventing medication errors with antineoplastic agents Part 1. Hospital Pharmacy 35(5): 511-25	Reason for exclusion: Not relevant
Bell DS, Cretin S, Marken RS, et al. (2004) A Conceptual Framework for Evaluating Outpatient Electronic Prescribing Systems Based on Their Functional Capabilities. Journal of the American Medical Informatics Association 11(1): 60-70	Reason for exclusion: Not relevant intervention
Benjamin DM. (2003) Reducing medication errors and increasing patient safety: case studies in clinical pharmacology. Journal of Clinical Pharmacology 43(7): 768-83	Reason for exclusion: Not relevant intervention
Benning A, Ghaleb M, Suokas A, et al. (2011) Large scale organisational intervention to improve patient safety in four UK hospitals: mixed method evaluation. BMJ 342: d195	Reason for exclusion: Not relevant intervention
Benson JM and Snow G. (2012) Impact of medication reconciliation on medication error rates in community hospital cardiac care units. Hospital Pharmacy 47(12): 927-32	Reason for exclusion: Not relevant intervention
Ben-Yehuda A, Bitton Y, Sharon P, et al. (2011) Risk factors for prescribing and transcribing medication errors among elderly patients during acute hospitalization: A cohort, case-control study. Drugs and Aging 28(6): 491-500	Reason for exclusion: Not relevant intervention
Berdot S, Bertrand M, Dartigues JF, et al. (2009) Inappropriate medication use and risk of falls—a prospective study in a large community-dwelling elderly cohort. BMC Geriatrics 9: 30	Reason for exclusion: No relevant outcomes
Berensen NM and Weart CW. (2004) Managing poly-pharmacy issues. Cardiology Review 21(10): 27-33	Reason for exclusion: Not relevant
Berger RG, Kichak JP. (2004) Computerized Physician Order Entry: Helpful or Harmful? Journal of the American Medical Informatics Association 11(2): 100-03	Reason for exclusion: Not relevant
Bergeron BP. (2005) Medical errors: Computers are no panacea.	Reason for exclusion: Not

Author	Reason for exclusion
Journal of Medical Practice Management 21(1): 31-34	relevant
Bergkvist A, Midlöv P, Höglund P, et al. (2009) Improved quality in the hospital discharge summary reduces medication errors, LIMM: Landskrona Integrated Medicines Management. European Journal of Clinical Pharmacology 65(10): 1037-46	Reason for exclusion: Not relevant
Berman A. (2004) Reducing medication errors through naming, labeling, and packaging. Journal of Medical Systems 28(2): 9-29	Reason for exclusion: Not relevant
Berner ES, Maisiak RS, et al. (2007) Solutions in the non-peer-reviewed literature for reducing medication errors. Journal of Pharmaceutical Finance, Economics and Policy 15(3): 7-41	Reason for exclusion: Not relevant intervention
Besag FM. (2007) Is current drug safety an issue? Current Drug Safety 2(1):1-4	Reason for exclusion: Not relevant
Bion JF, Abrusci T, Hibbert P. (2010) Human factors in the management of the critically ill patient. British Journal of Anaesthesia 105(1): 26-33	Reason for exclusion: Not relevant
Birnbaum D and Scheckler W. (2002) Beware of the patient safety juggernauts. British Journal of Clinical Governance 7(4): 282-85	Reason for exclusion: Not relevant
Bitton I, Sharon P. (2010) Patient-related factors associated with medication errors among hospitalized elderly patients. Clinical pharmacology and therapeutics 87: S16	Reason for exclusion: Not relevant
Bjeldbak-Olesen M, Danielsen AG, Tomsen DV, et al. (2013) Medication reconciliation is a prerequisite for obtaining a valid medication review. Danish Medical Journal 60(4): A4605	Reason for exclusion: Not relevant intervention
Boothman RC and Blackwell AC. (2010) Integrating risk management activities into a patient safety program. Clinical Obstetrics and Gynecology 53(3): 576-85	Reason for exclusion: Not relevant
Boparai MK, Korc-Grodzicki B. (2011) Prescribing for older adults. Mount Sinai Journal of Medicine 78(4): 613-26	Reason for exclusion: Not relevant
Borenstein J, Chiou CF, Henning JM, et al. (2003) Physician attitudes toward strategies to promote the adoption of medical evidence into clinical practice. American Journal of Managed Care9 (3): 225-34	Reason for exclusion: Not relevant
Boxwala AA, Dierks M, Keenan M, et al. (2004) Organization and representation of patient safety data: Current status and issues around generalizability and scalability. Journal of the American Medical Informatics Association 11(6): 468-78	Reason for exclusion: Not relevant
Boyce T, Howard R. (2004) Illustrations of strategies to reduce medication errors and near misses. Pharmacy in Practice 14(5): 134-36	Reason for exclusion: Not relevant
Boyer R, McPherson ML, Deshpande G, et al. (2009) Improving medication error reporting in hospice care. American Journal of Hospice & Palliative Medicine 26(5): 361-67	Reason for exclusion: Not relevant intervention
Brady AM, Malone AM, Fleming S (2009) A literature review of the individual and systems factors that contribute to medication errors in nursing practice. Journal of Nursing Management 17(6): 679-97	Reason for exclusion: Not relevant
Braithwaite RS, DeVita MA, Mahidhara R. (2004) Use of medical emergency team (MET) responses to detect medical errors. Quality and Safety in Health Care 13(4): 255-59	Reason for exclusion: Not relevant
Bregnhøj L, Thirstrup S, Kristensen MB, et al. (2009) Combined intervention programme reduces inappropriate prescribing in elderly patients exposed to polypharmacy in primary care. European Journal of Clinical Pharmacology 65(2): 199-207	Reason for exclusion: Not relevant intervention

Author	Reason for exclusion
Brennan C, Donnelly K, Somani S, et al. (2011) Needs and opportunities for achieving optimal outcomes from the use of medicines in hospitals and health systems. American Journal of Health-System Pharmacy 68(12): 1086-96	Reason for exclusion: Not relevant
Bridge L. (2007) Reducing the risk of wrong route errors. Paediatric Nursing 19(6): 33-5	Reason for exclusion: Not relevant
Brown K, Sykes R, Philips G. (2001) Is that adverse experience really expected? Guidelines for interpreting and formatting adverse experience information in the United States. Drug Information Journal 35(1): 269-84	Reason for exclusion: Not relevant
Brown M. (2005) Medication safety issues in the emergency department. Critical Care Nursing Clinics of North America 17(1): 65-9	Reason for exclusion: Not relevant
Brown MM. (2001) Managing medication errors by design. Critical Care Nursing Quarterly 24(3): 77-97	Reason for exclusion: Not relevant
Buetow S. (2005) Why the need to reduce medical errors is not obvious. Journal of Evaluation in Clinical Practice 11(1): 53-7	Reason for exclusion: Not relevant
Bujnowska-Fedak MM, Van, Berkestijan L, et al. (2006). The patient-centred clinical method – The family practice model. Family Medicine and Primary Care Review 8(2): 362-67	Reason for exclusion: Not relevant
Bullock LM. (2011) Transform into a culture of safety. Nursing Management 42(7): 14	Reason for exclusion: Not relevant
Burdeu G, Crawford R, Van de Vreede M, et al. (2006) Taking aim at infusion confusion. Journal of Nursing Care Quality 21(2): 151-59	Reason for exclusion: Not relevant intervention
Burke KG, Mason DJ, Alexander M, et al. (2005) Making medication administration safe: report challenges nurses to lead the way. American Journal of Nursing 105(3:Suppl): 2-3	Reason for exclusion: Not relevant intervention
Burke. (2005) Executive summary: the state of the science on safe medication administration symposium. Journal of Infusion Nursing 28(2:Suppl): Suppl 4-9	Reason for exclusion: Not relevant intervention
Burross DC. (2000) Commentary: the role of quality improvement organizations in reducing medical errors. Texas Medicine 96(3): 28	Reason for exclusion: Not relevant
Cadwell SM. (2008) Pediatric medication safety in the emergency department. Journal of Emergency Nursing 34(4): 375-77	Reason for exclusion: Unable to source paper in required timeframe
Cadwell. (2008) Pediatric medication safety in the emergency department. Journal of Emergency Nursing 34(4): 375-77	Reason for exclusion: Unable to source paper in required timeframe
Cafiero. (2003) Reducing medication errors in a long-term care setting. Annals of Long-Term Care 11(2): 29-35	Reason for exclusion: Not relevant intervention
Cameli D, Francis M, Londrigan M , et al. (2013) The effectiveness of medication reconciliation strategies to reduce medication errors in community dwelling older adults: A systematic review. JBI Database of Systematic Reviews and Implementation Reports 11(7): 1-31	Reason for exclusion: Not relevant intervention
Camiré E, Moyen E, Stelfox HT. (2009) Medication errors in critical care: Risk factors, prevention and disclosure. CMAJ 180(9): 936-43	Reason for exclusion: Not relevant intervention
Cannon KT, Choi MM, Zuniga MA. (2006) Potentially inappropriate medication use in elderly patients receiving home health care: a retrospective data analysis. American Journal of Geriatric Pharmacotherapy 4(2): 134-43	Reason for exclusion: Not relevant
Cano FG, Rozenfield S. (2009) Adverse drug events in hospitals: a systematic review. Cadernos de Saude Publica 25: Suppl 72	Reason for exclusion: Not relevant intervention

Author	Reason for exclusion
Cao H, Stetson P, Hripcsak G (2003) Assessing explicit error reporting in the narrative electronic medical record using keyword searching. Journal of Biomedical Informatics 36(1-2): 99-105	Reason for exclusion: Not relevant intervention
Carlton G, Blegen MA. (2006) Medication-related errors: a literature review of incidence and antecedents. Annual Review of Nursing Research 24: 19-38	Reason for exclusion: Not relevant
Carroll CA, Cox KS, Santos SR, et al. (2002) Using standard desk-top tools to monitor medical error rates. Seminars for Nurse Managers 10(2): 95-9	Reason for exclusion: Unable to source
Carthey J. (2002) Medication errors: Causes, prevention and reduction. British Journal of Haematology 116(2): 255-65	Reason for exclusion: Not relevant
Carvalho CJ, Borycki EM, Kushniruk AW. (2009) Using heuristic evaluations to assess the safety of health information systems. Studies in Health Technology & Informatics 143: 297-301	Reason for exclusion: No relevant outcomes
Cassono AT. (2006) IV medication safety software implementation in a multihospital health system. Hospital Pharmacy 41(2): 151-5	Reason for exclusion: Not relevant intervention
Castelino RL, Bajorek BV, Chen TF. (2009) Targeting suboptimal prescribing in the elderly: A review of the impact of pharmacy services. Annals of Pharmacotherapy 43(6): 1096-106	Reason for exclusion: Not relevant
Castelino RL, Hilmer SN, Bajorek SN, et al. (2010) Drug Burden Index and potentially inappropriate medications in community-dwelling older people: the impact of Home Medicines Review. Drugs & Aging 27(2): 135-48	Reason for exclusion: No relevant outcomes
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Chamberlain CJ, Koniairis LG, Wu AW, et al. (2012) Disclosure of "non harmful" medical errors and other events: Duty to disclose. Archives of Surgery 147(3): 282-86	Reason for exclusion: Not relevant
Chamberlain JM, Slonim A, Joseph JG. (2004) Reducing errors and promoting safety in pediatrics emergency care. Ambulatory Pediatrics 4(1): 55-63	Reason for exclusion: Not relevant intervention
Chan J, Shojania KG, Easty AC, et al. (2011) Does user-centred design affect the efficiency, usability and safety of CPOE order sets? Journal of the American Medical Informatics Association 18(3): 276-81	Reason for exclusion: Not relevant intervention
Chang CB, Chan DC. (2010) Comparison of published explicit criteria for potentially inappropriate medications in older adults. Drugs and Aging 27(12): 947-57	Reason for exclusion: No relevant comparator
Chang J, Langberg M. et al. (2010) Improving outcomes through the use of inpatient order sets: A systematic review. Journal of General Internal Medicine 25: S308-09	Reason for exclusion: Abstract only
Chang J, Ronco C, Rosner MH. (2011) Computerized decision support systems: improving patient safety in nephrology. Nature Reviews Nephrology 7(6): 348-55	Reason for exclusion: Not relevant intervention
Chao C, Jen W, Chi Y, et al. (2007) Improving patient safety with RFID and mobile technology. International Journal of Electronic Healthcare 3(2): 175-92	Reason for exclusion: Not relevant

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Chapuis C, Roustit M, Bal G, et al. (2010) Automated drug dispensing system reduces medication errors in an intensive care setting. Critical Care Medicine 38(12): 2275-81	Reason for exclusion: Not relevant intervention
Charpiat B, Goutelle S, Schoeffler M. (2012), Prescriptions analysis by clinical pharmacists in the post-operative period: A 4-year prospective study. Acta Anaesthesiologica Scandinavica 56(8): 1047-51	Reason for exclusion: Not relevant
Chedoe I, Molendijk HA, Dittrich ST, et al. (2007) Incidence and nature of medication errors in neonatal intensive care with strategies to improve safety: a review of the current literature. Drug Safety 30(6): 503-13	Reason for exclusion: Not relevant
Chen S, Zillich AJ, Melton BL, et al. (2013) The effect of redesigned computerized drug-drug interaction alerts on medication errors and prescribing efficiency. Value in Health 16(3): A13	Reason for exclusion: Not relevant intervention
Cheng CM. (2011) Hospital systems for the detection and prevention of adverse Drug Events. Clinical pharmacology and therapeutics 89(6): 779-81	Reason for exclusion: Not relevant
Cheng L, Sun N, Li Y, et al. (2011) International comparative analyses of incidents reporting systems for healthcare risk management. Journal of Evidence-based Medicine 4(1): 32-47	Reason for exclusion: Not relevant
Chiozza ML, Plebani M. (2006) Clinical Governance: from clinical risk management to continuous quality improvement. Clinical Chemistry & Laboratory Medicine 44 (6): 694-98	Reason for exclusion: Not relevant
Choo J, Hutchinson A, Bucknall T. (2010) Nurses' role in medication safety. Journal of Nursing Management 18(7): 853-61	Reason for exclusion: Not relevant
Choo J, Johnston L, Manias E.(2013) Nurses' medication administration practices at two Singaporean acute care hospitals. Nursing & Health Sciences 15(1): 101-08	Reason for exclusion: Not relevant
Chrischilles EA, Fulda TR, Byrns PJ, et al. (2002) The role of pharmacy computer systems in preventing medication errors. Journal of the American Pharmaceutical Association 42(3): 439-48	Reason for exclusion: Not relevant
Christen C. (2006) Clinical pharmacy and medication safety. Annals of Pharmacotherapy 40(11):2020-21	Reason for exclusion: Not relevant
Christensen M, Lundh A. (2013) Medication review in hospitalised patients to reduce morbidity and mortality. Cochrane Database of Systematic Reviews Issue 2. Art. No.: CD008986. DOI: 10.1002/14651858.CD008986.pub2	Reason for exclusion: Not relevant
Christian JB, Vanhaaren A, Cameron KA, et al. (2004) Alternatives for potentially inappropriate medications in the elderly population: Treatment algorithms for use in the Fleetwood Phase III study. Consultant Pharmacist 19(11): 1011-28	Reason for exclusion: Not relevant intervention
Christian S, Gyves H, et al. (2004) Care of the Critically Ill. Electronic prescribing 20(3): 68-71	Reason for exclusion: Not relevant
Chua SS, Wong IC, Edmondson H, et al. (2003) A feasibility study for recording of dispensing errors and 'near misses' in four UK primary care pharmacies. Drug Safety 26 (11): 803-13	Reason for exclusion: Not relevant
Chua SS. (2010) Errors detected in 19% of paediatric medication preparations and administrations across five hospitals in London. Evidence-Based Medicine 15(4): 123-24	Reason for exclusion: Not relevant intervention
Chung K, Choi YB, Moon S. (2003) Toward efficient medication error reduction: Error-reducing information management systems. Journal of Medical Systems 27(6): 553-60	Reason for exclusion: Not relevant
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neonatal intensive care units. Clinics in Perinatology 35(1): 119-39	relevant intervention
Ciarkowski SL, Stalburg CM. (2010) Medication safety in obstetrics and gynaecology. Clinical Obstetrics & Gynaecology 53(3): 482-99	Reason for exclusion: Not relevant
Clancy TR. (2004) Medication error prevention. Progress of initiatives. JONA's Healthcare Law, Ethics, & Regulation 6(1): 3-12	Reason for exclusion: Not relevant
Clark C. (2013) Medication safety in the United Kingdom. Krankenhauspharmazie 33 (12): 511-13	Reason for exclusion: Not relevant
Clarke JR. (2006) How a system for reporting medical errors can and cannot improve patient safety. American Surgeon 72(11): 1088-91	Reason for exclusion: Not relevant
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Cohen DJ, Lisagor P. (2005) Medical errors – Is total quality management for the battlefield desirable? Military Medicine 170(11): 915-18	Reason for exclusion: Not relevant
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Cole SL, Grubbs JH, Din C, et al. (2012) Rural inpatient telepharmacy consultation demonstration for after-hours medication review. Telemedicine Journal & E-Health 18(7): 530-37	Reason for exclusion: Not relevant
Coleman JJ, Ferner RE, Evans SJ. (2006) Monitoring for adverse drug reactions. British Journal of Clinical Pharmacology 61(4): 371-78	Reason for exclusion: Not relevant intervention
Coleman NE, Pon S. (2013) Quality: performance improvement, teamwork, information technology and protocols. Critical Care Clinics 29(2): 129-151	Reason for exclusion: Not relevant
Colpaert K, Claus B, Somers A. (2006) Impact of computerized physician order entry on medication prescription errors in the intensive care unit: A controlled cross-sectional trial. Critical Care 10(1)	Reason for exclusion: No relevant outcomes
Colpaert K, Decruyenaere J. (2009) Computerized physician order entry in critical care. Best Practice and Research: Clinical Anaesthesiology 23(1): 27-38	Reason for exclusion: Not relevant
Compton RD. (2013) Polypharmacy concerns in the geriatric population. Osteopathic Family Physician 5(4): 147-52	Reason for exclusion: Not relevant
Conejos Miquel MD, Sanchez Cuervo M, Delgado Silveira E, et al. (2010) Potentially inappropriate drug prescription in older subjects across health care settings. European Geriatric Medicine 1(1): 9-14	Reason for exclusion: No relevant comparator
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Coombes ID, Heel AC, Henderson Y, et al. (2005) Identification of medication errors by nurses during a simulated ward, medication safety orientation program. Journal of Pharmacy Practice and Research 35(3): 190-94	Reason for exclusion: No relevant outcomes
Cooper GA, Spears RA, Thompson JP. (2009) A review of calls received by the UK National Poisons Information Service involving medical errors in hospitals, care homes and GP surgeries from April 2007 to March 2008. Clinical Toxicology 47(5): 509-10	Reason for exclusion: Abstract only
Corina I. (2005) Errors from the consumer's perspective. Journal of Infusion Nursing 28(2 Suppl): 12-13	Reason for exclusion: Not relevant
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Cornish PL, Knowles SR, Marchesano R, et al. (2005) Unintended medication discrepancies at the time of hospital admission. Archives of Internal Medicine 165(4): 424-29	Reason for exclusion: No relevant outcomes
Corsonello A, Onder G, Abbatecola AM, et al. (2012) Explicit criteria for potentially inappropriate medications to reduce the risk of adverse drug reactions in elderly people: from Beers to STOPP/START criteria. Drug Safety 35: Suppl 8	Reason for exclusion: Not relevant
Corsonello A, Pranno L, Garasto S, et al. (2009) Potentially inappropriate medication in elderly hospitalized patients. Drugs & Aging 26: Suppl 9	Reason for exclusion: Not relevant
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Cousins D. (2009) Current status of the monitoring of medication practice. American Journal of Health-System Pharmacy 66(5 Suppl 3): S49-56	Reason for exclusion: Not relevant
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Cowan J. (2004) Medication safety in 2004: The NHS agenda. Clinical Governance 9 (2): 132-35	Reason for exclusion: Not relevant intervention
Cox AR, Ferner RE. (2009) Prescribing errors in diabetes. British Journal of Diabetes and Vascular Disease 9(2): 84-88	Reason for exclusion: Not relevant
Crandall WV, Davis JT, McClead R, et al. (2012) Is Preventable Harm the Right Patient Safety Metric? Pediatric Clinics of North America 59(6): 1279-92	Reason for exclusion: Not relevant
Crane VS. (2000) New perspectives on preventing medication errors and adverse drug events. American Journal of Health-System Pharmacy 57(7): 690-97	Reason for exclusion: Not relevant
Crawford IW, Mackway-Jones K, Russell DR, et al. (2004) Planning for chemical incidents by implementing a Delphi based consensus study. Emergency Medicine Journal 21(1): 20-23	Reason for exclusion: Not relevant
Crawford SY, Cohen MR, Trafesse E. (2003) Systems factors in the reporting of serious medication errors in hospitals. Journal of Medical Systems 27(6): 543-51	Reason for exclusion: Not relevant intervention

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Cresswell KM, Bates DW, Phansalkar S, et al. (2011) Opportunities and challenges in creating an international centralised knowledge base for clinical decision support systems in ePrescribing. BMJ Quality and Safety 20(7): 625-30	Reason for exclusion: Not relevant
Cresswell KM, Fernando B, McKinstry B, et al. (2007) Adverse drug events in the elderly. British Medical Bulletin 83: 259-74	Reason for exclusion: Not relevant
Cresswell KM, Sadler S, Rodgers S, et al. (2012) An embedded longitudinal multi-faceted qualitative evaluation of a complex cluster randomized controlled trial aiming to reduce clinically important errors in medicines management in general practice. Trials 13: 78	Reason for exclusion: Not relevant
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Crossman M. (2009) Technical and environmental impact on medication error in paramedic practice: A review of causes, consequences and strategies for prevention. Journal of Emergency Primary Health Care 7(3)	Reason for exclusion: Not relevant intervention
Crowley C, Scott D, Duggan C, et al. (2004) Describing the frequency of IV medication preparation and administration errors. Hospital Pharmacist 11(8): 330-36	Reason for exclusion: Not relevant intervention
Cullen DJ, Bates DW, Leape LL, et al. (2000) Prevention of adverse drug events: A decade of progress in patient safety. Journal of Clinical Anesthesia 12(8): 600-14	Reason for exclusion: Not relevant
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Cusack CM.(2008) Electronic Health Records and Electronic Prescribing: Promise and Pitfalls. Obstetrics and Gynaecology Clinics of North America 35(1): 63-79	Reason for exclusion: Not relevant
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D'Souza DC, Koller LJ. (2004) Reporting, review and application of near-miss prescribing medication incident data. Journal of Pharmacy Practice and Research 34(3): 190-93	Reason for exclusion: Not relevant intervention
Dainty KN, Adhikari NK, Kiss A, et al. (2012) Electronic prescribing in an ambulatory care setting: A cluster randomized trial. Journal of Evaluation in Clinical Practice 18(4): 761-67	Reason for exclusion: Not relevant intervention
Damiani G, Pinnarelli L, Scopelliti L, et al. (2009) A review on the impact of systematic safety processes for the control of error in medicine. Medical Science Monitor 15 (7): RA157-RA166	Reason for exclusion: Not relevant study
Davis RM, Barach P. (2000) Enhancing patient safety and reducing medical error: The role of preventive medicine. American Journal of Preventive Medicine 19(3): 202-05	Reason for exclusion: No relevant intervention
Davis T. (2011) Paediatric prescribing errors. Archives of Disease in Childhood 96(5): 489-91	Reason for exclusion: Not relevant
De Feijter JM, De Grave WS, Muijtjens AM. (2012) A comprehensive overview of medical error in hospitals using incident-reporting systems, patient complaints and chart review of inpatient deaths. PLoS ONE 7(2): e31125	Reason for exclusion: No relevant outcomes
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Declifford JM, Caplygin FM. (2007) Impact of an emergency department pharmacist on prescribing errors in an Australian Hospital. Journal of Pharmacy Practice and Research 37(4): 284-86	Reason for exclusion: No relevant intervention
Decottignies A, Aldeguer A. (2010) Implementation of a medicinal error review. Pharmacy World and Science 32(5): 684	Reason for exclusion: Abstract only
Delisa JA. (2004) Physiatry: Medical errors, patient safety, patient injury, and quality of care. American Journal of Physical Medicine and Rehabilitation 83(8): 575-83	Reason for exclusion: Not relevant
Denison DE, Schneider R, Childs S, et al. (2011) A prevalence study of errors in opioid prescribing in a large teaching hospital. International Journal of Clinical Practice 65(9): 923-29	Reason for exclusion: Not relevant
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Denny JC, Guise DA, Jirjis JN, et al. (2005) The Vanderbilt experience with electronic health records. Seminars in Colon and Rectal Surgery 16(2): 59-68	Reason for exclusion: Not relevant
Dequito AB, Mol PG, Van Doormaal JE, et al. (2011) Preventable and non-preventable adverse drug events in hospitalized patients: a prospective chart review in the Netherlands. Drug Safety 34(11): 1089-1100	Reason for exclusion: Not relevant intervention
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Dhalla IA, Anderson G, Mamdani MM, et al. (2002) Inappropriate prescribing before and after nursing home admission. Journal of the American Geriatrics Society 50(6): 995-1000	Reason for exclusion: Not relevant intervention
Diav-Citrin O, Ratnapalan S, Grouhi M, et al. (2000) Medication errors in paediatrics: a case report and systematic review of risk factors. Paediatric Drugs 2(3): 239-42	Reason for exclusion: Not relevant
Dietz I, Borasio GD, Schneider G, et al. (2010) Medical errors and patient safety in palliative care: a review of current literature. Journal of Palliative Medicine 13(12): 1469-74	Reason for exclusion: Not relevant
Doherty K, Segal A, McKinney PG. (2004) The 10 most common prescribing errors: Tips on avoiding the pitfalls. Consultant 44(2): 173-82	Reason for exclusion: Not relevant
Donaldson-Myles F. (2005) Nurses' experiences of reporting a clinical incident: A qualitative study informing the management of clinical risk. Clinical Risk 11(3):105-9	Reason for exclusion: No relevant outcomes
Dorman T, Pronovost P. (2002) Intensive care unit errors: Detection and reporting to improve outcomes. Current Opinion in Anaesthesiology 15(2): 147-51	Reason for exclusion: Not relevant study
Duckworth S, Purkiss R. (2005) Electronic prescribing reduces errors and saves time through formulary and prescribing control. Pharmacy in Practice 15(6): 233-40	Reason for exclusion: Not relevant
Dueck C. (2005) The challenge: balancing competency and error management. Dynamics 16(4): 10-12	Reason for exclusion: Not relevant intervention
Dunn D. (2003) Incident reports-correcting processes and reducing errors. AORN Journal 78(2): 212-16	Reason for exclusion: Not relevant
Eadie A. (2012) Medical error reporting, should it be mandatory in Scotland? Journal of Forensic and Legal Medicine 19(7): 437-41	Reason for exclusion: Not relevant
Edwards IR. (2005) The WHO World Alliance for Patient Safety: A new challenge or an old one neglected? Drug Safety 28(5): 379-86	Reason for exclusion: Not relevant
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Eisenberg JM, Meyer G, Foster N. (2000) Medical errors and patient safety: A growing research priority. Health Services Research 2000 35(3): xi-xv	Reason for exclusion: Not relevant
Elder NC, Dovey SM. (2002) Classification of medical errors and preventable adverse events in primary care: a synthesis of the literature. Journal of Family Practice (11): 927-32	Reason for exclusion: Not relevant
Elder NC, Palleria H, Regan S. (2006) What do family physicians consider an error? A comparison of definitions and physician perception. BMC Family Practice 7: 73	Reason for exclusion: Not relevant intervention
Evans SM, Berry JG, Smith BJ, et al. (2006) Attitudes and barriers to incident reporting: a collaborative hospital study. Quality & Safety in Health Care 15(1): 39-43	Reason for exclusion: Not relevant intervention
Faragon JJ, Lesar TS. (2003) Update on prescribing errors with HAART. Aids Reader 13(6): 268-78	Reason for exclusion: Not relevant
Fattah S, Rehn M, Lockey D, et al. (2013) A consensus based template for reporting pre-hospital major incident medical management. Acta Anaesthesiologica Scandinavica Suppl 57: 22	Reason for exclusion: Abstract only
Fattah S, Rehn M, Reierth E, et al. (2013) Systematic literature review of templates for reporting pre hospital major incident medical management . BMJ Open 3(8)	Reason for exclusion: Not relevant intervention
Feinberg J, Pepper G. (2004) Improving patient safety in long-term care facilities: An overview of AHRQ funded projects. Annals of Long-Term Care 12(8): 34-38	Reason for exclusion: Not relevant intervention
Fernandez MC, Fuentes CG, Alonso Fernandez MA, et al. (2009) Safety "Check List" in an emergency and trauma intensive care unit of tertiary university hospital. Intensive Care Medicine 35: S298	Reason for exclusion: Abstract only
Ferner RE, Aronson JK. (2010) Preventability of drug-related harms part I: A systematic review. Drug Safety 33(11): 985-94	Reason for exclusion: Not relevant
Ferner RE, Aronson JK.(2006) Clarification of terminology in medication errors: Definitions and classification. Drug Safety 29(11): 1011-22	Reason for exclusion: Not relevant
Ferner RE, Coleman J. (2005) Anticipating, preventing and investigating medication errors. Clinical Medicine, Journal of the Royal College of Physicians of London. 5(1): 12-15	Reason for exclusion: Not relevant intervention
Fialova D. (2011) Medication errors in elderly population. Basic and Clinical Pharmacology and Toxicology 109: 6-7	Reason for exclusion: Not relevant
Fick D, Semla T, Beizer J, et al. (2012) American Geriatrics Society updated Beers Criteria for potentially inappropriate medication use in older adults. Journal of the American Geriatrics Society 60(4): 616-631	Reason for exclusion: Not relevant intervention
Fick DM, Maclean JR, Rodriguez NA, et al. (2004) A randomized study to decrease the use of potentially inappropriate medications among community-dwelling older adults in a south-eastern managed care organization. American Journal of Managed Care. 10(11: Part1) 761-68	Reason for exclusion: Not relevant intervention
Figueiras A, Tato F, Fontaiñas J, et al. (2001) Physicians' attitudes towards voluntary reporting of adverse drug events. Journal of Evaluation in Clinical Practice 7(4): 347-54	Reason for exclusion: Not relevant intervention
Flank S. (2008) Counterfeits and medication errors: keeping your patients safe. Postgraduate Medicine 120(3): 7-12	Reason for exclusion: Not relevant
Force MV, Deering L, Hubbe J, et al. (2006) Effective strategies to	Reason for exclusion: No

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Forester AJ, Shojania KG, Van Walraven C. (2005) Improving patient safety: Moving beyond the "hype" of medical errors. CMAJ 173(8): 893-94	Reason for exclusion: Not relevant
Forsetlund L, Eike MC, Gjerberg E, et al. (2010) Effect of interventions to reduce potentially inappropriate use of medicines in nursing homes: a systematic review of randomised controlled trials. Health Technology Assessment Database (4)	Reason for exclusion: Not relevant intervention
Franklin B, Reynolds M. (2010) A comparative study of prescribing errors in three NHS organisations. International Journal of Pharmacy Practice 18: 80-81	Reason for exclusion: Abstract only
Franklin BD, McLeod M, Barber N. (2010) Comment on 'Prevalence, Incidence and Nature of Prescribing Errors in Hospital Inpatients: A Systematic review' Drug Safety 33(2): 163-5	Reason for exclusion: Not relevant
Frush KS (2008) Fundamentals of a patient safety program. Pediatric Radiology 38: Suppl 9	Reason for exclusion: Not relevant
Gallagher P, Barry P, Ryan C. (2007) Inappropriate prescribing in the elderly. Journal of Clinical Pharmacy & Therapeutics 32(2): 113-21	Reason for exclusion: Not relevant intervention
Gandhi TK, Weingart SN, Seger AC, et al. (2005) Outpatient prescribing errors and the impact of computerized prescribing. Journal of General Internal Medicine 20(9): 837-41	Reason for exclusion: Not relevant intervention
Garcia-Aparicio J, Herrero-Herrero JI. (2013) Medication errors detected in elderly patients admitted to an internal medicine service. International Journal of Clinical Practice 67(3): 282-89	Reason for exclusion: Not relevant intervention
Garrouste-Orgeas M, Philippart F, Bruel C, et al. (2012) Overview of medical errors and adverse events. Annals of Intensive Care 2(1): 1-9	Reason for exclusion: Not relevant
George D, Austin-Bishop N. (2003) Error rates for computerized order entry by physicians versus non physicians. American Journal of Health-System Pharmacy 60(21): 2250-52	Reason for exclusion: Not relevant
Giaquinta D. (2006) New recommandations from the Institute of Medicine on preventing medication errors. Managed Care Interface 19(10): 26-31	Reason for exclusion: Not relevant intervention
Gibson T. (2001) Nurses and medication error: a discursive reading of the literature. Nursing Inquiry 8(2): 108-17 Reason for exclusion: Not relevant	
Gillespie U, Alassaad A, Hammarlund-Udenaes M, et al (2013) Effects of Pharmacists' Interventions on Appropriateness of Prescribing and Evaluation of the Instruments (MAI, STOPP and STARTs) Ability to Predict Hospitalization-Analyses from a Randomized Controlled Trial. PloS one 8(5)	Reason for exclusion: Not relevant intervention
Glavin RJ. (2010) Drug errors: consequences, mechanisms, and avoidance. British Journal of Anaesthesia 105(1): 76-82	Reason for exclusion: Not relevant intervention
Gluck PA. (2008) Medical error theory. Obstetrics & Gynecology Clinics of North America 35(1): 11-17	Reason for exclusion: Not relevant
Gluck PA. (2012) Patient safety: Some progress and many challenges. Obstetrics and Gynaecology 120(5): 1149-59 Reason for exclusion: Not relevant	Reason for exclusion: Not relevant
Godfrey CM, Harrison MB, Lang A, et al. (2013) Homecare safety and medication management: A scoping review of the quantitative and qualitative evidence. JBI Database of Systematic Reviews and Implementation Reports 11(2): 357-71	Reason for exclusion: Not relevant

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Gorini A, Migloretti M, Pravettoni G. (2012) A new perspective on blame culture: An experimental study. Journal of Evaluation in Clinical Practice 18(3): 671-75	Reason for exclusion: Not relevant
Goulding MR. (2004) Inappropriate Medication Prescribing for Elderly Ambulatory Care Patients Archives of Internal Medicine 164(3): 305-12	Reason for exclusion: Not relevant intervention
Granas AG, Berg C, Hjelvik V, et al. (2010) Evaluating categorisation and clinical relevance of drug-related problems in medication reviews. Pharmacy World and Science 32(3): 394-403	Reason for exclusion: Not relevant intervention
Grasso BC, Genest R, Jordon CW, et al. (2003) Use of chart and record reviews to detect medication errors in a state psychiatric hospital. Psychiatric Services 54(5): 677-81	Reason for exclusion: Not relevant
Grasso BC, Rothschild JM, Jordon CW, et al. (2005) What is the measure of a safe hospital? Medication errors missed by risk management, clinical staff, and surveyors. Journal of Psychiatric Practice 11(4): 268-73	Reason for exclusion: Not relevant
Grissinger M. (2005) Illusions and medication errors. Pharmacy and Therapeutics 30(9): 482	Reason for exclusion: Not relevant
Grissinger M. (2007) How to prevent medication errors in long-term care: Part 2. Consultant Pharmacist 22(8): 646-58	Reason for exclusion: Not relevant
Grissinger M. (2007) Medication errors in long-term care: Part 1 Consultant Pharmacist 22(7): 544-64	Reason for exclusion: Not relevant
Grissinger MC and Kelly K. (2007) Reducing the risk of medication errors in women. Journal of Women's Health 14(1): 61-7	Reason for exclusion: Not relevant
Grzybicki DM. (2004) Barriers to the implementation of patient safety initiatives. Clinics in Laboratory Medicine 24(4): 901-11	Reason for exclusion: Not relevant
Guchelaar HJ, Colen HB, Kalmeijer MD, et al. (2005) Medication errors: hospital pharmacist perspective. Drugs 65(13): 1735-46	Reason for exclusion: Not relevant
Gunn IP. (2000) Patient safety and human error: The big picture. Clinical Forum for Nurse Anesthetists 11(1): 41-48	Reason for exclusion: Not relevant
Gupta M, Agarwal M. (2013) Understanding medication errors in the elderly. New Zealand Medical Journal 126(1385): 73-81	Reason for exclusion: Unable to source
Hahn NB, Faustino CG. (2010) Clinical predictors to the prescription of potentially inappropriate medications to community older patients. Journal of the American Geriatrics Society 58: S48-S49	Reason for exclusion: Abstract only
Hamby EF, Rotarius T. (2003) Medical errors and safety. Dialysis and Transplantation 32(9): 535	Reason for exclusion: Not relevant
Handler JA, Gillam M, Sanders AB, et al (2000) Defining, identifying, and measuring error in emergency medicine. Academic Emergency Medicine 7(11): 1183-88	Reason for exclusion: Not relevant
Hanlon JT, Lindblad CI, Gray SL. (2004) Can clinical pharmacy services have a positive impact on drug-related problems and health outcomes in community-based older adults? American Journal of Geriatric Pharmacotherapy 2(1): 3-13	Reason for exclusion: Not relevant intervention
Haw CM, Dickens G, Stubbs J. (2005) A review of medication administration errors reported in a large psychiatric hospital in the United Kingdom. Psychiatric Services 56(12): 1610-13	Reason for exclusion: Not relevant intervention
Hayward RA, Asch SM, Hogan MM, et al. (2005) Sins of omission: Getting too little medical care may be the greatest threat to patient safety. Journal of General Internal Medicine 20(8): 686-91	Reason for exclusion: Not relevant
Hendrick EC, Montanya KR, Griffith N. (2007) Medication tracers: A systems approach to medication safety. Hospital Pharmacy 42(10): 916-20	Reason for exclusion: Not relevant

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Hertzel C, Sousa VD. (2009) The use of smart pumps for preventing medication errors. Journal of Infusion Nursing 32(5): 257-67	Reason for exclusion: Not relevant
Hesselgreaves H, Lough M, Power A. (2009) The perceptions of reception staff in general practice about the factors influencing specific medication errors. Education for Primary Care 20(1): 21-27	Reason for exclusion: Not relevant intervention
Hevia A, Hobgood C. (2003) Medical error during residency: To tell or not to tell. Annals of Emergency Medicine 42(4): 565-70	Reason for exclusion: Not relevant
Hicks RW, Becker SC, Jackson DG. (2008) Understanding medication errors: discussion of a case involving a urinary catheter implicated in a wrong route error. Urologic Nursing 28(6): 454-59	Reason for exclusion: Not relevant
Hicks RW, Becker SC, Krenzischeck D, et al. (2004) Medication errors in the PACU: a secondary analysis of MEDMARX findings. Journal of Perianesthesia Nursing 19(1): 18-28	Reason for exclusion: No relevant intervention
Hicks RW, Becker SC. (2006) An overview of intravenous-related medication administration errors as reported to MEDMARX, a national medication error-reporting program. Journal of Infusion Nursing 29(1): 20-27	Reason for exclusion: No relevant intervention
Hidle U. (2007) Implementing technology to improve medication safety in healthcare facilities: a literature review. Journal of the New York State Nurses Association 38(2): 4-9	Reason for exclusion: No relevant intervention
Hillsden I, Fenton GS. (2006) Improving practice and patient safety through a medication systems review. Quality in Primary Care 14(1): 33-40	Reason for exclusion: No relevant intervention
Hill-Taylor B, Sketris I, Hayden J, et al. (2013) Application of the STOPP/START criteria: a systematic review of the prevalence of potentially inappropriate prescribing in older adults, and evidence of clinical, humanistic and economic impact. Journal of Clinical Pharmacy & Therapeutics 38 (5): 360-72	Reason for exclusion: Systematic review – not all studies eligible. Relevant studies extracted
Hobgood C, Hevia A, Hinchey P. (2004) Profiles in patient safety: When an error occurs. Academic Emergency Medicine 11(7): 766-70	Reason for exclusion: Not relevant
Holden RJ, Karsh BT. (2007) A review of medical error reporting system design considerations and a proposed cross-level systems research framework. Human Factors 49(2): 257-76	Reason for exclusion: Not relevant intervention
Hoonhout LH, De Bruijne M, Wagner C, et al. (2010) Nature, occurrence and consequences of medication-related adverse events during hospitalization: a retrospective chart review in the Netherlands. Drug Safety 33(10): 853-64	Reason for exclusion: Not relevant intervention
Howard R. (2004) Incidents and near misses can be avoided by taking appropriate action. Pharmacy in Practice 14(6): 179-81	Reason for exclusion: Not relevant
Howard R. (2004) Root cause analysis can reduce patient safety errors. Pharmacy in Practice 14(2): 49-52	Reason for exclusion: Not relevant
Howard R. (2004) What strategies are in place to reduce medication errors in the pharmacy? Pharmacy in Practice 14(1): 22-24	Reason for exclusion: Not relevant
Hughes RG and Ortiz E. (2005) Medication errors: why they happen, and how they can be prevented. Journal of Infusion Nursing 28(2:Suppl) Suppl 24	Reason for exclusion: Not relevant
Hughes RG, Edgerton EA. (2005) Reducing pediatric medication errors: children are especially at risk for medication errors. American Journal of Nursing 105(5): 79-80	Reason for exclusion: Not relevant
Hussain S. (2008) Safer prescribing: the principles. Foundation Years 4(6): 246-48	Reason for exclusion: Not relevant

Author	Reason for exclusion
Ionnidis JP, Lau J. (2001) Evidence on interventions to reduce medical errors: An overview and recommendations for future research. Journal of General Internal Medicine 16(5): 325-34	Reason for exclusion: Not relevant
Ionnidis JP, Lau J. (2001) Review: Some interventions are effective in reducing medical errors. Evidence-Based Medicine 6(6): 190	Reason for exclusion: Abstract only
Jacobs B. (2007) Electronic medical record, error detection, and error reduction: a pediatric critical care perspective. Pediatric Critical Care Medicine 8(2:Suppl): Suppl 20	Reason for exclusion: Not relevant
Jacobson L, Elwyn G, Robling M, et al. (2003) Error and safety in primary care: No clear boundaries. Family Practice 20(3): 237-41	Reason for exclusion: Not relevant
James KL, Barlow D, Bithell A. (2013) The impact of automation on workload and dispensing errors in a hospital pharmacy. International Journal of Pharmacy Practice 21: 92-104	Reason for exclusion: Not relevant intervention
James KL, Barlow D, McArtney R, et al. (2009) Incidence, type and causes of dispensing errors: a review of the literature. International Journal of Pharmacy Practice 17(1): 9-30	Reason for exclusion: Not relevant intervention
Jani YH, Barber N, Wong IC. (2011) Republished error management: Paediatric dosing errors before and after electronic prescribing. Postgraduate Medical Journal 87(1030): 565-68	Reason for exclusion: Not relevant intervention
Jano E, Aparasu RR. (2007) Healthcare outcomes associated with beers' criteria: a systematic review. Annals of Pharmacotherapy 41(3): 438-47	Reason for exclusion: Not relevant study
Jeetu G, Girish T. (2010) Prescription drug labeling medication errors: A big deal for pharmacists. Journal of Young Pharmacists 2(1): 107-11	Reason for exclusion: Not relevant
Jepsen J, Jestrab F. (2010) Beers criteria medication review and use within a state psychiatric facility. Journal of Pharmacy Practice 23(2): 176	Reason for exclusion: Not relevant intervention
Joanna Briggs Institute. (2006) Strategies to reduce medication errors with reference to older adults. Nursing Standard 20(41): 53-57	Reason for exclusion: Not relevant intervention
Joergensen MG. (2012) STOPP and START screening tools as supplements to the pharmaceutical medicines review. European Journal of Hospital Pharmacy: Science and Practice 19(2): 234-35	Reason for exclusion: Abstract only
John JM. (2005) Preventing medication errors at home. Journal of Pharmacy Practice 18(3): 141-44	Reason for exclusion: Not relevant
Johnson N. (2000) The use of technology to improve drug therapy outcomes. Formulary 35(1): 65-70	Reason for exclusion: Not relevant
Johnson SK, Rozovsky FA. (2000) Strategies for reducing medical errors: HIM's role. Journal of the American Health Information Management Association 71(7): 52-56	Reason for exclusion: Not relevant
Källberg AS, Göransson K, Östergren J, et al. (2013) Medical errors and complaints in emergency department care in Sweden as reported by care providers, healthcare staff, and patients - a national review. European Journal of Emergency Medicine 20(1): 33-38	Reason for exclusion: No relevant intervention
Kalra J, Kalra N, Baniak N. (2013) Medical error, disclosure and patient safety: A global view of quality care. Clinical Biochemistry 46(13-14): 1161-1169	Reason for exclusion: Not relevant
Kalra J. (2004) Medical errors: an introduction to concepts. Clinical Biochemistry 37(12): 1043-51	Reason for exclusion: Not relevant
Kalra J. (2004) Medical errors: overcoming the challenges. Clinical Biochemistry 37(12): 1063-71	Reason for exclusion: No relevant intervention
Kane-Gill S. (2013) Comment: Prevalence and nature of medication	Reason for exclusion:

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administration errors in health care settings: A systematic review of direct observational evidence. Annals of Pharmacotherapy 47(5): 760-61	Abstract only
Karthikeyan M, Lalitha D. (2013) A prospective observational study of medication errors in general medicine department in a tertiary care hospital. Drug Metabolism & Drug Interactions 28(1): 13-21	Reason for exclusion: No relevant intervention
Katsi VK, Boudoulas KD, Lytrivi ID. (2013) Medical error in clinical practice: "Errare humanum est." Hellenic Journal of Cardiology 54(2): 131-135	Reason for exclusion: Not relevant
Kaufmann J, Laschat M, Wappler F. (2012) Medication errors in pediatric emergencies: a systematic analysis. Deutsches Arzteblatt International 109(38): 609-16	Reason for exclusion: Not relevant intervention
Kaur S, Mitchell G, Vitetta L, et al. (2009) Interventions that can reduce inappropriate prescribing in the elderly: a systematic review. Drugs & Aging 26(12): 1013-28	Reason for exclusion: Not relevant intervention
Kaushal R, Barker K, Bates DW. (2001) How can information technology improve patient safety and reduce medication errors in children's health care? Archives of Pediatrics and Adolescent Medicine 155(9): 1002-07	Reason for exclusion: Not relevant intervention
Kaushal R, Jaggi T, Walsh K, et al. (2004) Pediatric medication errors: What do we know? What gaps remain? Ambulatory Pediatrics 4(1): 73-81	Reason for exclusion: Not relevant intervention
Kaushal R, Kern LM, Barrón Y, et al. (2010) Electronic prescribing improves medication safety in community-based office practices. Journal of General Internal Medicine 25(6): 530-36	Reason for exclusion: Not relevant intervention
Kaushal R, Shojania K, Bates DW. (2003) Effects of computerized physician order entry and clinical decision support systems on medication safety: a systematic review. Archives of Internal Medicine 163(12): 1409-16	Reason for exclusion: Not relevant intervention
Kaushal R. (2002) Using chart review to screen for medication errors and adverse drug events. American Journal of Health-System Pharmacy 59(23): 2323-25	Reason for exclusion: Not relevant
Kazandjian VA, Matthes N, Thomas T. (2001) Errors: Can indicators measure the magnitude? Journal of Evaluation in Clinical Practice 7(2): 253-60	Reason for exclusion: Not relevant
Keatings M, Martin M, McCallum A, et al. (2006) Medical Errors: Understanding the Parent's Perspective. Pediatric Clinics of North America 53(6): 1079-89	Reason for exclusion: Not relevant
Keers RN, Williams SD, Cooke J, et al. (201) Causes of medication administration errors in hospitals: A systematic review of quantitative and qualitative evidence. Drug Safety 36(11): 1045-67	Reason for exclusion: Not relevant intervention
Keers RN, Williams SD, Cooke J, et al. (2012) Systematic review of direct observation evidence investigating the prevalence and nature of medication administration errors. Pharmacoepidemiology and Drug Safety 21(7): 794	Reason for exclusion: Abstract only
Keers RN, Williams SD, Cooke J, et al. (2012) The causes of and factors associated with medication administration errors: A systematic review of empirical evidence. International Journal of Pharmacy Practice 20: 28-29	Reason for exclusion: Abstract only
Keohane CA, Bates DW. (2008) Medication safety. Obstetrics & Gynecology Clinics of North America 35(1): 37-52	Reason for exclusion: Not relevant
Kester L, Stoller JK. (2003) Prevalence and Causes of Medication Errors: A Review. Clinical Pulmonary Medicine 10(6): 322-326	Reason for exclusion: Not relevant
Key C, Lee S. (2010) Impact of a geriatric consultation on the prescription of potentially inappropriate medications and opioids in	Reason for exclusion: Abstract only

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elderly patients. Journal of the American Geriatrics Society 58: S170	
Kfuri TA, Morlock L, Hicks RW, et al. (2008) Medication errors in obstetrics. Clinics in Perinatology 35(1): 101-17	Reason for exclusion: Not relevant
Khalili H, Farsaei S, Razee H, et al. (2011) Role of clinical pharmacists' interventions in detection and prevention of medication errors in a medical ward. International Journal of Clinical Pharmacy 33(2): 281-84	Reason for exclusion: No relevant outcomes
Khan FA, Hoda MQ. (2005) Drug related critical incidents. Anaesthesia 60(1): 48-52	Reason for exclusion: Not a study
King WJ, Paice N, Rangrel J, et al. (2003) The effect of computerized physician order entry on medication errors and adverse drug events in pediatric inpatients. Pediatrics 112(3 Part 1): 506-09	Reason for exclusion: No relevant intervention
Kirke C. (2009) Medication safety in hospitals. Irish Medical Journal 102 (10) 339-41	Reason for exclusion: No relevant intervention
Klopotowska JE, Kuiper RA, van Kan HJ. (2009) Reviewing medication and participation of a clinical pharmacist in a Dutch intensive care team reduce prescribing errors. Quality and Safety in Health Care 18(4): e1	Reason for exclusion: Abstract Only
Koczmara C, Dueck C, Jelincic V. (2006) To err is human, to share is divine. Dynamics 17(3): 22-25	Reason for exclusion: Not relevant
Koczmara C, Jelincic V, Perri D. (2006) Communication of medication orders by telephone – "writing it right". Dynamics 17(1) 20-24	Reason for exclusion: Not relevant
Kohn LT. (2001) The Institute of Medicine report on medical error: Overview and implications for pharmacy. American Journal of Health-System Pharmacy 58(1): 63-66	Reason for exclusion: Not relevant
Kopec D, Kabir MH, Reinharth D, et al. (2003) Human Errors in Medical Practice: Systematic classification and reduction with automated information systems. Journal of Medical Systems 27(4): 297-313	Reason for exclusion: Not relevant
Koppel R. (2005) What do we know about medication errors made via a CPOE system versus those made via handwritten orders? Critical Care 9(5): 427-28	Reason for exclusion: Not relevant
Koskinen T, Maukonen M. (2009) The Finnish adverse event reporting process (HaiPro). EJHP Practice 15(3): 77-78	Reason for exclusion: Not relevant
Koumpagioti D, Varounis C, Kletsiou E, et al. (2011) Evaluation of the medication process in pediatric patients: A meta-analysis of medication errors rate. Acta Paediatrica, International Journal of Paediatrics: 100-105	Reason for exclusion: Abstract only
Koutantji M, Davis R, Vincent C, et al. (2005) The patient's role in patient safety: Engaging patients, their representatives, and health professionals. Clinical Risk 11(3): 99-104	Reason for exclusion: Not relevant
Kozer E, Berkovitch M, Koren G. (2006) Medication Errors in Children. Pediatric Clinics of North America 2006 53(6): 1155-68	Reason for exclusion: Not relevant
Kozer E, Scolnik D, MacPherson A, et al. (2005) Using a preprinted order sheet to reduce prescription errors in a pediatric emergency department: A randomized, controlled trial. Pediatrics 116(6): 1299-1302	Reason for exclusion: Not relevant intervention
Krähenbühl-Melcher A, Schlienger R, Lampert M, et al. (2007) Drug-related problems in hospitals: A review of the recent literature. Drug Safety 30(5): 379-407	Reason for exclusion: Not relevant intervention
Kram R. (2008) Critical incident reporting system in emergency	Reason for exclusion: Not

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medicine. Current Opinion in Anaesthesiology 21(2): 240-244	relevant
Kripalani S, Roumie CL, Dalal AK. (2012) Effect of a pharmacist intervention on clinically important medication errors after hospital discharge: A randomized trial. Annals of Internal Medicine 157(1): 1-10	Reason for exclusion: Not relevant intervention
Kristensen S, Mainz J, Bartels P. (2009) Selection of indicators for continuous monitoring of patient safety: Recommendations of the project 'safety improvement for patients in Europe'. International Journal for Quality in Health Care 21(3): 169-175	Reason for exclusion: Not relevant intervention
Kroll L, Singleton A, Collier J, et al. (2008) Learning not to take it seriously: junior doctors' accounts of error. Medical Education 42(10): 982-90	Reason for exclusion: Not relevant
Krouwer JS. (2004) An improved failure mode effects analysis for hospitals. Archives of Pathology and Laboratory Medicine 128(6): 663-67	Reason for exclusion: Not relevant
Krug SE, Frush K. (2007) Patient safety in the pediatric emergency care setting. Pediatrics 120(6): 1367-75	Reason for exclusion: Not relevant
Kuo GM. (2007) Medication errors in community/ambulatory care: Incidence and reduction strategies. Journal of Pharmaceutical Finance, Economics and Policy 15(3): 43-136	Reason for exclusion: No relevant intervention
Kuperman GJ, Teich JM, Gandhi TK, et al. (2001) Patient safety and computerized medication ordering at Brigham and Women's Hospital. Joint Commission Journal on Quality Improvement 27(10): 509-21	Reason for exclusion: No relevant intervention
Kyriacou DN, Coben JH. (2000) Errors in emergency medicine: research strategies. Academic Emergency Medicine 7(11): 1201-03	Reason for exclusion: Not relevant
La Pietra L, Calligaris L, Molendini L, et al. (2005) Medical errors and clinical risk management: state of the art. Acta Otorhinolaryngologica Italica 25(6): 339-46	Reason for exclusion: Not relevant
Lafleur KJ. (2004) Tackling med errors with technology. RN Journal 67(5): 29-34	Reason for exclusion: Not relevant
Lainer M, Mann E, Sönnichsen A. (2013) Information technology interventions to improve medication safety in primary care: A systematic review. International Journal for Quality in Health Care 25(5): 590-98	Reason for exclusion: No relevant intervention
Lam MP, Cheung BM. (2012) The use of STOPP/START criteria as a screening tool for assessing the appropriateness of medications in the elderly population. Expert Review of Clinical Pharmacology 5(2): 187-97	Reason for exclusion: Not relevant study
Landrigan CP. (2005) The safety of inpatient pediatrics: preventing medical errors and injuries among hospitalized children. Pediatric Clinics of North America 52(4): 979-93	Reason for exclusion: Not relevant
Larson EB. (2002) Measuring, monitoring, and reducing medical harm from a systems perspective: A medical director's personal reflections. Academic Medicine 77(10): 993-1000	Reason for exclusion: Not relevant
Lassetter JH, Warnick ML. (2003) Medical errors, drug-related problems, and medication errors: a literature review on quality of care and cost issues. Journal of Nursing Care Quality 182 18(3): 175-181	Reason for exclusion: Not relevant intervention
Latimer SL, Chaboyer W, Hall T. (2011) Non-therapeutic medication omissions: incidence and predictors at an Australian hospital. Journal of Pharmacy Practice and Research 41(3): 188-91	Reason for exclusion: Not relevant
Lawton R, McEachan RR, Giles SJ, et al. (2012) Development of an evidence-based framework of factors contributing to patient safety incidents in hospital settings: a systematic review. BMJ Quality &	Reason for exclusion: No relevant comparator

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Safety 21(5): 369-80	
Leape LL, Berwick D, Clancy C. (2009) Transforming healthcare: A safety imperative. Quality and Safety in Health Care 18(6): 424-28	Reason for exclusion: No relevant intervention
Lee D, Martini N, Moyes S. (2013) Potentially inappropriate medication use: the Beers' Criteria used among older adults with depressive symptoms. Journal of Primary Health Care 5(3): 182-90	Reason for exclusion: No relevant comparator
Leemderste AJ, Egberts AC, Stoker LJ. (2008) Frequency of and risk factors for preventable medication-related hospital admissions in the Netherlands. Archives of Internal Medicine 168(17): 1890-96	Reason for exclusion: No relevant intervention
Lefrak L. (2002) Moving toward safer practice: reducing medication errors in neonatal care. Journal of Perinatal & Neonatal Nursing 16(2): 73-84	Reason for exclusion: Not relevant
Lehmann CU and Kim GR. (2006) Decreasing errors in pediatric continuous intravenous infusions. Pediatric Critical Care Medicine 7(3): 225-30	Reason for exclusion: No relevant intervention
Lehmann CU, Johnson K, Del Beccaro MA, et al. (2013) Electronic prescribing in pediatrics: Toward safer and more effective medication management. Pediatrics 131(4): 824-26	Reason for exclusion: Not relevant
Lehmann CU, Kim GR. (2005) Prevention of medication errors. Clinics in Perinatology 32(1): 107-23	Reason for exclusion: Not relevant
Leonard MS. (2010) Patient safety and quality improvement: medical errors and adverse events. Pediatrics in Review 31(4): 151-58	Reason for exclusion: Not relevant
Levy HB, Marcus EL, Christen C. (2010) Beyond the beers criteria: A comparative overview of explicit criteria. Annals of Pharmacotherapy 44(12): 1968-75	Reason for exclusion: Not relevant
Lewis PJ, Dornan T, Taylor D, et al. (2009) Prevalence, incidence and nature of prescribing errors in hospital inpatients: A systematic review. Drug Safety 32(5): 379-89	Reason for exclusion: No relevant intervention
Lim MK. (2004) Quest for quality care and patient safety: The case of Singapore. Quality and Safety in Health Care 13(1): 71-75	Reason for exclusion: Not relevant
Lisby M, Nielsen LP, Brock B, et al. (2010) How are medication errors defined? A systematic literature review of definitions and characteristics. International Journal for Quality in Health Care 22(6): 507-18	Reason for exclusion: Not relevant intervention
Lisby M, Nielsen LP. (2010) Focused Conference Group: P13 - Maximising benefits and minimizing harms from drugs does definition of medication errors have any impact at prevalence? A systematic review of definitions. Basic and Clinical Pharmacology and Toxicology 107: 417	Reason for exclusion: Abstract only
Liu W, Manias E, Gerdtz M. (2011) Understanding medication safety in healthcare settings: a critical review of conceptual models. Nursing Inquiry 18(4): 290-302	Reason for exclusion: Not relevant
Looi KL, Black PN. (2008) How often do physicians review medication charts on ward rounds? BMC Clinical Pharmacology 8: 9	Reason for exclusion: Not relevant intervention
Lucas AJ. (2004) Improving medication safety in a neonatal intensive care unit. American Journal of Health-System Pharmacy 61(1): 33-37	Reason for exclusion: Not relevant
Lund BC, Carnahan RM, Egge JA. (2010) Inappropriate prescribing predicts adverse drug events in older adults. Annals of Pharmacotherapy 44(6): 957-63	Reason for exclusion: Not relevant intervention
Lund BC, Steinman MA, Chrischilles EA, et al. (2011) Beers criteria as a proxy for inappropriate prescribing of other medications among	Reason for exclusion: Not relevant

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older adults. Annals of Pharmacotherapy 45(11): 1363-70	
Mager DR. (2007) Medication errors and the home care patient. Home Healthcare Nurse156 25(3): 151-55	Reason for exclusion: Not relevant
Magrabi F, Li SY, Day RO. (2010) Errors and electronic prescribing: A controlled laboratory study to examine task complexity and interruption effects. Journal of the American Medical Informatics Association 17(5): 575-83	Reason for exclusion: Not relevant intervention
Mahajan RP. (2011) Medication errors: Can we prevent them? British Journal of Anaesthesia 107(1): 3-5	Reason for exclusion: Not relevant intervention
Maher RL, Hajjar ER. (2012) Medication errors in the ambulatory elderly. Aging Health 8(2): 127-135	Reason for exclusion: Not relevant
Maidment ID, Haw C, Stubbs J, et al. (2008) Medication errors in older people with mental health problems: A review. International Journal of Geriatric Psychiatry 23(6): 564-73	Reason for exclusion: Not relevant intervention
Maidment ID, Lelliot P, Paton C. (2006) Medication errors in mental healthcare: a systematic review. Quality & Safety in Health Care 15(6): 409-13	Reason for exclusion: Not relevant
Manias E, Williams A, Liew D. (2012) Interventions to reduce medication errors in adult intensive care: a systematic review. British Journal of Clinical Pharmacology 74 (3): 411-23	Reason for exclusion: Systematic review – not all studies eligible. Relevant studies extracted
Manias E. (2013) Detection of medication-related problems in hospital practice: A review. British Journal of Clinical Pharmacology76 (1): 7-20	Reason for exclusion: Not relevant study
Mannheimer B, Ulfvarson J, Eklöf S, et al. (2006) Drug-related problems and pharmacotherapeutic advisory intervention at a medicine clinic. European Journal of Clinical Pharmacology 62(12): 1075-81	Reason for exclusion: Not relevant intervention
Manno MS. (2006) Preventing adverse drug events. Nursing 36(3): 56-61	Reason for exclusion: Not relevant
Mansour M, James V, Edgley A. (2012) Investigating the safety of medication administration in adult critical care settings. Nursing in Critical Care 17(4): 189-197	Reason for exclusion: Not relevant intervention
Marcos Perez G, Mulet Alberola A, Escudero Brocal A, et al. (2012) Prescribing errors detected after an electronic prescribing system implementation. European Journal of Hospital Pharmacy: Science and Practice 19(2): 94	Reason for exclusion: Abstract only
Marcum ZA, Handler SM, Boyce R, et al (2010) Medication misadventures in the elderly: A year in review. American Journal Geriatric Pharmacotherapy 8(1): 77-83	Reason for exclusion: No relevant intervention
Mark SM and Weber RJ. (2007) Developing a medication patient safety program – Infrastructure and strategy. Hospital Pharmacy 42(2): 149-56	Reason for exclusion: Not relevant
Mark SM, Weber RJ. (2007) Developing a medication patient safety program, part 2: Process and implementation. Hospital Pharmacy 42(3): 249-54	Reason for exclusion: Not relevant
Martin CM, Bryan G. (2006) Pharmacists at the forefront: Reducing medication errors. Consultant Pharmacist 21(5): 380-89	Reason for exclusion: Not relevant
Martin CM. (2003) Providing medication management at home: A new role for consultant pharmacists. Consultant Pharmacist 18(9): 738-45	Reason for exclusion: Not relevant
Martin CM. (2004) Implementing the revised "Beers criteria": New problems, or new possibilities? Consultant Pharmacist 19(5): 416-422	Reason for exclusion: Not relevant study

Author	Reason for exclusion
Martin CM. (2012) The updated beers criteria: Promoting use of evidence-based medications in the elderly. Consultant Pharmacist 27(9): 602-12	Reason for exclusion: Not relevant
Matanovic SM, Vlahovic-Palcevski V. (2012) Potentially inappropriate medications in the elderly: A comprehensive protocol. European Journal of Clinical Pharmacology 68(8): 1123-38	Reason for exclusion: Not relevant intervention
Matlow A, Stevens P, Harrison C, et al. (2006) Disclosure of medical errors. Pediatric Clinics of North America 53(6): 1091-104	Reason for exclusion: Not relevant
Mattox EA. (2012) Strategies for improving patient safety: linking task type to error type. Critical Care Nurse 32(1): 52-78	Reason for exclusion: Not relevant
Mazor KM, Simon S, Gurwitz JH. (2004) Communicating with patients about medical errors: A review of the literature. Archives of Internal Medicine 164(15): 1690-97	Reason for exclusion: Not relevant
McBride-Henry K, Foureur M. (2006) Medication administration errors: understanding the issues. Australian Journal of Advanced Nursing 23(3): 33-41	Reason for exclusion: Not relevant
McCarter TG, Centafont R, Daly FN, et al. (2003) Reducing medication errors: A regional approach for hospitals. Drug Safety 26(13): 937-50	Reason for exclusion: Not relevant
McLeod SE, Lum E, Mitchell C. (2008) Value of medication reconciliation in reducing medication errors on admission to hospital. Journal of Pharmacy Practice and Research 38(3):196-99	Reason for exclusion: No relevant intervention
McNutt RA, Abrams R, Arons DC, et al. (2002) Patient safety efforts should focus on medical errors. Journal of the American Medical Association 287(15): 1997-2001	Reason for exclusion: Not relevant
McRae J, Lovett A, Ohaya J, et al. (2013) Drug-related problems and medication errors: A literature review on economic outcomes in Sub-Saharan Africa. Value in Health 16(3): A198	Reason for exclusion: Abstract only
Mehndiratta S. (2012) Strategies to reduce medication errors in pediatric ambulatory settings. Journal of Postgraduate Medicine 58(1): 47-53	Reason for exclusion: Not relevant
Merry AF and Anderson BJ. (2011) Medication errors - New approaches to prevention. Paediatric Anaesthesia 21(7): 743-53	Reason for exclusion: Not relevant
Metlay JP, Cohen A, Polsky D, et al. (2005) Medication safety in older adults: Home-based practice patterns. Journal of the American Geriatrics Society 53(6): 976-82	Reason for exclusion: Not relevant
Meyboom RHB. (2010) 'Spontaneous monitoring': Lessons from the past, uses in the future. Rheumatologia 24(3): 73-80	Reason for exclusion: No relevant intervention
Meyer G, Foster N, Christrup S, et al. (2001) Setting a research agenda for medical errors and patient safety. Health Services Research 36(1 Part 1)	Reason for exclusion: Not relevant
Meyer GS, Battles J, Hart JC, et al. (2003) The US Agency for Healthcare Research and Quality's activities in patient safety research. International Journal for Quality in Health Care Suppl 1: i25-30	Reason for exclusion: Unable to extrapolate to UK setting
Meyer GS, Rall C. (2002) Use of evidence-based data to drive your patient safety program. American Journal of Infection Control 30(5): 314-17	Reason for exclusion: Not relevant
Meyer-Massetti C, Cheng CM, Schwappach DL, et al. (2011) Systematic review of medication safety assessment methods. American Journal of Health System Pharmacy 68 (3) 227-40	Reason for exclusion: Systematic review – not all studies eligible. Relevant studies extracted
Miller MR, Robinson KA, Lubomski LH, et al. (2007) Medication errors in paediatric care: A systematic review of epidemiology and	Reason for exclusion: Not relevant

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an evaluation of evidence supporting reduction strategy recommendations. Quality and Safety in Health Care 16(2): 116-26	
Milligan F. (2006) Implementing solutions to prevent patient harm. Nursing Standard 20(19): 56-59	Reason for exclusion: No relevant intervention
Mimica MS, Vlahovic-Palcevski V. (2012) Potentially inappropriate medications in the elderly: a comprehensive protocol. European Journal of Clinical Pharmacology 68(8): 1123-38	Reason for exclusion: Not relevant
Mims E, Tucker C, Carlson R, et al. (2009) Quality-monitoring program for bar-code-assisted medication administration. American Journal of Health-System Pharmacy 66(12): 1125-31	Reason for exclusion: No relevant intervention
Moore C, Wisnivesky J, Williams S, et al. (2003) Medical errors related to discontinuity of care from an inpatient to an outpatient setting. Journal of General Internal Medicine 18(8): 646-51	Reason for exclusion: Not relevant
Morris CJ, Catrill JA, Avery AJ. (2003) How the use of preventable drug-related morbidity indicators can improve medicines management in primary care. Pharmaceutical Journal 271(7275): 682-86	Reason for exclusion: Not relevant intervention
Moyen E, Camiré E, Stelfox HT. (2008) Clinical review: Medication errors in critical care. Critical Care 12(2)	Reason for exclusion: Not relevant
Muller T. (2003) Typical medication errors in oncology: Analysis and prevention strategies. Onkologie 26(6): 539-44	Reason for exclusion: Not relevant
Murray MD, Ritchey ME, Wu J. (2009) Effect of a pharmacist on adverse drug events and medication errors In outpatients with cardiovascular disease. Archives of Internal Medicine169(8): 757-63	Reason for exclusion: Not relevant intervention
Nasser S, Slim M. (2012) Impact of clinical pharmacy program on prescription errors in a Lebanese institution: A cost benefit analysis. Value in Health15(7): A307	Reason for exclusion: Abstract only
Nath SB, Marcus SC. (2006) Medical errors in psychiatry. Harvard Review of Psychiatry 14(4): 204-11	Reason for exclusion: Not relevant
Neale G, Chapman EJ, Hoare J, et al. (2006) Recognising adverse events and critical incidents in medical practice in a district general hospital. Clinical Medicine 6(2): 157-62	Reason for exclusion: Not relevant
Nelson NC, Evans RS, Samore MH, et al. (2005). Detection and prevention of medication errors using real-time bedside nurse charting. Journal of the American Medical Informatics Association 12(4): 390-97	Reason for exclusion: Not relevant intervention
Nichols JH. (2005) Reducing medical errors at the point of care. Laboratory Medicine 36(5): 275-77	Reason for exclusion: Not relevant
Nichols P, Copeland TS, Craib IA, et al. (2008) Learning from error: Identifying contributory causes of medication errors in an Australian hospital. Medical Journal of Australia 188(5): 276-79	Reason for exclusion: Not relevant intervention
Nichter MA. (2008) Medical errors affecting the pediatric intensive care patient: incidence, identification, and practical solutions. Pediatric Clinics of North America 55(3): 757-77	Reason for exclusion: Not relevant intervention
Nkeng GL, Cloutier AM, Craig C, et al. (2010) A Review of risk minimization interventions – 2000 to 2009. Drug Safety 33(10): 946	Reason for exclusion: Abstract only
Nusbaum NJ. (2005) Improving patient care: Learning more from bad outcomes. American Journal of the Medical Sciences 329(1): 22-24	Reason for exclusion: Not relevant
O'Connor E, Coates HM, Yardley IE, et al. (2010) Disclosure of patient safety incidents: a comprehensive review. International Journal for Quality in Health Care 22(5): 371-79	Reason for exclusion: Not relevant intervention

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O'Connor MN, Gallgher P, O'Mahony D. (2012) Inappropriate prescribing: criteria, detection and prevention. Drugs and Aging 29(6): 437-52	Reason for exclusion: No relevant outcomes
O'Dell K. (2006) Allergy documentation: strategies for patient safety. Oklahoma Nurse 51(2)	Reason for exclusion: Unable to source study
O'Mahony D, Gallagher P, Ryan C, et al. (2010) STOPP & START criteria: A new approach to detecting potentially inappropriate prescribing in old age. European Geriatric Medicine 1(1): 45-51	Reason for exclusion: Not relevant study
O'Mahony D, Gallagher P. (2008) Inappropriate prescribing in the older population: need for new criteria. Age & Ageing 37(2): 138-41	Reason for exclusion: No relevant outcomes
O'Malley P. (2007) Computerized provider order entry and prescribing and the evidence for safe practice: update for the clinical nurse specialist. Clinical Nurse Specialist 21(3): 139-41	Reason for exclusion: Not relevant intervention
O'Malley P. (2007) Order no harm: evidence-based methods to reduce prescribing errors for the clinical nurse specialist. Clinical Nurse Specialist 21(2): 68-70	Reason for exclusion: Not relevant
O'Malley P. (2008) Think bar-code medication administration eliminates adverse drug events? Think again! Clinical Nurse Specialist 22(6): 269-70	Reason for exclusion: Not relevant intervention
Ogboli-Nwasor E. (2013) Medication errors in anaesthetic practice: a report of two cases and review of the literature. African Health Sciences 13(3): 845-49	Reason for exclusion: Not relevant study
Oliven A, Michalake I, Zalman D, et al. (2005) Prevention of prescription errors by computerized, on-line surveillance of drug order entry. International Journal of Medical Informatics 74(5): 377-86	Reason for exclusion: Not relevant
Opondo D, Eslami S, Visscher S, et al. (2012) Inappropriateness of medication prescriptions to elderly patients in the primary care setting: a systematic review. PLoS ONE 7(8): e43617	Reason for exclusion: Not relevant
Oren E, Shaffer ER, Guglielmo BJ. (2003) Impact of emerging technologies on medication errors and adverse drug events. American Journal of Health-System Pharmacy 60(14): 1447-58	Reason for exclusion: Not relevant
Page K, McKinney A. (2007) Addressing medication errors – The role of undergraduate nurse education. Nurse Education Today 27(3): 219-24	Reason for exclusion: Not relevant
Page RL, Linnebur SA, Bryant LL. (2010) Inappropriate prescribing in the hospitalized elderly patient: Defining the problem, evaluation tools, and possible solutions. Clinical Interventions in Aging 5(1): 75-87	Reason for exclusion: No relevant outcomes
Palaian S, Mishra P, Shankar PR, et al. (2006) Safety monitoring of drugs – Where do we stand? Kathmandu University Medical Journal 4(1): 119-27	Reason for exclusion: Not relevant
Pamer CA, Phillips J. (2000) Medication errors associated with levothyroxine products. Hospital Pharmacy 35(12): 1280-86	Reason for exclusion: Not relevant
Paoletti RD, Suess TM, Lesko MG. (2007) Using bar-code technology and medication observation methodology for safer medication administration. American Journal of Health-System Pharmacy 64(5): 536-43	Reason for exclusion: Not relevant
Pape TM. (2001) Searching for the final answer: factors contributing to medication administration errors. Journal of Continuing Education in Nursing 32(4): 152-60	Reason for exclusion: Not relevant
Patel GP, Kane- Gill SL. (2010) Medication error analysis: A	Reason for exclusion: Not

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systematic approach. Current Drug Safety 5(1): 2-5 study	relevant study
Patel IJ, Balkrishnan R. (2010) Medication error management around the globe: An overview. Indian Journal of Pharmaceutical Sciences 72(5): 539-45	Reason for exclusion: Not relevant study
Patterson SM, Hughes C, Kerse N, et al. (2013) Interventions to improve the appropriate use of polypharmacy for older people: A Cochrane Systematic Review. Pharmacoepidemiology and Drug Safety 22(6): 685-86	Reason for exclusion: No relevant intervention
Payton H, Garcia LE. (2013) Improving inappropriate medication use among elderly veterans: Impact of medication review on polypharmacy. Journal of the American Geriatrics Society 61: S163-S164	Reason for exclusion: Abstract only
Peeters MJ, Kamm GL, Bettyukova SA. (2009) A computer-based module for prescribing error instruction. American Journal of Pharmaceutical Education 73(6)	Reason for exclusion: No relevant outcomes
Perri D, Koczmara C, Zytaruk N, et al. (2012) The inventory of medication safety interventions for ICU (IMSI-ICU) – a new medication safety tool. Critical Care Medicine 40(12: Suppl 1): 251-52	Reason for exclusion: Abstract only
Petrarca AM, Lengel AJ, Mangan MN. (2012) Inappropriate medication use in the elderly. Consultant Pharmacist 27(8): 583-86	Reason for exclusion: Not relevant
Petrone K, Katz P, et al. (2005) Approaches to appropriate drug prescribing for the older adult. Primary Care; Clinics in Office Practice 32(3): 755-75	Reason for exclusion: Not relevant intervention
Petty BG. (2007) Trends in medication use: Implications for medication errors. Journal of Pharmaceutical Finance, Economics and Policy 15(3): 137-74	Reason for exclusion: Not relevant
Pham JC, Aswani MS, Rosen M, et al. (2012) Reducing medical errors and adverse events. Annual Review of Medicine 63: 447-63	Reason for exclusion: Not relevant intervention
Phillips DP, Bredder CC. (2002) Morbidity and mortality from medical errors: An increasingly serious public health problem. Annual Review of Public Health 23: 135-50	Reason for exclusion: Not relevant
Phillips MAS. (2001) National program for medication error reporting and benchmarking: Experience with MedMARx. Hospital Pharmacy 36(5): 509-13	Reason for exclusion: Not relevant
Pitts EP. (2011) Medication errors versus time of admission in a subpopulation of stroke patients undergoing inpatient rehabilitation complications and considerations. Topics in Stroke Rehabilitation 18(2): 151-53	Reason for exclusion: Not relevant intervention
Pollock M, Bazalda OV, Dobbie AE. (2007) Appropriate prescribing of medications: an eight-step approach. American Family Physician 75(2): 231-36	Reason for exclusion: Not relevant intervention
Portanova AA, Auriti C. (2010) Reporting errors and patient safety in neonatology. Journal of Maternal-Fetal and Neonatal Medicine 23: 268	Reason for exclusion: Abstract only
Porter SC, Kaushal R, Forbes PW, et al. (2008) Impact of a patient centred technology on medication errors during pediatric emergency care. Ambulatory Pediatrics 8(5): 329-35	Reason for exclusion: Not relevant
Porto GG. (2001) Disclosure of medical error: facts and fallacies. Journal of Healthcare Risk Management 21(4): 67-76	Reason for exclusion: Not relevant
Preston RM. (2004) Drug errors and patient safety: the need for a change in practice. British Journal of Nursing 13(2): 72-78	Reason for exclusion: Not relevant

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Procyshyn RM, Barr AM, Brickell T, et al. (2010) Medication errors in psychiatry: a comprehensive review. CNS Drugs 24(7): 595-609	Reason for exclusion: No relevant intervention
Radley DC, Wasserman MR, Olsho LE, et al. (2013) Reduction in medication errors in hospitals due to adoption of computerized provider order entry systems. Journal of the American Medical Informatics Association 20(3): 470-76	Reason for exclusion: No relevant intervention
Raebel MA, Charles J, Dugan J, et al. (2007) Randomized trial to improve prescribing safety in ambulatory elderly patients. Journal of the American Geriatrics Society 55(7): 977-85	Reason for exclusion: No relevant outcomes
Ramnarayan P, Steel E, Britto JF. (2004) ISABEL: A novel approach to the reduction of medical error. Clinical Risk 10(1): 9-11	Reason for exclusion: Not relevant
Rawat N. (2008) Medication error and their prevention. Journal of Neonatology 22(2): 115-17	Reason for exclusion: Not relevant
Reckmann MH, Westbrook JI, Koh Y. (2009) Does Computerized Provider Order Entry Reduce Prescribing Errors for Hospital Inpatients? A Systematic Review. Journal of the American Medical Informatics Association 16(5): 613-23	Reason for exclusion: Not relevant intervention
Rigby D. (2008) Avoiding the prescribing cascade. Australian Journal of Pharmacy 89(1064): 26-27	Reason for exclusion: Not relevant
Rivard PE, Luther SL, Christiansen CL, et al. (2008) Using patient safety indicators to estimate the impact of potential adverse events on outcomes. Medical Care Research and Review 65(1): 67-87	Reason for exclusion: Not relevant
Roark DC. (2004) Bar codes and drug administration. American Journal of Nursing 104(1): 63-66	Reason for exclusion: Not relevant intervention
Rodriguez MA, Storm CD, Burris HA. (2009) Medical errors: Physician and institutional responsibilities. Journal of Oncology Practice 5(1): 24-26	Reason for exclusion: Not relevant
Rosen AB, Blendon RJ, DesRoches CM, et al. (2005) Physicians' views of interventions to reduce medical errors: Does evidence of effectiveness matter? Academic Medicine 80(2): 189-92	Reason for exclusion: Not relevant
Rosner F, Berger JT, Kark P. (2000) Disclosure and prevention of medical errors. Committee on Bioethical Issues of the Medical Society of the State of New York. Archives of Internal Medicine 160(14): 2089-92	Reason for exclusion: Not relevant
Rothschild J. (2004) Computerized physician order entry in the critical care and general inpatient setting: A narrative review. Journal of Critical Care 19(4): 271-78	Reason for exclusion: Not relevant intervention
Roughead EE, Semple SJ, Gilbert AL. (2003) Quality use of medicines in aged-care facilities in Australia. Drugs and Aging 20(9): 643-53	Reason for exclusion: Not relevant study (review)
Roughead EE, Semple SJ. (2009) Medication safety in acute care in Australia: Where are we now? Part 1: A review of the extent and causes of medication problems 2002-2008. Australia and New Zealand Health Policy 6(1)	Reason for exclusion: Not relevant intervention
Routsis D, Williams M. (2011) Seven year review of a radiotherapy incident reporting and learning system. Radiotherapy and Oncology 99: S43	Reason for exclusion: Abstract only
Rozich JD, Haraden CR, Resar RK. (2003) Adverse drug event trigger tool: A practical methodology for measuring medication related harm. Quality and Safety in Health Care 12(3): 194-200	Reason for exclusion: No relevant comparator
Ruggiero C, Lattanzio F, Dell'Aquila G, et al. (2009) Inappropriate drug prescriptions among older nursing home residents: the Italian perspective. Drugs and Aging 26: Suppl 30	Reason for exclusion: Not relevant

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Ruiz B, Garcia M, Aguirre U, et al. (2008) Factors predicting hospital readmissions related to adverse drug reactions. European Journal of Clinical Pharmacology 64(7): 715-22	Reason for exclusion: Not relevant intervention
Runciman WB, Roughead EE, Semple SJ. (2003) Adverse drug events and medication errors in Australia. International Journal for Quality in Health Care 15 (Suppl 1): i49-59	Reason for exclusion: Not relevant intervention
Runy LA. (2004) High-alert: Medications. Hospitals and Health Networks 78(9): 67-73	Reason for exclusion: Not relevant intervention
Ryan C, O'Mahony D. (2010) Appropriate prescribing in long-term care facilities. International Journal of Pharmacy Practice 18: 5-6	Reason for exclusion: Abstract only
Ryan R. (2012) The use of failure modes and effects analysis (FMEA) to review a medication incident reporting system in a hospital. European Journal of Hospital Pharmacy: Science and Practice 19(2): 123-24	Reason for exclusion: Abstract only
Sakowski J, Newman JM, Dozier K. (2008) Severity of medication administration errors detected by a bar-code medication administration system. American Journal of Health-System Pharmacy 65(17): 1661-66	Reason for exclusion: No relevant comparator
Sakuma M, Bates DW, Morimoto T. (2012) Clinical prediction rule to identify high-risk inpatients for adverse drug events: the JADE Study. Pharmacoepidemiology and Drug Safety 21(11): 1221-26	Reason for exclusion: Not relevant intervention, no relevant outcomes
Samaranayake NR, Choung BMY. (2011) Avoiding medication errors – what is the best evidenced based practice. International Journal of Pharmacy and Technology 3(1): 1722-39	Reason for exclusion: Not relevant intervention
Sandars J, Esmail A. (2003) The frequency and nature of medical error in primary care: understanding the diversity across studies. Family Practice 20(3): 231-36	Reason for exclusion: Not relevant intervention
Sangtawesin V, Kanjanapattanakul W, Srisan P, et al. (2003) Medication errors at Queen Sirikit National Institute of Child Health. Journal of the Medical Association of Thailand 86 (Suppl 3): S570-75	Reason for exclusion: Not relevant intervention
Santel JP, Cousins DD, Hicks R, et al. (2003) USP drug safety review: Top 10 drugs involved in medication errors. Drug Topics 147(9): HSE23	Reason for exclusion: Not relevant study
Santel JP, Cousins DD, Hicks R, et al. (2004) USP Drug Safety Review: Pediatric population requires vigilance to ensure safety. Drug Topics 148(14): HSE14	Reason for exclusion: Not relevant study
Santell JP, Hicks RW. (2005) Medication errors involving geriatric patients. Joint Commission Journal on Quality and Patient Safety 31(4): 233-38	Reason for exclusion: Not relevant intervention
Sari AB, Sheldon TA, Cracknell A. (2007) Extent, nature and consequences of adverse events: Results of a retrospective case note review in a large NHS hospital. Quality and Safety in Health Care 16(6): 434-39	Reason for exclusion: No relevant comparator
Savage SW, Schneider PJ, Pedersen CA. (2005) Utility of an online medication-error-reporting system. American Journal of Health-System Pharmacy 62(21): 2265-70	Reason for exclusion: No relevant outcomes
Schachter M. (2012) Common prescribing errors and how to prevent them. Medicine (United Kingdom) 40(7): 394-96	Reason for exclusion: Not relevant study
Schedlbauer A, Prasad V, Mulvaney C. (2009) What evidence supports the use of computerized alerts and prompts to improve clinicians' prescribing behaviour? Journal of the American Medical Informatics Association 16(4): 531-38	Reason for exclusion: Not relevant intervention
Schenkel S. (2000) Promoting patient safety and preventing	Reason for exclusion: Not

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medical error in emergency departments. Academic Emergency Medicine 7(11): 1204-22	relevant study
Schmader KE, Hanlon JT, Pieper CF, et al. (2004) Effects of geriatric evaluation and management on adverse drug reactions and suboptimal prescribing in the frail elderly. American Journal of Medicine 116(6): 394-401	Reason for exclusion: Not relevant intervention
Schmock GT, Nair VP, Finley JM, et al. (2003) Penetration of Medication Safety Technology in Community Hospitals. Journal of Medical Systems 27(6): 531-41	Reason for exclusion: Not relevant intervention
Schneider PJ, Pedersen CA, Montanya KR, et al. (2006) Improving the safety of medication administration using an interactive CD-ROM program. American Journal of Health-System Pharmacy 63(1): 59-64	Reason for exclusion: Not relevant study
Schulmeister L. (2005) Ten simple strategies to prevent chemotherapy errors. Clinical Journal of Oncology Nursing 9(2): 201-05	Reason for exclusion: Not relevant
Schulmeister L. (2006) Look-alike, sound-alike oncology medications. Clinical Journal of Oncology Nursing 10(1): 35-41	Reason for exclusion: Not relevant study
Sclafani J, Levy B, Lawrence H, et al. (2012) Building a better safety net: Taking the safety agenda to office-based women's health. Obstetrics and Gynaecology 120 (2 Part 1): 355-59	Reason for exclusion: Not relevant intervention
Scobie AC, Boyle TA, Mackinnon NJ. (2012) Head office commitment to quality-related event reporting in community pharmacy. Canadian Pharmacists Journal 145(3): e1-6	Reason for exclusion: No relevant outcomes
Scott GP, Shah P, Wyatt JC, et al. (2011) Making electronic prescribing alerts more effective: scenario-based experimental study in junior doctors. Journal of the American Medical Informatics Association 18(6): 789-98	Reason for exclusion: Not relevant intervention
Scott I, Jayathissa S. (2010) Quality of drug prescribing in older patients: Is there a problem and can we improve it? Internal Medicine Journal 40(1): 7-18	Reason for exclusion: Not relevant intervention
Scott IA, Gray LC, Martin JH, et al. (2013) Deciding when to stop: Towards evidence-based deprescribing of drugs in older populations. Evidence-Based Medicine 18(4): 121-24	Reason for exclusion: Not relevant intervention
Selbst SM, Levine S, Mull C, et al. (2004) Preventing medical errors in pediatric emergency medicine. Pediatric Emergency Care 20(10): 702-09	Reason for exclusion: Not relevant intervention
Sellappans R, Chua SS, Tajuddin NA, et al. (2013) Health innovation for patient safety improvement. Australasian Medical Journal 6(1): 60-63	Reason for exclusion: Unable to extrapolate to a UK setting
Serrano Santos J, Kelly J, Wood R, et al. (2012) Implementation of individualised medication administration guides for patients with dysphagia: Results from a pilot controlled trial. International Journal of Pharmacy Practice 20: 16	Reason for exclusion: Abstract only
Shamliyan TA, Duval S, Du J. (2008) Just what the doctor ordered. Review of the evidence of the impact of computerized physician order entry system on medication errors. Health Services Research 43(1 Part 1): 32-53	Reason for exclusion: Not relevant intervention
Sharek PJ, Classen D. (2006) The incidence of adverse events and medical error in pediatrics. Pediatric Clinics of North America 53(6): 1067-77	Reason for exclusion: Not relevant intervention
Sheikh A, Hurwitz B. (2001) Setting up a database of medical error in general practice: Conceptual and methodological considerations. British Journal of General Practice 51(462): 57-60	Reason for exclusion: No relevant outcomes
Shin AY, Longhurst C, Sharek PJ. (2012) Reducing mortality	Reason for exclusion: Not

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related to adverse events in children. Pediatric Clinics of North America 59(6): 1293-1306	relevant intervention
Shojania KG, Wald H, Gross R. (2002) Understanding medical error and improving patient safety in the inpatient setting. Medical Clinics of North America 86(4): 847-67	Reason for exclusion: Not relevant intervention
Shrank WH, Parker R, Davis T. (2010) Rationale and design of a randomized trial to evaluate an evidence-based prescription drug label on actual medication use. Contemporary Clinical Trials 31(6): 564-71	Reason for exclusion: No results given
Shuster J. (2000) Does your hospital have more preventable adverse events than other hospitals? Apparent neuroleptic malignant syndrome in a patient with Parkinson's disease; fluconazole and amitriptyline lead to cardiac toxicity; manic episode caused by chemotherapy; anaphylactic reactions to proton-pump inhibitors. Hospital Pharmacy 35(7): 703	Reason for exclusion: Not relevant
Silver MP, Antonow JA. (2000) Reducing medication errors in hospitals: a peer review organization collaboration. Joint Commission Journal on Quality Improvement 26(6): 332-40	Reason for exclusion: Not relevant intervention
Simon A, Lee RC, Cooke DA, et al. (2005) Institutional medical incident reporting systems: a review (Provisional abstract). Database of Abstracts of Reviews of Effects 2005 (4):64	Reason for exclusion: Abstract only
Simon SR, Smith DH, Feldstein AC. (2006) Computerized prescribing alerts and group academic detailing to reduce the use of potentially inappropriate medications in older people. Journal of the American Geriatrics Society 54(6): 963-68	Reason for exclusion: Not relevant intervention, no relevant outcomes
Simons SL. (2007) Designing medication safety in the NICU. Journal of Neonatal Nursing 26(6): 407-08	Reason for exclusion: Not relevant study (review)
Simonson W, Feinberg JL. (2005) Medication-related problems in the elderly: Defining the issues and identifying solutions. Drugs and Aging 22 (7): 559-69	Reason for exclusion: Not relevant study
Simpson JH and Grant J. (2006) How can we reduce medication errors in the neonatal intensive care unit? British Journal of Intensive Care 16(1): 19-22	Reason for exclusion: Not relevant study
Simpson JH, Lynch R, Grant J, et al. (2004) Reducing medication errors in the neonatal intensive care unit. Archives of Disease in Childhood: Fetal and Neonatal Edition 89(6): F480-82	Reason for exclusion: Not relevant intervention
Singh R, McLean-Plunckett EA, Kee R, et al. (2009) Experience with a trigger tool for identifying adverse drug events among older adults in ambulatory primary care. Quality and Safety in Health Care 18(3): 199-204	Reason for exclusion: No relevant comparator
Sinnemaki J, Sihvo S, Isojärvi J, et al. (2011) A systematic review of automated dose dispensing in primary health care. Value in Health 14 (7): A348	Reason for exclusion: Abstract only
Slattum PW, Delafuente JC. (2001) Selecting medications to avoid drug-related problems in the elderly. Pharmacy and Therapeutics 26(10): 523-29	Reason for exclusion: No relevant outcomes
Slight SP, Howard R. (2012) What are the causes of prescribing errors in primary care? International Journal of Pharmacy Practice 20: 27-28	Reason for exclusion: Abstract only
Snijders C, van-Lingen RA, Molendijik A. (2007) Incidents and errors in neonatal intensive care: A review of the literature. Archives of Disease in Childhood: Fetal and Neonatal Edition 92(5): F391-98	Reason for exclusion: Not relevant study
Soares MA, Fernandez-Llimos F, Cabrita J. (2011) Tools to evaluate potentially inappropriate prescription in the elderly a systematic review. Acta Medica Portuguesa 24(5): 775-84	Reason for exclusion: Not English language

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Soe A, Apampa B, Fernando B, et al. (2013) Interventions for reducing medication errors in children in hospital. Cochrane Database of Systematic Reviews Issue 2. Art. No.: CD006208. DOI: 10.1002/14651858.CD006208.pub2	Reason for exclusion: No results given
Sokola AJ, Molzen CJ. (2002) The changing standard of care in medicine. E-health, medical errors and technology add new obstacles. Journal of Legal Medicine 23(4): 449-90	Reason for exclusion: Not relevant intervention
Sorrentino E, Alegiani C (2012) Medication errors in the neonate. Journal of Maternal Fetal and Neonatal Medicine 25: Suppl 3	Reason for exclusion: Not relevant intervention
Soulliard D, Hong M, Saubermann L. (2004) Development of a pharmacy-managed medication dictionary in a newly implemented computerized prescriber order-entry system. American Journal of Health-System Pharmacy 61(6): 617-22	Reason for exclusion: Not relevant intervention
South SF. (2005) Achieving breakthrough improvements with the application of lean six sigma tools and principles within process excellence. Laboratory Medicine 36(4): 240-42	Reason for exclusion: Not relevant intervention
Spear SJ, Schmidhofer M. (2005) Ambiguity and workarounds as contributors to medical error. Annals of Internal Medicine 142(8): 627-630	Reason for exclusion: No relevant outcomes
Spigelman AD, Swan J. (2005) Review of the Australian incident monitoring system. ANZ Journal of Surgery 75(8): 657-61	Reason for exclusion: No relevant outcomes
Spiro RF. (2008) Electronic prescribing in long-term care: an overview of five pilot projects. Consultant Pharmacist 23(1): 16-26	Reason for exclusion: Not relevant intervention
St. Onge EL, Dea M, Rose RL. (2006) Medication errors and strategies to improve patient safety. Drug Topics 150(9): 36-45	Reason for exclusion: Not relevant study
Star K. (2011) Detecting unexpected adverse drug reactions in children. Pediatric Drugs 13(2): 71-73	Reason for exclusion: Not relevant study
Stavroudis TA, Miller MR, Lehmann CU. (2008) Medication errors in neonates. Clinics in Perinatology 35(1): 141-61	Reason for exclusion: Not relevant study
Stefanacci RG, Cavallaro E, Beers MH et al. (2009) Developing explicit positive beers criteria for preferred central nervous system medications in older adults. Consultant Pharmacist 2009 24(8): 601-10	Reason for exclusion: No relevant outcomes
Steiner JL. (2006) Managing risk: Systems approach versus personal responsibility for hospital incidents. Journal of the American Academy of Psychiatry and the Law 34(1): 96-98	Reason for exclusion: Not relevant intervention
Steinman MA, Rosenthal GE, Landefield CS, et al. (2009) Agreement between drugs-to-avoid criteria and expert assessments of problematic prescribing. Archives of Internal Medicine 169 (14): 1326-32	Reason for exclusion: Not relevant intervention
Stevens P, Campbell J, Urmson L, et al. (2010) Building safer systems through critical occurrence reviews: nine years of learning. Healthcare Quarterly 13: Spec 80	Reason for exclusion: No relevant comparator
Stevenson JM, Erskine SD, Williams J, et al. (2012) Predicting medication related risk in the elderly; a review of validated tools. European Geriatric Medicine 3: S129	Reason for exclusion: Abstract only
Stockwell DC and Kane-Gill SL. (2010) Developing a patient safety surveillance system to identify adverse events in the intensive care unit. Critical Care Medicine 38 (6:Suppl): Suppl 25	Reason for exclusion: No relevant comparator
Stockwell DC, Slonim AD. (2006) Quality and safety in the intensive care unit. Journal of Intensive Care Medicine 21(4): 199-210	Reason for exclusion: Not relevant study
Stow J (2006) Using medical-error reporting to drive patient safety efforts. AORN Journal 411 84(3): 406-08	Reason for exclusion: Not relevant study
Strabova P. (2013) Medication errors in nursing practice. Klinicka	Reason for exclusion: Not

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Farmakologie a Farmacie 27(1): 37-41	English language
Straumanis JP. (2007) Disclosure of medical error: Is it worth the risk? Pediatric Critical Care Medicine 8 (2 SUPPL): S38-43	Reason for exclusion: Not relevant study
Strom BL, Schinnar R, Aberra F, et al. (2010) Unintended effects of a computerized physician order entry nearly hard-stop alert to prevent a drug interaction: a randomized controlled trial. Archives of Internal Medicine 170(17):1578-83	Reason for exclusion: Not relevant intervention
Strom BL, Schinnar R, Bilker W, et al. (2010) Randomized clinical trial of a customized electronic alert requiring an affirmative response compared to a control group receiving a commercial passive CPOE alert: NSAID Warfarin co-prescribing as a test case. Journal of the American Medical Informatics Association 17(4): 411-15	Reason for exclusion: Not relevant intervention
Styles M. (2004) Standard operating procedures make for safer dispensing. Pharmacy in Practice 14(8): 233-237	Reason for exclusion: Not relevant study (review paper)
Subhedar NV, Parry HA. (2010) Critical incident reporting in neonatal practice. Archives of Disease in Childhood Fetal and Neonatal Edition 95(5): F378-82	Reason for exclusion: Not relevant study (review paper)
Subramanian S, Hoover S, Gilman B, et al. (2007) Computerized physician order entry with clinical decision support in long-term care facilities: costs and benefits to stakeholders. Journal of the American Geriatrics Society 55(9): 1451-57	Reason for exclusion: Not relevant intervention
Sullivan JE, Buchino JJ. (2004) Medication errors in pediatrics, the octopus evading defeat. Journal of Surgical Oncology 88(3): 182-88	Reason for exclusion: Not relevant intervention
Sundhagen R, Thorstenson LA. (2006) Effects of barcording on medication errors. Prairie Rose 75(1): 21-24	Reason for exclusion: Unable to source paper
Swanepoel C. (2013) Medication errors in oncology: A literature review. SA Pharmaceutical Journal 80(7): 48-50	Reason for exclusion: Not relevant intervention
Takata GS, Mason W, Taketomo C, et al. (2008) Development, testing, and findings of a pediatric-focused trigger tool to identify medication-related harm in US children's hospitals. Pediatrics 12(4): e927-35	Reason for exclusion: No relevant comparator
Tallentire VR, Hale R, Dewhurst NG, et al. (2013) The contribution of prescription chart design and familiarity to prescribing error: A prospective, randomised, cross-over study. BMJ Quality and Safety 22(10): 864-69	Reason for exclusion: Not relevant intervention
Tam VC, Knowles SR, Cornish PL, et al. (2005) Frequency, type and clinical importance of medication history errors at admission to hospital: A systematic review. CMAJ 173(5): 510-15	Reason for exclusion: Not relevant intervention
Tamer H, Sehhab N. (2006) Using pre-printed medication order forms to improve the safety of investigational drug use. American Journal of Health-System Pharmacy 63(11): 1022-28	Reason for exclusion: Not relevant intervention
Taxis K, Quoc T. (2011) Medication errors in nursing homes: a systematic literature review. International Journal of Clinical Pharmacy 33(4): 708	Reason for exclusion: Abstract only
Taylor JA, Brownstein D, Christakis DA, et al. (2004) Use of incident reports by physicians and nurses to document medical errors in pediatric patients. Pediatrics114 (3): 729-35	Reason for exclusion: No relevant outcomes
Taylor JA, Winter L, Geyer LJ. (2006) Oral outpatient chemotherapy medication errors in children with acute lymphoblastic leukaemia. Cancer 107(6): 1400-06	Reason for exclusion: Not relevant intervention
Temelkovski S, Callaghan K. (2010) Opportunities to learn from medical incidents: a review of published reports from the Health and	Reason for exclusion: Not relevant intervention

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Disability Commissioner. New Zealand Medical Journal 123(1314): 18-30	
Terrell KM, Heard K, Miller DK. (2006) Prescribing to older ED patients. American Journal of Emergency Medicine 24(4): 468-78	Reason for exclusion: Not relevant intervention
Terry M. (2009) E-prescribing: Onramp to the new electronic healthcare highway. Telemedicine and e-Health 15(4): 320-24	Reason for exclusion: Not relevant intervention
Tezak B, Anderson C, Down A, et al. (2009) Looking ahead: the use of prospective analysis to improve the quality and safety of care. Healthcare Quarterly 12: Spec 4	Reason for exclusion: No relevant outcomes
Thiagarajan RR, Bird G, Harrington K, et al. (2007) Improving safety for children with cardiac disease. Cardiology in the Young 17: Suppl 32	Reason for exclusion: Not relevant intervention
Thiankhanithikun K, Kaewvichit S. (2009) Prevention model for serious adverse drug reactions. Drug Safety 32(10): 913-14	Reason for exclusion: Abstract only
Thomas AN, Panchagnula U, Taylor RJ. (2009) Review of patient safety incidents submitted from Critical Care Units in England & Wales to the UK National Patient Safety Agency. Anaesthesia 64(11): 1178-85	Reason for exclusion: No relevant outcomes
Thomas DO. (2005) Lessons learned: basic evidence-based advice for preventing medication errors in children. Journal of Emergency Nursing 31(5): 490-93	Reason for exclusion: No relevant outcomes
Thomas EJ, Brennan TA. (2000) Incidence and types of preventable adverse events in elderly patients: population based review of medical records. BMJ 320(7237): 741-44	Reason for exclusion: Not relevant intervention
Thomas MJ, Schultz TJ, Hannaford N, et al. (2011) Mapping the limits of safety reporting systems in health care – what lessons can we actually learn? Medical Journal of Australia 194(12): 635-39	Reason for exclusion: No relevant outcomes
Thomas SK, Coleman JJ. (2012) The impact of computerised physician order entry with integrated clinical decision support on pharmacist-physician communication in the hospital setting: A systematic review of the literature. European Journal of Hospital Pharmacy: Science and Practice 19(4): 349-54	Reason for exclusion: Not relevant intervention
Thomeczek C. (2003) Error prevention and error management in medicine – Adopting strategies from other professions. Onkologie 26(6): 545-50	Reason for exclusion: Not relevant intervention, no relevant outcomes
Thomsen LA, Winterstein AG, Søndergaard B, et al. (2007) Systematic review of the incidence and characteristics of preventable adverse drug events in ambulatory care. Annals of Pharmacotherapy 41(9): 1411-26	Reason for exclusion: Not relevant intervention
Thurmann P. (2011) Potentially inappropriate medications for the elderly – Evidence, validity and usefulness of check-lists. Basic and Clinical Pharmacology and Toxicology 109: 52	Reason for exclusion: Abstract only
Thurtle V. (2000) An audit of drug incidents in learning disability group homes. British Journal of Community Nursing 5(4): 170-74	Reason for exclusion: No relevant outcomes
Tice MA. (2007) Patient safety: honoring advanced directives. Home Healthcare Nurse 25(2): 79-81	Reason for exclusion: Not relevant
Tobias DE. (2004) Identifying potentially inappropriate drugs for geriatric patients: Updating the Beers List. More evidence for treating systolic hypertension in the elderly. Hospital Pharmacy 39(3): 210-14	Reason for exclusion: Not relevant intervention, no relevant outcomes
Tobias JD, Yadav G, Gupta SK, et al. (2013) Medication errors: A matter of serious concern. Anaesthesia, Pain and Intensive Care	Reason for exclusion: No relevant outcomes

Author	Reason for exclusion
17(2): 111-14	
Topinkova E, Baeyens JP, Michel JP, et al. (2012) Evidence-based strategies for the optimization of pharmacotherapy in older people. Drugs and Aging 29(6): 477-94	Reason for exclusion: Not relevant intervention
Tragulpiankit P, Chulavatnatol S. (2009) Impact of pharmacist's interventions on adverse drug event reductions in outpatients with rheumatoid arthritis. Drug Safety 32(10): 922-23	Reason for exclusion: Abstract only
Traynor K. JCAHO retreats on retrospective pharmacy review for CPOE systems. American Journal of Health-System Pharmacy 59(15): 1397	Reason for exclusion: Not relevant
Trivalle C, Cartier T, Verny C, et al. (2010) Identifying and preventing adverse drug events in elderly hospitalised patients: a randomised trial of a program to reduce adverse drug effects. Journal of Nutrition, Health and Aging 14(1): 57-61	Reason for exclusion: Not relevant intervention
Trontell A. (2004) Expecting the unexpected – Drug safety, pharmacovigilance and the prepared mind. New England Journal of Medicine 351(14): 1385-87	Reason for exclusion: Not relevant
Tsang C, Majeed A, Aylin P. (2012) Routinely recorded patient safety events in primary care: a literature review. Family Practice 29(1): 8-15	Reason for exclusion: Not relevant intervention
Tsilimingras D, Rosen AK, Berlowitz DR. (2003) Patient safety in geriatrics: a call for action. Biological Sciences and Medical Sciences 58(9): M813-19	Reason for exclusion: Not relevant intervention
Tsuda Y, Hirose M, Egami K, et al. (2012) An analysis of internal medication errors using incident reports at a teaching hospital in Japan: A retrospective study. Value in Health 15(4): A23	Reason for exclusion: No relevant outcomes
Tully MP, Ashcroft DM, Dornan T, et al. (2009) The causes of and factors associated with prescribing errors in hospital inpatients: A systematic review. Drug Safety 32(10): 819-36	Reason for exclusion: Not relevant intervention
Tully MP. (2012) Prescribing errors in hospital practice. British Journal of Clinical Pharmacology 74(4): 668-75	Reason for exclusion: Not relevant intervention
Turcasso NM, Weart CW. (2000) Managing polypharmacy issues. Cardiology Review 17(9): 42	Reason for exclusion: Not relevant intervention
Uhlenhake E, Feldman SR. (2010) Dermatological patient safety: problems and solutions. Journal of Dermatological Treatment 21(2): 86-92	Reason for exclusion: Not relevant intervention, no relevant outcomes
Ukens C. (2004) CPOE requires clinical R.Ph. involvement, study finds. Drug Topics 148(10): 56	Reason for exclusion: Not relevant intervention
Ukens C. (2004) Triggers point way to adverse drug effects. Drug Topics 148(12): HSE1	Reason for exclusion: Not relevant
Unruh L, Lugo NR, White SV, et al. (2005) Managed care and patient safety: risks and opportunities. Health Care Manager 24(3): 245-56	Reason for exclusion: Not relevant intervention
Unwin BK, Porvaznik M, Spoelhof GD (2010) Nursing home care: part II. Clinical aspects. American Family Physician 81(10): 1229-37	Reason for exclusion: No relevant outcomes
Urquhart C, Currell R, Grant MJ, et al. (2009) Nursing record systems: effects on nursing practice and healthcare outcomes. Cochrane Database of Systematic Reviews Issue 1. Art. No.: CD002099. DOI: 10.1002/14651858.CD002099.pub2	Reason for exclusion: Not relevant intervention
Ursprung R, Gray J. (2010) Random safety auditing, root cause analysis, failure mode and effects analysis Clinics in Perinatology 37(1): 141-65	Reason for exclusion: Not relevant study
Valenti WM. (2007) Making the transition to an electronic health record. Drug Benefit Trends 19(8): 306-12	Reason for exclusion: Not relevant intervention

Author	Reason for exclusion
Valentin A. (2010) The importance of risk reduction in critically ill patients. Current Opinion in Critical Care 16(5): 482-86	Reason for exclusion: Not relevant intervention
Valentin A. (2013) Approaches to decreasing medication and other care errors in the ICU. Current Opinion in Critical Care 19(5): 474-79	Reason for exclusion: Not relevant study
Van Den Anker JN. (2005) Managing drugs safely. Seminars in Fetal and Neonatal Medicine 10(1): 73-81	Reason for exclusion: Not relevant intervention
van der Linden CMJ, Jansen PAF, Grouls RJE, et al. (2013) Systems that prevent unwanted represcription of drugs withdrawn because of adverse drug events: A systematic review. Therapeutic Advances in Drug Safety 4(2): 73-90	Reason for exclusion: Not relevant intervention
van Doormaal JE, van den Bemt PM, Zaal RJ, et al. (2009) The influence that electronic prescribing has on medication errors and preventable adverse drug events: an interrupted time-series study. Journal of the American Medical Informatics Association 16(6): 816-25	Reason for exclusion: Not relevant intervention
Van RF, Maat B, Rademaker CMA, et al. (2009) The effect of computerized physician order entry on medication prescription errors and clinical outcome in pediatric and intensive care: A systematic review. Pediatrics 123(4): 1184-90	Reason for exclusion: Not relevant intervention
Van Voorhis KT, Willis TS. (2009) Implementing a pediatric rapid response system to improve quality and patient safety. Pediatric Clinics of North America 56(4): 919-33	Reason for exclusion: Not relevant
Vande Voorde KM, France AC. (2002) Proactive error prevention in the intensive care unit. Critical Care Nursing Clinics of North America 14(4): 347-58	Reason for exclusion: No relevant outcomes
Varney SM, Bronstein AC. (2012) Using the national poison data system to detect mistaken oral ingestions of medication capsules designed for use in pulmonary inhalers. Hospital Pharmacy 47(2):118-123	Reason for exclusion: Not relevant intervention
Vastag B. (2004) Donald M. Berwick, MD, MPP: Advocate for evidence-based health system. Reform Journal of the American Medical Association 291(16): 1945-47	Reason for exclusion: Not relevant
Vaughan S, Bate T, Round J. (2012) Must we get it wrong again? A simple intervention to reduce medical error. Trends in Anaesthesia and Critical Care 2(3): 104-08	Reason for exclusion: Not relevant
Vecchione A. (2003) USP drug safety review: Distractions contribute to medication errors. Drug Topics 147(8): HSE42	Reason for exclusion: Not relevant
Vecchione A. (2004) USP drug safety review: Improving patient identification. Drug Topics 148(12): HSE18	Reason for exclusion: Not relevant intervention
Vecchione A. (2004) USP drug safety review: Medication errors in the patient's home. Drug Topics 148(8): HSE14	Reason for exclusion: Not relevant intervention
Vecchione A. (2004) USP Drug Safety Review: Medication errors in the emergency room. Drug Topics 148(4): HSE11	Reason for exclusion: Not relevant intervention
Vecchione A. (2004) USP drug safety review: Medication errors involving geriatric patients. Drug Topics 148(2): HSE31	Reason for exclusion: Not relevant intervention
Vecchione A. (2004) USP drug safety review: Medication errors with pre-printed orders. Drug Topics 148(6): HSE28	Reason for exclusion: Not relevant intervention
Vecchione A. (2004) USP Drug Safety Review: Similarities in products can lead to errors. Drug Topics 148(10): HSE16	Reason for exclusion: Not relevant intervention
Venkatraman R, Durai R. (2008) Errors in medicine administration: how can they be minimised? Journal of Perioperative Practice	Reason for exclusion: No relevant outcomes

Author	Reason for exclusion
18(6): 249-53	
Via-Sosa MA, Lopes N, March M. (2013) Effectiveness of a drug dosing service provided by community pharmacists in polymedicated elderly patients with renal impairment: a comparative study. BMC Family Practice 14: 96	Reason for exclusion: Not relevant intervention
Viktil KK, Blix HS, Moger TA, et al. (2006) Interview of patients by pharmacists contributes significantly to the identification of drug-related problems. Pharmacoepidemiology and Drug Safety 15(9): 667-74	Reason for exclusion: Not relevant intervention
Vilke GM, Tornabene SV, Stepanski B, et al. (2006) Paramedic self-reported medication errors. Prehospital Emergency Care 10(4): 457-62	Reason for exclusion: No relevant outcomes
Vivian JC. (2010) Electronic controlled substances prescriptions. US Pharmacist 35(7): 65-68	Reason for exclusion: Not relevant intervention
Vlayen A, Verelst S, Bekkering GE, et al. (2012) Incidence and preventability of adverse events requiring intensive care admission: A systematic review Journal of Evaluation in Clinical Practice 18(2): 485-97	Reason for exclusion: Not relevant intervention
von Laue NC, Schwappach DL, Koeck CM. (2003) The epidemiology of preventable adverse drug events: a review of the literature. Wiener Klinische Wochenschrift 115(12): 407-15	Reason for exclusion: Not relevant intervention
von Laue NC, Schwappach DL, Koeck CM. (2003) The epidemiology of medical errors: a review of the literature. Wiener Klinische Wochenschrift 115(10): 318-25	Reason for exclusion: Not relevant intervention
Voshall B, Piscotty R, Lawrence J, et al. (2013) Barcode medication administration work-arounds: a systematic review and implications for nurse executives. Journal of Nursing Administration 43(10): 530-535	Reason for exclusion: Not relevant intervention
Wachter RM. (2010) Patient safety at ten: Unmistakable progress, troubling gaps. Health Affairs 29(1): 165-73	Reason for exclusion: No relevant outcomes
Waegemann CP, Tessier C. (2002) Documentation goes wireless: A look at mobile healthcare computing devices. Journal of the American Health Information Management Association 73(8): 36-39	Reason for exclusion: Not relevant intervention
Walsh KE, Adams WG, Bauchner H, et al. (2006) Medication errors related to computerized order entry for children. Pediatrics 118(5): 1872-79	Reason for exclusion: Not relevant intervention
Walsh KE, Kaushal R, Chessare JB. (2005) How to avoid paediatric medication errors: a user's guide to the literature. Archives of Disease in Childhood 90(7): 698-702	Reason for exclusion: Not relevant intervention
Walsh T, Beatty PC. (2002) Human factors error and patient monitoring. Physiological Measurement 23(3): R111-32	Reason for exclusion: Not relevant intervention
Walton P. (2008) Has there been a review? Pharmaceutical Journal 280(7496): 398	Reason for exclusion: Not relevant intervention
Wanzer LJ, Hicks RW. (2006) Medication safety within the perioperative environment. Annual Review of Nursing Research 24: 127-55	Reason for exclusion: Not relevant intervention
Ward JR, Clarkson PJ. (2004) An analysis of medical device-related errors: Prevalence and possible solutions. Journal of Medical Engineering and Technology 28(1):2-21	Reason for exclusion: Not relevant
Waring JJ. (2005) Beyond blame: Cultural barriers to medical incident reporting. Social Science and Medicine 60(9): 1927-35	Reason for exclusion: No relevant outcomes
Wears RL, Janiak B, Moorhead JC, et al. (2000) Human error in medicine: promise and pitfalls, part 2. Annals of Emergency Medicine 36(2): 142-44	Reason for exclusion: No relevant outcomes

Author	Reason for exclusion
Weber RJ. (2008) Implementing a bar-code medication administration system. Hospital Pharmacy 43(12): 1016-23	Reason for exclusion: No relevant outcomes, no relevant comparator
Webster CS, Anderson DJ. (2002) A practical guide to the implementation of an effective incident reporting scheme to reduce medication error on the hospital ward. International Journal of Nursing Practice 8(4): 176-83	Reason for exclusion: No relevant outcomes
Webster CS, Larsson L, Frampton CM, et al. (2010) Clinical assessment of a new anaesthetic drug administration system: a prospective, controlled, longitudinal incident monitoring study. Anaesthesia 65(5): 490-99	Reason for exclusion: Not relevant intervention
Webster L, Spiro RF. (2010) Health information technology: A new world for pharmacy. Journal of the American Pharmacists Association 50(2): e20-31	Reason for exclusion: Not relevant intervention, no relevant outcomes
Webster LR. (2010) Select medical-legal reviews of unintentional overdose deaths. Pain Medicine 11(2): 333-34	Reason for exclusion: Abstract only
Weingart SN, Simchowitz B, Shiman L, et al. (2009) Clinicians' assessments of electronic medication safety alerts in ambulatory care. Archives of Internal Medicine 169(17): 1627-32	Reason for exclusion: Not relevant intervention
Weingart SN, Toth M, Eneman J, et al. (2004) Lessons from a patient partnership intervention to prevent adverse drug events International Journal for Quality in Health Care 16(6): 499-507	Reason for exclusion: Not relevant intervention
Weir CR, Staggers N, Laukert T. (2012) Reviewing the impact of computerized provider order entry on clinical outcomes: The quality of systematic reviews. International Journal of Medical Informatics 81(4): 219-31	Reason for exclusion: Not relevant intervention
Weir MC, Ryan R, Mayhew A, et al. (2010) The Rx for Change database: a first-in-class tool for optimal prescribing and medicines use. Implementation Science 5: 89	Reason for exclusion: Not relevant intervention
Weisbart ES (2006) Safer prescribing for older adults: Clinical and business imperatives aligned. Clinical Geriatrics 14(11): 18-24	Reason for exclusion: Not relevant intervention
Weisbart ES, Greenberg HE. (2005) Toward safer prescribing: History, challenges, and potential solutions in outpatient medication safety. Pharmacy and Therapeutics 30(8): 451-55	Reason for exclusion: Not relevant intervention
Weiss PM, Miranda F (2008) Transparency, apology and disclosure of adverse outcomes. Obstetrics and Gynaecology Clinics of North America 35(1): 53-62	Reason for exclusion: Not relevant study (review)
Weru I, Wata D. (2012) Review of medication errors in oncology at Kenyatta National Hospital. Journal of Oncology Pharmacy Practice 18: 17	Reason for exclusion: Abstract only
Westphal JF, Nonnenmacher C (2009) Comparative utilization of the French consensus list vs beers list of criteria for identifying potentially inappropriate medications in elderly inpatients. Drug Safety 32(10): 884	Reason for exclusion: Abstract only
Westra BL, Delaney CW, Konicek D, et al. (2008) Nursing standards to support the electronic health record. Nursing Outlook 56(5): 258-66	Reason for exclusion: Unable to source paper in required timeframe
Wharton AE. (2004) Oh no! Not another medication error! Drug Topics 148(22)	Reason for exclusion: Not relevant
Wheeler DW, Carter JJ, Murray LJ, et al. (2008) The effect of drug concentration expression on epinephrine dosing errors: A randomized trial. Annals of Internal Medicine 148(1): 11-14	Reason for exclusion: Not relevant intervention

Author	Reason for exclusion
Wheeler SJ, Wheeler DW (2005) Medication errors in anaesthesia and critical care. Anaesthesia 60(3): 257-73	Reason for exclusion: Not relevant intervention
White AA, Waterman AD, McCotter P, et al. (2008) Supporting health care workers after medical error: Considerations for health care leaders. Journal of Clinical Outcomes Management 15(5): 240-47	Reason for exclusion: Not relevant intervention
Wholey D, Moscovice I, Hietpas T, et al. (2004) The environmental context of patient safety and medical errors. Journal of Rural Health 20(4): 304-13	Reason for exclusion: No relevant outcomes
Wieman TJ, Wieman EA (2004) A systems approach to error prevention in medicine. Journal of Surgical Oncology 88(3): 115-21	Reason for exclusion: Not relevant intervention, no relevant outcomes
Wilcock M, Harding G, Moore L, et al. (2013) What do hospital staff in the UK think are the causes of penicillin medication errors? International Journal of Clinical Pharmacy 35(1): 72-78	Reason for exclusion: Unable to source paper in required timeframe
Wilcox RA, Whitham EM. (2003) Reduction of medical error at the point-of-care using electronic clinical information delivery. Internal Medicine Journal 33(11): 537-40	Reason for exclusion: Not relevant intervention
Wilder GL. (2003) Medication safety in home infusion care. Journal of Infusion Nursing 26(5): 311-18	Reason for exclusion: Not relevant intervention, no relevant outcomes
Wilson K, Sullivan M. (2004) Preventing medication errors with smart infusion technology American Journal of Health-System Pharmacy 61(2): 177-83	Reason for exclusion: Not relevant intervention
Wilson T, Sheikh A. (2002) Enhancing public safety in primary care. BMJ 324 (7337): 584-87	Reason for exclusion: No relevant outcomes
Winters B, Dorman T. (2006) Patient-safety and quality initiatives in the intensive-care unit. Current Opinion in Anaesthesiology 19(2):140-45	Reason for exclusion: Not relevant intervention
Wolf ZR (2007) Pursuing safe medication use and the promise of technology. MEDSURG Nursing 16(2): 92-100	Reason for exclusion: No relevant outcomes
Wong D, Herndon J, Canale T. (2002) Medical errors in orthopaedics: Practical pointers for prevention Journal of Bone and Joint Surgery 84(11): 2097-2100	Reason for exclusion: No relevant outcomes
Wong IC, Wong LY, Cranswick NE (2009) Minimising medication errors in children. Archives of Disease in Childhood 94(2): 161-64	Reason for exclusion: Not relevant intervention
Wong ICK, Ghaleb MA, Franklin BD, et al. (2004) Incidence and nature of dosing errors in paediatric medications: A systematic review. Drug Safety 27(9): 661-70	Reason for exclusion: Not relevant intervention
Woodward HI, Mytton OT, Lemer C, et al. (2010) What have we learned about interventions to reduce medical errors? Annual Review of Public Health 31: 479-97	Reason for exclusion: Not relevant intervention
Woolf SH. (2004) Patient Safety Is Not Enough: Targeting quality improvements to optimize the health of the population. Annals of Internal Medicine 140(1): 33-36	Reason for exclusion: No relevant outcomes
Woolsynowych M, Rogers S, Taylor-Adams S, et al. (2005) The investigation and analysis of critical incidents and adverse events in healthcare. Health Technology Assessment (Winchester, England) 9(19): 1-143	Reason for exclusion: Not relevant intervention
Wreathall J, Nemeth C. (2004) Assessing risk: The role of probabilistic risk assessment (PRA) in patient safety improvement. Quality and Safety in Health Care 13(3): 206-12	Reason for exclusion: No relevant outcomes

Author	Reason for exclusion
Wright K. (2010) Do calculation errors by nurses cause medication errors in clinical practice? A literature review. Nurse Education Today 30(1): 85-97	Reason for exclusion: Not relevant intervention
Wulff K, Cummings GG, Marck P, et al. (2011) Medication administration technologies and patient safety: a mixed-method systematic review. Journal of Advanced Nursing 67(10): 2080-95	Reason for exclusion: Not relevant intervention
Yang C, Yang L, Xiang X, et al. (2012) Interventions Assessment of Prescription Automatic Screening System in Chinese Hospitals: A Systematic Review. Drug Information Journal 46(6): 669-76	Reason for exclusion: Not relevant intervention, unable to extrapolate to UK Setting
Yin HS, Dreyer BP, van SL, et al. (2008) Randomized controlled trial of a pictogram-based intervention to reduce liquid medication dosing errors and improve adherence among caregivers of young children. Archives of Pediatrics and Adolescent Medicine 162(9): 814-22	Reason for exclusion: Not relevant intervention
Youngberg BJ (2008) Event reporting: the value of a nonpunitive approach. Clinical Obstetrics and Gynaecology 51(4): 647-55	Reason for exclusion: No relevant outcomes
Yu F, Salas M, Kim Y-I, et al. (2009) The relationship between computerized physician order entry and pediatric adverse drug events: A nested matched case-control study. Pharmacoepidemiology and drug safety 18(8): 751-55	Reason for exclusion: Not relevant intervention
Yusuff KB, Tayo F (2011) Frequency, types and severity of medication use-related problems among medical outpatients in Nigeria. International Journal of Clinical Pharmacy 33(3): 558-6	Reason for exclusion: Not relevant intervention
Zaal RJ, Jansen MM, Duisenberg-van EM, et al. (2013) Identification of drug-related problems by a clinical pharmacist in addition to computerized alerts. International Journal of Clinical Pharmacy 35(5): 753-62	Reason for exclusion: Not relevant intervention
Zed PJ, Abu-Laban RB, Balen RM, et al. (2008) Incidence, severity and preventability of medication-related visits to the emergency department: A prospective study. CMAJ 178(12): 1563-69	Reason for exclusion: Not relevant intervention
Zedan HS, Avery AJ (2008) Prescribing safety in primary care. Comparing the United Kingdom and Saudi Arabia. Saudi Medical Journal 29(12): 1703-10	Reason for exclusion: Not relevant
Zhan C, Miller MR (2003) Administrative data based patient safety research: a critical review. Quality and Safety in Health Care 12: Suppl-63	Reason for exclusion: Not relevant intervention
Zhang Y, Dong YJ, Webster CS, et al. (2013) The frequency and nature of drug administration error during anaesthesia in a Chinese hospital. Acta Anaesthesiologica Scandinavia 57(2): 158-64	Reason for exclusion: Not relevant intervention
Zimmerman S, Love K, Sloane PD, et al. (2011) Medication administration errors in assisted living: Scope, characteristics, and the importance of staff training Journal of the American Geriatrics Society 59 (6): 1060-68	Reason for exclusion: Not relevant intervention
Zimmerman TG. (2010) The case for electronic medical records - Why the time to act is now. Osteopathic Family Physician 2(4): 108-13	Reason for exclusion: Not relevant intervention
Zuckerman SL, France DJ, Green C, et al. (2012) Surgical debriefing: a reliable roadmap to completing the patient safety cycle. Neurosurgical Focus 33(5): E4	Reason for exclusion: Not relevant

C.5.2 Medicines-related communication systems when patients move from one care setting to another

Author	Reason for Exclusion
Abad-Corpa E, Carrillo-Alcaraz A, Royo-Morales T, et al. (2010) Effectiveness of planning hospital discharge and follow-up in primary care for patients with chronic obstructive pulmonary disease: research protocol. Journal of Advanced Nursing 66(6): 1365-70	Reason for exclusion: Not relevant study
Abraham J, Kannampallil T. (2014) A systematic review of the literature on the evaluation of handoff tools: Implications for research and practice. Journal of the American Medical Informatics Association 21(1): 154-62	Reason for exclusion: Not relevant
Afilalo M, Lang E, Léger R, et al. (2007) Impact of a standardized communication system on continuity of care between family physicians and the emergency department. Canadian Journal of Emergency Medical Care 9(2): 79-86	Reason for exclusion – Not relevant intervention
Al-Rashed SA, Wright DJ, Roebuck N, et al. (2002) The value of inpatient pharmaceutical counselling to elderly patients prior to discharge. British Journal of Clinical Pharmacology 54 (6): 657-64	Reason for exclusion: Not a randomised controlled trial
Altfeld SJ, Shier GE, Rooney M, et al. (2013) Effects of an enhanced discharge planning intervention for hospitalized older adults: a randomized trial. Gerontologist 53(3): 430-40#Reason for exclusion – Not relevant intervention	Reason for exclusion: Not relevant intervention
Aoki N, Dunn K, Johnson-Throop KA, et al. (2003) Review: outcomes and methods in telemedicine evaluation. Telemedicine Journal & E-Health 9(4): 393-401	Reason for exclusion: Not relevant
Aromataris E. (2010) Effectiveness of strategies to promote safe transition of older people across care settings. Journal of Advanced Nursing 66(7): 1448-51	Reason for exclusion: Unable to source full paper
Arora VM, Manjarrez E, Dresseler DD, et al. (2009) Hospitalist handoffs: A systematic review and task force recommendations. Journal of Hospital Medicine 4(7): 433-40	Reason for exclusion: Not relevant intervention
Barnason S, Zimmerman L, Nieveen J, et al. (2012) Patient recovery and transitions after hospitalization for acute cardiac events: an integrative review. Journal of Cardiovascular Nursing 27(2): 175-91	Reason for exclusion: Not relevant
Basque Office for Health Technology Assessment. (2003) Health care follow up between hospital and primary health services in stroke patients (Project record). Health Technology Assessment Database 4	Reason for exclusion: Not English language
Beauchesne MF, Nenciu LM, Thanh-Ha D, et al. (2007) Active communication of a pharmacy discharge plan for patients with respiratory diseases: A pilot study. Journal of Pharmacy Technology 23(2): 67-74	Reason for exclusion: Not a randomised controlled trial
Belcher JR. (2005) The Longitudinal Discharge Planning and Treatment Model. Social Work in Mental Health 3(4): 2005-61	Reason for exclusion: Not a randomised controlled trial
Bench S, Day T, Griffiths P. (2013) Effectiveness of critical care discharge information in supporting early recovery from critical illness. Database of Abstracts of Reviews of Effects (4): 41-52	Reason for exclusion: Not relevant intervention
Bergkvist A, Midlov P, Höglund P, et al. (2009) Improved quality in the hospital discharge summary reduces medication errors — LIMM: Landskrona Integrated Medicines Management. European Journal of Clinical Pharmacology 65(10): 1037-46	Reason for exclusion: Not a randomised controlled trial
Brassard K. (2011) Evidence-based risk factors for adverse health outcomes in older patients after discharge home and assessment	Reason for exclusion: Not relevant intervention

Author	Reason for Exclusion
tools: a systematic review. Journal of Evidence‐based Social Work. 8(5): 445-68.	
Bull MJ, Hansen HE, Gross CR. (2000) A professional-patient partnership model of discharge planning with elders hospitalized with heart failure. Applied nursing research 13(1): 19-28	Reason for exclusion: Not relevant intervention
Bump GM, Jovin F, Destefano L, et al. (2011) Resident Sign-Out and Patient Hand-Offs: Opportunities for Improvement. Teaching & Learning in Medicine 23(2): 105-12	Reason for exclusion: No relevant comparator
Caliskan YM, Ozsoy SA. (2010) Effectiveness of a discharge-planning program and home visits for meeting the physical care needs of children with cancer. Supportive Care in Cancer 18(2): 243-53	Reason for exclusion: Not relevant intervention
Coit MH, Katz J, McMahon GT. (2011) The effect of workload reduction on the quality of residents' discharge summaries. Journal of General Internal Medicine 26(1): 28-32 Reason for exclusion: Not relevant intervention	Reason for exclusion: Not relevant intervention
Cook CB, Seifert KM, Hull BP, et al. (2009) Inpatient to outpatient transfer of diabetes care: planning for an effective hospital discharge. Endocrine Practice 15(3): 263-69	Reason for exclusion: Not relevant study
Crilly J, Chaboyer W, Wallis M. (2006) Continuity of care for acutely unwell older adults from nursing homes. Scandinavian Journal of Caring Sciences 20(2): 122-34	Reason for exclusion: Not relevant intervention
Crocker, C. (2009) Review: Following the patient journey to improve medicines management and reduce errors. Nursing Times 105(46): 12-15	Reason for exclusion: Not relevant study
Davis MN, Brumfield VC, Toombs-Smith S, et al. (2005) A one-page nursing home to emergency room transfer form: What a difference it can make during an emergency! Annals of Long-Term Care 13(11): 34-38	Reason for exclusion: Not relevant study
Dawson S, King L, Grantham H. (2013) Improving the hospital clinical handover between paramedics and emergency department staff in the deteriorating patient. . Emergency Medicine Australasia 25(5): 393-405	Reason for exclusion: Not relevant study
Department of Health (2010) Ready to go: planning the discharge and transfer of patients from hospital and intermediate care. 1-35	Reason for exclusion: Not relevant study
Durbin J, Barnsley J, Finlayson B, et al. (2012) Quality of communication between primary health care and mental health care: an examination of referral and discharge letters. J Behav Health Serv Res 39(4): 445-61	Reason for exclusion: Not relevant intervention
Engel KG, Buckley BA, McCarthy DM, et al. (2010) Communication amidst chaos: Challenges to patient communication in the emergency department. Journal of Clinical Outcomes Management 17(10): 17-21	Reason for exclusion: Not relevant study
Enguidanos S, Gibbs N, Jamison P. (2012) From hospital to home: a brief nurse practitioner intervention for vulnerable older adults. Journal of Gerontological Nursing 38(3): 40-50	Reason for exclusion: Not relevant intervention
Ferrigno RF, Bradley K, .Werdmann MJ. (2001) A simple strategy for improving patient contact after ED discharge. American Journal of Emergency Medicine 19(1): 46-48	Reason for exclusion: Not relevant intervention
Fisher J, Macintyre J, Kinnear M, et al. (2006) Design and evaluation of a documentation system to support the continuity of pharmaceutical care of day-case oncology patients between hospital and community pharmacists. International Journal of Pharmacy Practice 14(2): 149-57	Reason for exclusion: No relevant comparator
Fitzgerald R, Bauer M, Koch SH, et al. (2011) Hospital discharge:	Reason for exclusion: No

Author	Reason for Exclusion
recommendations for performance improvement for family carers of people with dementia. Australian Health Review 35(3): 364-71	relevant comparator
Fontanella CA, Pottick KJ, Warner LA, et al. (2010) Effects of Medication Management and Discharge Planning on Early Readmission of Psychiatrically Hospitalized Adolescents. Social Work in Mental Health 8(2): 117-33	Reason for exclusion: Not relevant intervention
Gill JM, Mainous AG, Nsereko M. (2003) Does having an outpatient visit after hospital discharge reduce the likelihood of readmission? Delaware Medical Journal 75(8): 291-98	Reason for exclusion: Not relevant intervention
Graumlich JF, Novotny NL, Stephen-Nace G, et al. (2009) Patient readmissions, emergency visits, and adverse events after software-assisted discharge from hospital: cluster randomized trial. Journal of Hospital Medicine 4(7): E11-E19	Reason for exclusion: Not relevant intervention
Greenhalgh T, Stramer K, Brantan T, et al. (2008) Summary care record early adopter programme: an independent evaluation by University College London.	Reason for exclusion: No relevant comparator
Gysels M, Richardson A, Higginson IJ (2007) Does the patient held record improve continuity and related outcomes in cancer care: a systematic review. Health Expectations 10(1): 75-91	Reason for exclusion: Not relevant
Halasyamani L, Kripalani S, Coleman E, et al. (2006) Transition of care for hospitalized elderly patients, development of a discharge checklist for hospitalists. Journal of Hospital Medicine 1(6): 354-60	Reason for exclusion: Not relevant study
Hammar T, Rissanen P, Perälä ML. (2009) The cost-effectiveness of integrated home care and discharge practice for home care patients. Health Policy 92(1): 10-20	Reason for exclusion: Not relevant intervention
Health Quality Ontario. (2013) Electronic tools for health information exchange: an evidence-based analysis. Ontario Health Technology Assessment Series.13 (11): 1–76	Reason for exclusion: Not relevant intervention
Herrera-Espiñeira C, Rodríguez del Águila MM, Navarro Espigares JL, et al. (2011) Effect of a telephone care program after hospital discharge from a trauma surgery unit. Gaceta sanitaria 25(2): 133-38	Reason for exclusion: Not English language
Hesselink G, Schoonhoven L, Barach P, et al. (2012) Improving patient handovers from hospital to primary care: a systematic review. Annals of Internal Medicine 157(6): 417-28	Reason for exclusion: Systematic review – cannot be included in its entirety as not all studies relevant
Huang TT, Liang SH. (2005) A randomized clinical trial of the effectiveness of a discharge planning intervention in hospitalized elders with hip fracture due to falling. Journal of Clinical Nursing 14(10): 1193-201	Reason for exclusion: Not relevant intervention
Hughes G. (2001) Transfer of patient health information across the continuum (updated). Journal of the American Health Information Management Association 72(6): 64S-64Z	Reason for exclusion: Not relevant study
Hustey FM, Palmer RM. (2010) An Internet-based communication network for information transfer during patient transitions from skilled nursing facility to the emergency department. Journal of the American Geriatrics Society. 58(6): 1148-53	Reason for exclusion: Not a randomised controlled trial
Hyde CJ, Robert IE, Sinclair AJ. (2000) The effects of supporting discharge from hospital to home in older people. Age and ageing 29(3): 271-79	Reason for exclusion: Not relevant intervention
Johnson A, Sandford J. (2005) Written and verbal information versus verbal information only for patients being discharged from acute hospital settings to home: systematic review. Health Education Research 20(4): 423-29	Reason for exclusion: Systematic review – cannot be included in its entirety as not all studies relevant
Kowk T, Lum CM, Chan HS , et al. (2004) A randomized, controlled	Reason for exclusion: Not

Author	Reason for Exclusion
trial of an intensive community nurse-supported discharge program in preventing hospital readmissions of older patients with chronic lung disease. Journal of the American Geriatrics Society 52(8): 1240-46	relevant intervention
Laugaland K, Aase K, Barach P et al (2012) Interventions to improve patient safety in transitional care-a review of the evidence. Work 41: 2915-24	Reason for exclusion: Systematic review – cannot be included in its entirety as not all studies relevant
Mabire C, Monod S, Dwyer A, et al. (2013) Effectiveness of nursing discharge planning interventions on health-related outcomes in elderly inpatients discharged home: A systematic review protocol. JBI Database of Systematic Reviews and Implementation Reports 11(8): 1-12	Reason for exclusion: No data reported
Midlov P, Deierborg E, Holmdahl L, et al. (2008) Clinical outcomes from the use of medication report when elderly patients are discharged from hospital. Pharmacy World & Science 30(6): 840-45	Reason for exclusion: Not a randomised controlled trial
New Zealand Health Technology Assessment. (2002) What is the efficacy of discharge planning protocols, i.e., managing the transition from hospital to community? What should be included in the plan? Evidence Tables (Structured abstract). Health Technology Assessment Database 4	Reason for exclusion: Unable to source study
Okoniewska BM, Santana MJ, Holroyd-Leduc J, et al. (2012). The seamless transfer of care protocol: a randomized controlled trial assessing the efficacy of an electronic transfer-of-care communication tool. BMC Health Services Research 12: 414	Reason for exclusion: No results available
Parker SG, Peet S, McPherson A, et al. (2004) A systematic review of discharge arrangements for older people. (Structured abstract). Health Technology Assessment Database 6(4): 1-183	Reason for exclusion: Systematic review – cannot be included in its entirety as not all studies relevant
Parry C, Coleman EA, Smith JD, et al. (2003) The care transitions intervention: a patient-centred approach to ensuring effective transfers between sites of geriatric care. Home Health Care Services Quarterly 22(3): 1-17	Reason for exclusion: Not relevant study
Payne S, Kerr C, Hawker S, et al. (2002) The communication of information about older people between health and social care practitioners. Age & Ageing 31(2): 107-17	Reason for exclusion: Not relevant intervention
Phillips CO, Wright SM, Kern DE, et al. (2004) Comprehensive discharge planning with post discharge support for older patients with congestive heart failure: a meta-analysis. JAMA 291(11): 1358-67	Reason for exclusion: Not relevant intervention
Preen DB, Bailey BE, Wright A, et al. (2005) Effects of a multidisciplinary, post-discharge continuance of care intervention on quality of life, discharge satisfaction, and hospital length of stay: a randomized controlled trial. International Journal for Quality in Health Care 17(1): 43-51	Reason for exclusion: Not relevant intervention
Puschner B, Steffen S, Gaebel W, et al. (2008) Needs-oriented discharge planning and monitoring for high utilisers of psychiatric services design and methods. BMC Health Services Research 8: 152	Reason for exclusion: Not relevant intervention
Rideout E. (2004) Comprehensive discharge planning plus post-discharge support reduced total readmissions in older patients with congestive heart failure. Evidence Based Nursing 7(4): 115-16	Reason for exclusion: Not relevant intervention
Scott IA. (2010) Preventing the rebound: improving care transition in hospital discharge processes. Australian Health Review 34(4): 445-51	Reason for exclusion: Not relevant study
Scott P, Ross P, Prytherch D. (2011) Evidence-based inpatient	Reason for exclusion: Not

Author	Reason for Exclusion
handovers – a literature review and research agenda. Clinical Governance: An International Journal 16: 1477-7274	relevant study
Shepperd S, Lannin NA, Clemson LM, et al. (2013) Discharge planning from hospital to home. Cochrane Database of Systematic Reviews DOI: 10.1002/14651858.CD000313.pub4.	Reason for exclusion: Systematic review – cannot be included in its entirety as not all studies relevant
Were MC, Li X, Kesterson J, et al. (2009) Adequacy of hospital discharge summaries in documenting tests with pending results and outpatient follow-up providers. Journal of General Internal Medicine 24(9): 1002-06	Reason for exclusion: No relevant comparator
Wilson S, Ruscoe W, Chapman M, et al. (2001) General practitioner-hospital communications: a review of discharge summaries. Journal of Quality in Clinical Practice 21(4): 104-08	Reason for exclusion: No relevant comparator
Young A. (2006) Improving information transfer from hospital to primary care. Hospital Pharmacist 13(7): 253-56	Reason for exclusion: Not relevant study
Zhao Y. (2004) Effects of a discharge planning intervention for elderly patients with coronary heart disease in Tianjin, China: a randomized controlled trial. Hong Kong Polytechnic University, People's Republic of China, PhD dissertation 221	Reason for exclusion: Unpublished study

C.5.3 Medicines reconciliation

Author	Reason for exclusion
Barnsteiner JH. (2005) Medication reconciliation. Journal of Infusion Nursing 28(2 Suppl): 31-36	Reason for exclusion: Not relevant study
Bayoumi I, Howard M, Holbrook AM, (2009) et al. Interventions to improve medication reconciliation in primary care. Annals of Pharmacotherapy 43(10): 1667-75	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Benson JM, Snow G. (2012) Impact of medication reconciliation on medication error rates in community hospital cardiac care units. Hospital Pharmacy 47(12): 927-32	Reason for exclusion: Not relevant study
Brown RL. (2009)The home health model: reducing hospitalizations by improving medication reconciliation and communication. Journal of the Arkansas Medical Society 105(9): 204-205	Reason for exclusion: Not relevant study
Chhabra PT, Rattinger GB, Dutcher SK, et al. Medication reconciliation during the transition to and from long-term care settings: a systematic review. Research in Social & Administrative Pharmacy 8(1): 60-75	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Delate T, Chester EA, Stubbings TW, et al. (2008) Clinical outcomes of a home-based medication reconciliation program after discharge from a skilled nursing facility. Pharmacotherapy: The Journal of Human Pharmacology & Drug Therapy 28(4): 444-52	Reason for exclusion: Not relevant study
Hansen LO, Young RS, Hinami K, et al. (2011) Interventions to reduce 30-day rehospitalization: a systematic review. Annals of Internal Medicine 155(8): 520-28	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Hellström LM, Bondesson A, Höglund P, et al. (2011) Impact of the Lund Integrated Medicines Management (LIMM) model on medication appropriateness and drug-related hospital revisits. European Journal of Clinical Pharmacology 67(7): 741-52	Reason for exclusion: Not relevant intervention

Author	Reason for exclusion
Islahudin F, Ahmad N, Abidin ZZ. (2013) Impact of medication reconciliation during patient admission. International Journal of Pharmacy and Pharmaceutical Sciences 5(3): 631-34	Reason for exclusion: No relevant comparator
Kwan JL, Lo L, Sampson M, et al. (2013) Medication reconciliation during transitions of care as a patient safety strategy: a systematic review. Annals of Internal Medicine 158(5:Pt 2): t-403	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Leung V, Mach K, Charlsworth E, et al. (2010). Perioperative Medication Management (POMM) pilot: Integrating a community-based medication history (MedsCheck) into medication reconciliation for elective orthopedic surgery inpatients. Canadian Pharmacists Journal 143(2): 82-87	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Londrigan M, Cameli D, Francis M, et al. (2013) The effectiveness of medication reconciliation strategies to reduce medication errors in community dwelling older adults: A systematic review. JBI Database of Systematic Reviews and Implementation Reports 11(7): 1-31	Reason for exclusion: Unable to source
McLeod SE, Lum E, Mitchell C. (2008) Value of medication reconciliation in reducing medication errors on admission to hospital. Journal of Pharmacy Practice and Research 38(3): 196-99	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Mueller SK, Sponsler KC, Kripalani S, et al.(2012) Hospital-based medication reconciliation practices: a systematic review. Archives of Internal Medicine 172(14): 1057-69	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Terry DR, Solanki GA, Sinclair AG, et al. (2010) Clinical significance of medication reconciliation in children admitted to a UK pediatric hospital: observational study of neurosurgical patients. Paediatric Drugs 12(5): 331-37	Reason for exclusion: Not relevant study
Unroe KT, Pfeiffenberger T, Riegelhaupt S, et al. (2010) Inpatient medication reconciliation at admission and discharge: A retrospective cohort study of age and other risk factors for medication discrepancies. American Journal of Geriatric Pharmacotherapy 8(2): 115-26	Reason for exclusion: No relevant comparator
Zoni AC, Durán García ME, Jiménez Muñoz AB, et al. (2012) The impact of medication reconciliation program at admission in an internal medicine department. European Journal of Internal Medicine 23(8): 696-700	Reason for exclusion: Not relevant study

C.5.4 Medication review

Author	Reason for Exclusion
Ahmad A, Nijpels G, Dekker JM, et al. (2012) Effect of a pharmacist medication review in elderly patients discharged from the hospital. Archives of Internal Medicine 172(17): 1346-47	Reason for exclusion: Not an RCT
Alderman CP, Kong L, Kildea L, et al. (2013) Medication-related problems identified in home medicines reviews conducted in an Australian rural setting. Consultant Pharmacist 28(7): 432-42	Reason for exclusion: Not relevant intervention
Alldred DP, Raynor DK, Hughes C, et al. (2013) Interventions to optimise prescribing for older people in care homes. Cochrane Database of Systematic Reviews 2: CD009095	Reason for exclusion: Not relevant intervention
Alldred DP, Zermansky AG, Petty DR, et al. (2007) Clinical medication review by a pharmacist of elderly people living in care	Reason for exclusion: Not relevant intervention

Author	Reason for Exclusion
homes: Pharmacist interventions. International Journal of Pharmacy Practice 15(2): 93-99	
Anon (2011) Multidisciplinary medication review in long term care: a review of the clinical evidence and guidelines (Structured abstract). Health Technology Assessment Database (4)	Reason for exclusion: Not relevant
Banning M. (2007) Medication review for the older person. Reviews in Clinical Gerontology 17(1): 25-32	Reason for exclusion: Not relevant
Bernal DD, Stafford L, Bereznicki LR, et al. (2012) Home medicines reviews following acute coronary syndrome: study protocol for a randomized controlled trial. Trials 13: 30	Reason for exclusion: Unable to source
Bhupatiraju RT, Gorman P. (2008) "Doing the yellows." Analysis of medication review processes by different clinicians in long term care. AMIA Annual Symposium	Reason for exclusion: Not relevant
Blenkinsopp A, Bond C, Raynor DK. (2012) Medication reviews. British Journal of Clinical Pharmacology 74(4): 573-80	Reason for exclusion: Not relevant
Bolton PGM, Parker SM. (2004) Impact of Medication Review by General Practitioners and Patient Peer Education. Journal of Pharmacy Practice and Research 34(1): 8-10	Reason for exclusion: No relevant comparator
Bondesson A, Eriksson T, Kragh A, et al. (2013) In-hospital medication reviews reduce unidentified drug-related problems. European Journal of Clinical Pharmacology 69(3) 647-55	Reason for exclusion: Not an RCT
Brulhart MI, Wermeille JP. (2011) Multidisciplinary medication review: evaluation of a pharmaceutical care model for nursing homes. International Journal of Clinical Pharmacy 33(3): 549-57	Reason for exclusion: Not relevant intervention
Buisson J. (2004) Medication reviews in a GP surgery. Pharmaceutical Journal 272(7285): 155	Reason for exclusion: Not relevant
Burkiewicz J, Sweeney BL. (2006) Medication reviews in senior community housing centers. Consultant Pharmacist 21(9): 715-18	Reason for exclusion: No relevant comparator
Callaghan J, Story I. (1994) The impact of an ACAT clinical/consultant pharmacist on medication use by older people. Lincoln Pap Gerontol 26: 1-40	Reason for exclusion: Unable to source
Chan DC, Chen JH, Kuo HK, et al. (2012) Drug-related problems identified from geriatric medication safety review clinics. Archives of Gerontology & Geriatrics 2012 54 (1): 168 – 174	Reason for exclusion: No relevant comparator
Cheong EA, Ng K. (2003) Home Pharmacy Service: Three Years' Experience. Journal of Pharmacy Practice and Research 33(3): 212-15	Reason for exclusion: No relevant comparator
Choiniere K, Plein JB, Henry HW. (2011) A pilot study of pharmacist medication regimen reviews for long-term care residents. Consultant Pharmacist 26(1): 52-55	Reason for exclusion: No relevant comparator
Christensen M, Lundh A. (2013) Medication review in hospitalised patients to reduce morbidity and mortality. Cochrane Database of Systematic Review 2: CD008986. doi: 10.1002/14651858	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Clyne B, Bradley MC, Smith SM, et al. (2013) Effectiveness of medicines review with web-based pharmaceutical treatment algorithms in reducing potentially inappropriate prescribing in older people in primary care: a cluster randomized trial. Trials 14: 72	Reason for exclusion: Not relevant intervention
Costello I, Wong IC, Nunn AJ, et al. (2004) A literature review to identify interventions to improve the use of medicines in children. Child: Care, Health & Development 30(6): 647-65	Reason for exclusion: Not relevant intervention
Czap A. (2010) Fifteen years of alternative medicine review; A	Reason for exclusion: Not

Author	Reason for Exclusion
retrospective. Alternative Medicine Review 15(4): 299	relevant
Davidsson M, Vibe OE, Ruths S, et al. (2011) A multidisciplinary approach to improve drug therapy in nursing homes. Journal of multidisciplinary healthcare 4: 9-13	Reason for exclusion: No relevant comparator
Desborough J, Houghton J, Wood J, et al. (2011) Multi-professional clinical medication reviews in care homes for the elderly: study protocol for a randomised controlled trial with cost effectiveness analysis. Trials 12: 218	Reason for exclusion: Unable to source publication
Fejzic JB, Tett SE. (2004) Medication management reviews for people from the former Yugoslavia now resident in Australia. Pharmacy World & Science 26(5): 271-76	Reason for exclusion: No relevant comparator
Finkers F, Maring JG, Boersma F, et al. (2007) A study of medication reviews to identify drug-related problems of polypharmacy patients in the Dutch nursing home setting. Journal of Clinical Pharmacy & Therapeutics 32(5): 469-76	Reason for exclusion: No relevant comparator
Forsetlund L, Eike MC, Gjerberg E, et al. (2011) Effect of interventions to reduce potentially inappropriate use of drugs in nursing homes: a systematic review of randomised controlled trials. BMC Geriatrics 11: 16	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Geurts, MM, Talsma J, Brouwers JR, et al. (2012) Medication review and reconciliation with cooperation between pharmacist and general practitioner and the benefit for the patient: a systematic review. British Journal of Clinical Pharmacology 74(1): 16-33	Reason for exclusion: Not relevant intervention
Graabaek T, Kjeldsen LJ. (2013) Medication reviews by clinical pharmacists at hospitals lead to improved patient outcomes: a systematic review. Basic & Clinical Pharmacology & Toxicology 112(6): 359-73	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Hadi MA, Alldred DP, Closs SJ, et al. (2012) Effectiveness of pharmacist-led medication reviews in improving patient outcomes in chronic pain: A systematic review protocol. Canadian Pharmacists Journal 145(6): 264-66	Reason for exclusion: No results given
Halvorsen KH, Ruths S, Granas AG, et al. (2010) Multidisciplinary intervention to identify and resolve drug-related problems in Norwegian nursing homes. Scandinavian Journal of Primary Health Care 28(2): 82-88	Reason for exclusion: Not an RCT
Hatah E, Braund R, Tordoff J, et al. (2014) A systematic review and meta-analysis of pharmacist-led fee-for-services medication review. British Journal of Clinical Pharmacology 77(1): 102-15	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Hellström LM, Bondesson A, Höglund P, et al. (2011) Impact of the Lund Integrated Medicines Management (LIMM) model on medication appropriateness and drug-related hospital revisits. European Journal of Clinical Pharmacology 67(7): 741-52	Reason for exclusion: Not relevant intervention
Holland R, Desborough J, Goodyer L, et al. (2008) Does pharmacist-led medication review help to reduce hospital admissions and deaths in older people? A systematic review and meta-analysis. British Journal of Clinical Pharmacology 65(3): 303-16	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Krass I, Smith C. (2000) Impact of medication regimen reviews	Reason for exclusion: No

Author	Reason for Exclusion
performed by community pharmacists for ambulatory patients through liaison with general medical practitioners. International Journal of Pharmacy Practice 8(2): 111-20	relevant comparator
Leendertse AJ, de Koning FH, Goudswaard AN, et al. (2013) Preventing hospital admissions by reviewing medication (PHARM) in primary care. Journal of Clinical Pharmacy 38(5): 379-87	Reason for exclusion: Not an RCT
Lefante Jr, Harmon GN, Roy W.et al. (2005) The effect of medication reviews in a rural community pharmacy assistance program: The Cenla Medication Access Program. Journal of Pharmacy Practice 18(6): 486-92	Reason for exclusion: No relevant comparator
Leikola SN, Virolainen J, Tuomainen L, et al. (2012) Comprehensive medication reviews for elderly patients: findings and recommendations to physicians. Journal of the American Pharmacists Association: 52(5): 630-33	Reason for exclusion: Incorrect study design
Lisby M, Thomsen A, Nielsen LP et al. (2010) The effect of systematic medication review in elderly patients admitted to an acute ward of internal medicine. Basic & Clinical Pharmacology & Toxicology 106: 422-7	Reason for exclusion: Not relevant intervention
Loganathan M, Singh S, Franklin BD, et al. (2011) Interventions to optimise prescribing in care homes: systematic review. Age & Ageing 40(2): 150-62	Reason for exclusion: No relevant outcomes
Mackie CA, Lawson DH. (1999) A randomised controlled trial of medication review in patients receiving poly pharmacy in a general practice setting. The Pharmaceutical Journal 263(7063): R7	Reason for exclusion: published before the year 2000
Marcum ZA, Handler SM, Wright R, et al. (2010). Interventions to improve suboptimal prescribing in nursing homes: A narrative review. American Journal of Geriatric Pharmacotherapy 8(3): 183-200	Reason for exclusion: Not an RCT
Phelan M, Foster NE, Thomas E, et al. (2008) Pharmacist-led medication review for knee pain in older adults: Content, process and outcomes. International Journal of Pharmacy Practice 16(6): 347-55	Reason for exclusion: Not relevant paper
Roughead EE, Barratt JD, Ramsay E, et al. (2009) The effectiveness of collaborative medicine reviews in delaying time to next hospitalization for patients with heart failure in the practice setting: results of a cohort study. Circulation: Heart Failure 2(5): 424-28	Reason for exclusion: Not an RCT
Royal S, Smeaton L, Avery AJ, et al. (2006) Interventions in primary care to reduce medication related adverse events and hospital admissions: systematic review and meta-analysis. Quality & Safety in Health Care 15(1): 23-31	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Smith DH, Christensen DB, Stergachis A, et al. (1998) A randomized controlled trial of a drug use review intervention for sedative hypnotic medications. Medical Care 36(7): 1013-21	Reason for exclusion: Published before the year 2000
Stuijt, CC, Franssen, EJ, Egberts AC, et al. (2008) Appropriateness of prescribing among elderly patients in a Dutch residential home: observational study of outcomes after a pharmacist-led medication review. Drugs & Aging 25(11): 947-54	Reason for exclusion: Incorrect study design
Tjia J, Velten SJ, Parsons C, et al. (2013) Studies to reduce unnecessary medication use in frail older adults: a systematic review. Drugs & Aging 30(5): 285-307	Exclude: included studies do not meet the inclusion criteria
Verrue C, Mehuys E, Boussery K, et al. (2012) A pharmacist-conducted medication review in nursing home residents: impact on the appropriateness of prescribing. Acta Clinica Belgica 67(6): 23-29	Reason for exclusion: Incorrect study design

Author	Reason for Exclusion
Willis JS, Hoy RH, Jenkins WD. (2011) In-home medication reviews: a novel approach to improving patient care through coordination of care. Journal of Community Health 36(6): 1027-31	Reason for exclusion: No relevant comparator
Yeom, JH, Park JS, Oh OH, et al. (2005) Identification of inappropriate drug prescribing by computerized, retrospective DUR screening in Korea. Annals of Pharmacotherapy 39(11): 1918-23	Reason for exclusion: Not an RCT

(a) <Insert Note here>

C.5.5 Self-management plans

Author	Reason for Exclusion
Ackerman IN, Buchbinder R, Osborne RH. (2012) Challenges in evaluating an Arthritis Self-Management Program for people with hip and knee osteoarthritis in real-world clinical settings. Journal of Rheumatology 39(5): 1047-55	Reason for exclusion: Not relevant
Adams RJ, Boath K, Homan S, et al. (2001) A randomized trial of peak-flow and symptom-based action plans in adults with moderate-to-severe asthma. Respirology 6(4): 297-304	Reason for exclusion: no relevant comparator
Adepoju OE, Bolin JN, Phillips CD, et al. (2014) Effects of diabetes self-management programs on time-to-hospitalization among patients with type 2 diabetes: A survival analysis model. Patient Education & Counseling 95(1): 111-17	Reason for exclusion: Not relevant
Anon. (2005) E-health in caring for patients with atopic dermatitis. An economic evaluation comparing usual care with Internet-guided monitoring and self-management training by a nurse practitioner (Project record) 2005. Health Technology Assessment Database (1)	Reason for exclusion: Not relevant
Ahmed, S, Bartlett, SJ, Ernst P, et al. (2011) Effect of a web-based chronic disease management system on asthma control and health-related quality of life: study protocol for a randomized controlled trial. Trials 12: 260	Reason for exclusion: Study protocol
Anon. (2005) Summaries for patients. Chronic disease self-management programs for older adults 2005. Annals of Internal Medicine. 143(6): I32	Reason for exclusion: Not relevant
Anon. (2012) Self-management demonstrated in migraine patients 2012. Pharmacy Times 78(8)	Reason for exclusion: Not relevant
Azarnoush K, Camilleri L, Aublet-Cuvelier B, et al. (2011) Results of the first randomized French study evaluating self-testing of the International Normalized Ratio. Journal of Heart Valve Disease 20(5): 518-25	Reason for exclusion: Not relevant
Barlow J, Turner A, Swaby L, el at. (2009) An 8-yr follow-up of arthritis self-management programme participants. Rheumatology 48(2): 128-33	Reason for exclusion: Not relevant
Barlow JH, Turner AP, Wright CC. (2000) A randomized controlled study of the Arthritis self-management Programme in the UK. Health Education Research 15(6): 665-80	Reason for exclusion: Not relevant
Bheekie A, Syce JA, Weinberg EG. (2001) Peak expiratory flow rate and symptom self-monitoring of asthma initiated from community pharmacies. Journal of Clinical Pharmacy & Therapeutics 26(4): 287-96	

Author	Reason for Exclusion
Bischoff EW, Hamd DH, Sedeno M, et al. (2011) Effects of written action plan adherence on COPD exacerbation recovery. Thorax 66(1): 26-31	Reason for exclusion: Not relevant
Bischoff EW, Akkermans R, Bourbeau J, et al. (2012) Comprehensive self-management and routine monitoring in chronic obstructive pulmonary disease patients in general practice: randomised controlled trial. BMJ (345): e7642	Reason for exclusion: Not relevant
Bromberg J, Wood ME, Black Ram et al. (2012) A randomized trial of a web-based intervention to improve migraine self-management and coping. Headache 52(2): 244-61	Reason for exclusion: Not relevant intervention
Brown CS, Wan J, Bachmann G, (2009) Self-management, amitriptyline, and amitripyline plus triamcinolone in the management of vulvodynia. Journal of Women's Health 18(2): 163-69	Reason for exclusion: Not relevant
Brown CT, Yap T, Cromwell DA, et al. (2007) Self-management for men with lower urinary tract symptoms: randomised controlled trial. BMJ 334(7583): 25	Reason for exclusion: Not relevant
Chisolm SS, Taylor SL, Balkrishnan R, et al. (2008) Written action plans: potential for improving outcomes in children with atopic dermatitis. Journal of the American Academy of Dermatology 59(4): 677-83	Reason for exclusion: Not relevant study
Buszewicz M, Rait G, Griffin M, et al. (2006) Self-management of arthritis in primary care: randomised controlled trial. BMJ, 333(7574): 879	Reason for exclusion: Not relevant
Chodosh J, Morton SC, Mojica W, et al. (2005) Meta-analysis: chronic disease self-management programs for older adults. Annals of Internal Medicine 143(6): 427-38	Reason for exclusion: Not relevant
Choo K, Sheikh A. (2007) Action plans for the long-term management of anaphylaxis: systematic review of effectiveness. Clinical & Experimental Allergy 37(7): 1090-94	Reason for exclusion: Not relevant
Coyle ME, Francis K, Chapman Y. (2013) Self-management activities in diabetes care: a systematic review. Australian Health Review 37(4): 513-22	Reason for exclusion: Not relevant
Connock M, Stevens C, Fry-Smith A, et al. (2007) Clinical effectiveness and cost-effectiveness of different models of managing long-term oral anticoagulation therapy: a systematic review and economic modelling. Health Technology Assessment 11(38): iii-iiv	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Coster S, Gulliford MC, Seed PT, et al. (2000) Self-monitoring in Type 2 diabetes mellitus: a meta-analysis. Diabetic Medicine, 17(11): 755-61	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Donell S, Deane K, Swift L, et al. (2012) Patient directed self-management of pain (PaDSMaP) compared to treatment as usual following total knee replacement: study protocol for a randomized controlled trial. Trials 13: 204	Reason for exclusion: Not relevant
Douketis JD, Singh D. (2006) Self-monitoring and self-dosing of oral anticoagulation improves survival. Evidence-Based Cardiovascular Medicine 10(2): 124-26	Reason for exclusion: Abstract only
Du S, Yuan C. (2010) Evaluation of patient self-management outcomes in health care: a systematic review. International Nursing Review 57(2): 159-67	Reason for exclusion: Not relevant
Du S, Yuan C, Xiao X, et al. (2011) Self-management programs for chronic musculoskeletal pain conditions: a systematic review and meta-analysis. Patient Education & Counseling 85(3): e299-310	Reason for exclusion: Not relevant

Author	Reason for Exclusion
Ducharme FM, Noya F, McGillivray D, et al. (2008) Two for one: a self-management plan coupled with a prescription sheet for children with asthma. Canadian Respiratory Journal 15(7): 347-54	Reason for exclusion: Abstract only
Ducharme F, Zemek R, Chalut D, et al. (2008) Does the provision of a written action plan in the emergency department (ED) improve adherence to physicians recommendations and asthma control in children with acute asthma? A randomized controlled trial. European Respiratory Society Annual Congress October 4-8: E3059	Reason for exclusion: Not relevant
Eastwood CA, Travis L, Morgenstern TT, et al. (2007) Weight and symptom diary for self-monitoring in heart failure clinic patients. Journal of Cardiovascular Nursing 22(5): 382-89	Reason for exclusion: Not an RCT
Edelman S. (2006) Does a patient-administered titration algorithm of insulin glargine improve glycemic control? Nature Clinical Practice Endocrinology & Metabolism 2(2): 78-79	Reason for exclusion: Abstract only
Ferretti G, Giannarelli D, Carlini P, et al. (2007) Self-monitoring versus standard monitoring of oral anticoagulation. Thrombosis Research 119(3): 389-90	Reason for exclusion: Not relevant study
Effing T (2012) Action plans and case manager support may hasten recovery of symptoms following an acute exacerbation in patients with chronic obstructive pulmonary disease (COPD). Journal of Physiotherapy 58(1): 60	Reason for exclusion: Abstract only
Franek J. (2013) Self-management support interventions for persons with chronic disease: an evidence-based analysis. Ontario Health Technology Assessment Series 13(9): 1-60	Exclude: Not relevant intervention
Gadisseur AP, Kaptein AA, Breukink-Engbers WG, et al (2004) Patient self-management of oral anticoagulant care vs. management by specialized anticoagulation clinics: positive effects on quality of life. Journal of Thrombosis & Haemostasis 2(4): 584-91	Reason for exclusion: No relevant comparator
Gadoury MA, Schwartzman K, Rouleau M, et al. (2005) Self-management reduces both short- and long-term hospitalisation in COPD. European Respiratory Journal 26(5): 853-57	Exclude: Not relevant intervention
Garcia-Alamino JM, Ward AM, Alonso-Coello P, et al. (2010) Self-monitoring and self-management of oral anticoagulation. Cochrane Database of Systematic Reviews (4): CD003839	Reason for exclusion: Not relevant
Gardiner C, Longair I, Pescott MA, et al. (2009) Self-monitoring of oral anticoagulation: does it work outside trial conditions? Journal of Clinical Pathology 62(2): 168-171	Reason for exclusion: No relevant comparator
Gardiner C, Williams K, Longair I, et al. (2006) A randomised control trial of patient self-management of oral anticoagulation compared with patient self-testing. British Journal of Haematology 132(5): 598-603	Reason for exclusion: Not relevant study
Gibson PG, Powell H. (2004) Written action plans for asthma: an evidence-based review of the key components. Thorax 59(2): 94-99	Reason for exclusion: Not relevant
Greenstone M. (2004) Review: individualized written action plans based on peak expiratory flow improve asthma health outcomes. ACP Journal Club 141(2): 52	Reason for exclusion: Not relevant
Guidetti S, Ytterberg C. (2011) A randomised controlled trial of a client-centred self-care intervention after stroke: a longitudinal pilot study. Disability & Rehabilitation 33(6): 494-503	Reason for exclusion: Not relevant
Habibzadeh H, Gofranipoor F, Ahmadi F (2007) A study on the effect of self-care plan on activity daily living status in patient with cerebro vascular accident. Journal of Medical Sciences 7(1): 26-30	Reason for exclusion: Not relevant
Heneghan C, Ward A, Perera R, et al. (2012) Self-monitoring of oral	Reason for exclusion:

Author	Reason for Exclusion
anticoagulation: systematic review and meta-analysis of individual patient data. Lancet 379(9813): 322-34	Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Horstkotte D, Piper C. (2004) Improvement of oral anticoagulation therapy by INR self-management. Journal of Heart Valve Disease 13(3): 335-38	Reason for exclusion: Not relevant
Jones MI, Greenfield SM, Bray EP, et al. (2013) Patient self-monitoring of blood pressure and self-titration of medication in primary care: the TASMINH2 trial qualitative study of health professionals' experiences. British Journal of General Practice 63(611): e378-85	Reason for exclusion: No relevant outcomes
Kaya Z, Erkan F, Ozkan M. (2009) Self-management plans for asthma control and predictors of patient compliance. Journal of Asthma 46(3): 270-75	Reason for exclusion: No relevant comparator
Jovicic A, Holroyd-Leduc JM, Straus SE (2006) Effects of self-management intervention on health outcomes of patients with heart failure: a systematic review of randomized controlled trials. BMC Cardiovascular Disorders 6: 43	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Koertke H, Zittermann A, Wagner O, et al (2007) Self-Management of Oral Anticoagulation Therapy Improves Long-Term Survival in Patients With Mechanical Heart Valve Replacement. Annals of Thoracic Surgery 83 (1): 24-29	Reason for exclusion: Not relevant
Koertke H, Zittermann A, Wagner O. (2010) Efficacy and safety of very low-dose self-management of oral anticoagulation in patients with mechanical heart valve replacement. Annals of Thoracic Surgery 90(5): 1487-93	Reason for exclusion: Not relevant
Lavery KA, O'Neill B, Parker M, et al. (2011) Expert patient self-management program versus usual care in bronchiectasis: a randomized controlled trial. Archives of Physical Medicine & Rehabilitation 92(8): 1194-1201	Reason for exclusion: Not relevant
Lefevre F, Piper M, Weiss K. (2002) Do written action plans improve patient outcomes in asthma? An evidence-based analysis. Journal of Family Practice 51(10): 842-48	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Lenferink A, Frith P, Van Der V Buckman, et al. (2013) A self-management approach using self-initiated action plans for symptoms with ongoing nurse support in patients with Chronic Obstructive Pulmonary Disease (COPD) and comorbidities: the COPE-III study protocol. Contemporary Clinical Trials 36(1): 81-89	Reason for exclusion: Not relevant
Lennon S. McKenna S, Jones F (2013) Self-management programmes for people post stroke: a systematic review. Clinical Rehabilitation 27(10): 867-78	Reason for exclusion: Not relevant
Letz KL, Schlie AR, Smits WL. (2004) A randomized trial comparing peak expiratory flow versus symptom self-management plans for children with persistent asthma. Pediatric Asthma Allergy and Immunology 17(3): 177-90	Reason for exclusion: No relevant comparator
Lewin RJ, Furze G, Robinson J, et al. (2002) A randomised controlled trial of a self-management plan for patients with newly diagnosed angina. British Journal of General Practice 52(476): 194-96	Reason for exclusion: Not relevant intervention
Lorig KR, Ritter PL, Gonzalez VM (2003) Hispanic chronic disease self-management: a randomized community-based outcome trial. Nursing Research 52(6): 361-69	Reason for exclusion: Not relevant

Author	Reason for Exclusion
Lorig KR, Ritter P, Stewart AL, et al. (2001) Chronic disease self-management program: 2-year health status and health care utilization outcomes. Medical Care 39(11): 1217-23	Reason for exclusion: Not relevant
Lorig KR, Sobel DS, Ritter PL, et al. (2001) Effect of a self-management program on patients with chronic disease. Effective Clinical Practice 4(6): 256-62	Reason for exclusion: Not relevant
Mair H. Sachweh J. Sodian R, ET AL. (2012) Long-term self-management of anticoagulation therapy after mechanical heart valve replacement in outside trial conditions. Interactive Cardiovascular & Thoracic Surgery 14(3): 253-57	Reason for exclusion: Not relevant
McGillion M, O'Keefe-McCarthy S, Carroll SL, et al. (2014) Impact of self-management interventions on stable angina symptoms and health-related quality of life: a meta-analysis. BMC Cardiovascular Disorders 14(1): 14	Reason for exclusion: Not relevant
Mellis C. (2008) Review: symptom-based action plans reduce acute care visits more than peak flow-based plans in children with asthma. Evidence Based Medicine 13(4): 122	Reason for exclusion: Abstract only
Milenkovi B, Bosnjak P. (2007) Self-management program in treatment of asthma. Srpski Arhiv Za Celokupno Lekarstvo 135(3-4): 147-52	Reason for exclusion: Not English language
Myles S. 2009. Is patient self-monitoring (including self-testing and self-management) of oral anticoagulation therapy safe efficacious and cost-effective? Health Technology Assessment Database(1)	Reason for exclusion: Abstract only
Nolte S, Osborne RH. (2013) A systematic review of outcomes of chronic disease self-management interventions. Quality of Life Research 22(7): 1805-16	Reason for exclusion: Not relevant
Oliveira VC, Ferreira PH, Maher CG, et al. (2012) Effectiveness of self-management of low back pain: systematic review with meta-analysis. Arthritis Care & Research 64(11): 1739-48	Reason for exclusion: Not relevant
Pal K, Eastwood SV, Michie S, et al. (2013) Computer-based diabetes self-management interventions for adults with type 2 diabetes mellitus. [Review]. Cochrane Database of Systematic Reviews 3: CD008776	Reason for exclusion: Not relevant
Passel JC, Lara B, Arenas D, et al. (2010) Written action plans for improving the management of asthmatic children in primary care: A randomized clinical trial [Abstract]. European Respiratory Society Annual Congress Barcelona Spain September 18-22 4777	Reason for exclusion: Abstract only
Powers BJ, Olsen MK, Oddone EZ, et al. (2009) The effect of a hypertension self-management intervention on diabetes and cholesterol control. American Journal of Medicine 122(7): 639-46	Reason for exclusion: No relevant intervention
Pugh AN, Murphy BL.(2013) Self-testing and self-management of warfarin anticoagulation therapy in geriatric patients. Consultant Pharmacist 28(5): 319-21 study	Reason for exclusion: Not relevant study
Quin J, Rogers LQ, Markwell S, et al. (2007) Home-anticoagulation testing: accuracy of patient-reported values. Journal of Surgical Research 140(2): 189-93	Reason for exclusion: Not relevant
Reid MC, Papaleontiou M, Ong A, et al. (2008) Self-management strategies to reduce pain and improve function among older adults in community settings: a review of the evidence. [Review] Pain Medicine 9(4): 409-24	Reason for exclusion: Not relevant intervention
Ryan F, Byrne S, O'Shea S. 2009. Randomized controlled trial of supervised patient self-testing of warfarin therapy using an internet-	Reason for exclusion: Not relevant

Author	Reason for Exclusion
based expert system. Journal of Thrombosis & Haemostasis 7(8): 1284-290	
Ridner SH, Fu MR, Wanchai A, et al. (2012) Self-management of lymphedema: a systematic review of the literature from 2004 to 2011. Nursing Research 61(4): 291-99	Reason for exclusion: Not relevant
Sedeno MF, Nault D, Hamd DH, et al. (2009) A self-management education program including an action plan for acute COPD exacerbations. COPD: Journal of Chronic Obstructive Pulmonary Disease 6(5): 352-58	Reason for exclusion: Not relevant
Shao JH, Chang AM, Edwards H, et al. (2013) A randomized controlled trial of self-management programme improves health-related outcomes of older people with heart failure. Journal of Advanced Nursing 69(11): 2458-469	Reason for exclusion: Not relevant
Sheares BJ, Evans D. (2013) Do patients of specialist physicians really benefit from the use of a written asthma action plan? American Journal of Respiratory and Critical Care Medicine 187(Meeting Abstracts): A6012	Reason for exclusion: Not relevant
Sheares BJ, Du Y, Vazquez TL, et al. (2007) Use of written treatment plans for asthma by specialist physicians. Pediatric Pulmonology 42(4): 348-56	Reason for exclusion: Not relevant
Shelledy DC, Legrand TS, Gardner DD, et al (2009). A randomized controlled study to evaluate the role of an in-home asthma disease management program provided by respiratory therapists in improving outcomes and reducing the cost of care. Journal of Asthma 46(2): 194-201	Reason for exclusion: Not relevant intervention
Tagaya E, Tamaoki J, Nagai A, et al. (2005) The role of a self-management program in the control of mild to moderate asthma: A randomized controlled study. Allergology International 54(4): 527-31	Reason for exclusion: Not relevant intervention
Simmons B J, Jenner KM, Delate T, et al. (2012) Pilot study of a novel patient self-management program for warfarin therapy using venipuncture-acquired international normalized ratio monitoring. Pharmacotherapy: The Journal of Human Pharmacology & Drug Therapy 32(12): 1078-84	Reason for exclusion: Not relevant study
Smith TO, Davies L, McConnell L, et al. (2013) Self-management programmes for people with osteoarthritis: A systematic review and meta-analysis. Current Rheumatology Reviews 9(3): 165-75	Reason for exclusion: Not relevant
Souza WK, Jardim PC, Brito L, et al. (2012) Self measurement of blood pressure for control of blood pressure levels and adherence to treatment. Arquivos Brasileiros De Cardiologia 98(2): 167-74	Reason for exclusion: Not relevant
Stinson J, Wilson R, Gill N, et al. (2009) A systematic review of internet-based self-management interventions for youth with health conditions. Journal of Pediatric Psychology 34(5): 495-510	Reason for exclusion: Not relevant
Swerissen H, Belfrage J, Weeks A, et al. (2006) A randomised control trial of a self-management program for people with a chronic illness from Vietnamese Chinese Italian and Greek backgrounds. Patient Education & Counseling 64(1-3): 360-68	Reason for exclusion: Not relevant intervention
Taylor SJ, Sohanpal R. Bremner SA, et al. (2012) Self-management support for moderate-to-severe chronic obstructive pulmonary disease: a pilot randomised controlled trial. British Journal of General Practice 62(603): e687-95	Reason for exclusion: Not relevant
Thompson L. (2013) Is patient self-monitoring (including self-testing and self-management) of oral anticoagulation therapy safe efficacious and cost effective? Health Technology Assessment	Reason for exclusion: Not relevant

Author	Reason for Exclusion
Database (1)	
Toelle BG, Ram FS. (2002) Written individualised management plans for asthma in children and adults. Cochrane Database of Systematic Reviews (3): CD002171	Reason for exclusion: Systematic review withdrawn
Trappenburg JC, Monninkhof EM, Bourbeau J, et al. (2011) Effect of an action plan with ongoing support by a case manager on exacerbation-related outcome in patients with COPD: a multicentre randomised controlled trial. Thorax 66(11): 977-84	Reason for exclusion: Not relevant intervention
Van Der Meer V, Bakker MJ, Van Den Hout WB, et al. (2009) Internet-based self-management plus education compared with usual care in asthma: a randomized trial. Annals of Internal Medicine 151(2): 110-20	Reason for exclusion: Not relevant intervention
Van Der Meer V, Van Stel HF. Bakker MJ, et al. (2010) Weekly self-monitoring and treatment adjustment benefit patients with partly controlled and uncontrolled asthma: an analysis of the SMASHING study. Respiratory Research 11: 74	Reason for exclusion: Not relevant intervention
Vetter W, Hess L, Brignoli R. (2000) Influence of self-measurement of blood pressure on the responder rate in hypertensive patients treated with losartan: results of the SVATCH Study. Standard vs Automatic Treatment Control of COSAAR in Hypertension. Journal of Human Hypertension 14(4): 235-41	Reason for exclusion: Not relevant
Walters JA. Turnock AC. Walters EH, et al. (2010) Action plans with limited patient education only for exacerbations of chronic obstructive pulmonary disease. Cochrane Database of Systematic Reviews (5): CD005074	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Wattana C, Srisuphan W, Pothiban L, et al. (2007) Effects of a diabetes self-management program on glycemic control coronary heart disease risk and quality of life among Thai patients with type 2 diabetes. Nursing & Health Sciences 9(2): 135-41	Reason for exclusion: Not relevant
Watzke HH, Forberg E, Svolba G, et al. (2000) A prospective controlled trial comparing weekly self-testing and self-dosing with the standard management of patients on stable oral anticoagulation. Thrombosis and Haemostasis 83(5): 661-65	Reason for exclusion: Not relevant study
Welschen LM, Bloemendal E, Nijpels G, et al. (2005) Self-monitoring of blood glucose in patients with type 2 diabetes who are not using insulin: a systematic review (Structured abstract). Diabetes Care 28(6): 1510-17	Reason for exclusion: Not relevant
Wood-Baker R, McGlone S, Venn A, et al. (2006) Written action plans in chronic obstructive pulmonary disease increase appropriate treatment for acute exacerbations. Respirology 11(5): 619-26	Reason for exclusion: No relevant comparator

C.5.6 Patient decision aids used in consultations about medicines

Author	Reason for Exclusion
Achiron A, Barak Y. (2011) Real-life versus hypothetical decision making: Opt-in and opt-out treatment decisions in multiple sclerosis. Neurology Asia 16 (2): 133-38	Reason for exclusion: Not relevant intervention
Akl EA, Oxman AD, Herrin J, et al. (2011) Using alternative statistical formats for presenting risks and risk reductions. Using alternative statistical formats for presenting risks and risk reductions. Cochrane Database Systematic Reviews, Issue 3: Art. No CD006776. DOI: 10.1002/14651858. CD006776.pub2	Reason for exclusion: Not relevant intervention
Bond C, Blenkinsopp A, Raynor DK. (2012) Prescribing and partnership with patients. British Journal of Clinical Pharmacology	Reason for exclusion: Not relevant study

Author	Reason for Exclusion
74(4): 581-88	
Brass EP, Lofstedt R, Renn O. (2013) A decision-analysis tool for benefit-risk assessment of non-prescription drugs. Journal of Clinical Pharmacology 53(5): 475-82	Reason for exclusion: Unable to source paper
Burkiewicz JS, Vesta KS, Hume AL. (2008) Improving effectiveness in communicating risk to patients. Consultant Pharmacist 23(1): 37-43	Reason for exclusion: Not relevant study.
Chang K. (2010) Diabetes Medication Choice cards improve patient knowledge and involvement in decision-making, but do not improve medication adherence or glycaemic control. Evidence Based Nursing 13(1): 25-27	Reason for exclusion: Not relevant study
Chapman SR. (2007) The importance of good prescribing support when determining patients' risks and benefits cannot be underestimated. Pharmacy in Practice. 17(6): 219-22	Reason for exclusion: Not relevant study
Corser W, Holmes-Rovner M, Lein C, et al. (2007) A shared decision-making primary care intervention for type 2 diabetes. Diabetes Educator 33(4): 700-09	
Crockett RA, Sutton S, Walter FM, et al. (2011) Impact on decisions to start or continue medicines of providing information to patients about possible benefits and/or harms: a systematic review and meta-analysis. Medical Decision Making 31(5): 767-77 Reason for exclusion: Systematic review; relevant papers already identified	Reason for exclusion: Systematic review; relevant papers already identified
Grime J, Blenkinsopp A, Raynor DK, et al. (2007) The role and value of written information for patients about individual medicines: a systematic review. Health Expectations 10(3): 286-98	Reason for exclusion: Not relevant intervention
Légaré F, Labrecque M, Godin G, et al. (2011) Training family physicians in shared decision making for the use of antibiotics for acute respiratory infections: a pilot clustered randomized controlled trial. Health Expectations 14: 96-111	Reason for exclusion: Not relevant intervention
Markopoulos C. (2013) Overview of the use of Oncotype DX as an additional treatment decision tool in early breast cancer. Expert Rev Anticancer Therapy 13(2): 179-94	Reason for exclusion: Not relevant intervention
Montgomery AA, Fahey T, Peters TJ. (2003) A factorial randomised controlled trial of decision analysis and an information video plus leaflet for newly diagnosed hypertensive patients. British Journal of General Practice 53(491): 446-53	Reason for exclusion: Not relevant intervention
Protheroe, J, Fahey T, Montgomery AA, et al. (2001) Effects of patients' preferences on the treatment of atrial fibrillation: observational study of patient-based decision analysis. Western Journal of Medicine 174(5): 311-15	
Sheridan SL, Pignone MP, Lewis CL. (2003) A Randomized comparison of patients' understanding of number needed to treat and other common risk formats. Journal of General Internal Medicine 18(11): 884-92	Reason for exclusion: Not relevant intervention
Stacey D, Légaré F, Col NF, et al. (2014) Decision aids for people facing health treatment or screening decisions. Cochrane Database of Systematic Reviews, Issue 1. Art. No.: CD001431. DOI: 10.1002/14651858.CD001431.pub4	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Taylor A and Thompson C. (2004) Decision aids reduced decisional conflict in patients with newly diagnosed hypertension. Evidence Based Nursing 7(1): 17-18	Reason for exclusion: Not relevant study
Wilson SR, Strub P, Buist, AS, et al. (2010) Shared treatment decision making improves adherence and outcomes in poorly controlled asthma. American Journal of Respiratory & Critical Care Medicine. 181 (6): 566-77	Reason for exclusion: Not relevant intervention

C.5.7 Clinical decision support

Author	Reason for Exclusion
Anon. (1925) Technology-based decision support fuels quality improvement. Disease Management Advisor 11(3): 33-35	Reason for exclusion: Not relevant
Anon. (2005) Optimizing diagnosis of recurrent events using (almost) continuous monitoring ancillary study of Costs and effects of strategies to prevent over sedation in Intensive Care patients. Patient safety/medication safety: The impact of computerized physician order entry on medication error prevention in hospitalized patients. Health Technology Assessment Database (4)	Reason for exclusion: Not relevant
Anon. (2005) Thrombo-Base. A technology assessment of a decision support system and a clinical database for anticoagulant treatment. Health Technology Assessment Database (4)	Reason for exclusion: Not relevant
Anon. (2006) Evidence based medicine decision support (Project record). Health Technology Assessment Database (4)	Reason for exclusion: Not relevant
Anon (2008) Chronic care model and shared care in diabetes: Randomized trial of an electronic decision support system. Mayo Clinic Proceedings 83(10): 1189	Reason for exclusion: Not relevant
Anon (2010) Enabling health care decision making through the use of health information technology (Health IT) (Project record). Health Technology Assessment Database (4)	Reason for exclusion: Not relevant intervention
Anon. (2011) Enabling medication management through health information technology. Health Technology Assessment Database (4)	Reason for exclusion: Not relevant
Anon. (2006) Design of a decision support system in rheumatoid arthritis (Project record). Health Technology Assessment Database (4)	Reason for exclusion: Not relevant
Anon. (2007) Cost-effectiveness of two strategies to implement the NVOG guidelines on hypertension in pregnancy: An innovative strategy including a computerised decision support system compared to a common strategy of professional audit & feedback (Project record). Health Technology Assessment Database (4)	Reason for exclusion: Not relevant
Adams P, Riggio JM, Thomson L, et al. (2012) Clinical decision support systems to improve utilization of thromboprophylaxis: a review of the literature and experience with implementation of a computerized physician order entry program. Hospital Practice 40(3): 27-39	Reason for exclusion: Unable to source
Ageno W, Johnson J, Nowacki B, et al. (2000) A computer generated induction system for hospitalized patients starting on oral anticoagulant therapy. Thrombosis and Haemostasis 83(6): 849-52	Reason for exclusion: Unable to source
Ali MK, Shah S, Tandon N. (2011). Review of electronic decision-support tools for diabetes care: a viable option for low- and middle-income countries? Journal of Diabetes Science & Technology 5(3): 553-70	Reason for exclusion: Not relevant
Alldred DP, Raynor DK, Hughes C, et al. (2013) Interventions to optimise prescribing for older people in care homes. Cochrane Database of Systematic Reviews 2: CD009095	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Anchala R, Pinto MP, Shroufi A, et al. (2012) The role of Decision Support System (DSS) in prevention of cardiovascular disease: a systematic review and meta-analysis. PLos One (10): e47064	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Apkon M, Mattera JA, Lin Z, et al. (2005) A randomized outpatient trial of a decision-support information technology tool. Archives of	Reason for exclusion: Systematic review, not all

Author	Reason for Exclusion
Internal Medicine 165(20): 2388-94	studies relevant. Relevant studies extracted and included in analysis
Augstein P, Vogt L, Kohnert KD, et al. (2007) Outpatient assessment of Karlsburg Diabetes Management System-based decision support. Diabetes Care 30(7): 1704-8	Reason for exclusion: Not relevant
Avansino J, Leu MG. (2012) Effects of CPOE on provider cognitive workload: a randomized crossover trial. Pediatrics 130(3): e547-552	Reason for exclusion: Not relevant
Bailey TC, Noirot LA, Gage BF. (2006) Improving adherence to coronary heart disease secondary prevention medication guidelines at a community hospital. AMIA Annual Symposium Proceedings / AMIA Symposium 850	Reason for exclusion: No relevant outcomes
Balaguer Santamaría JA, Fernández-Ballart JD, Escribano SJ. (2001). Usefulness of a software package to reduce medication errors in neonatal care. Anales Españoles De Pediatría 55(6): 541-45	Reason for exclusion: Not relevant
Balaguer A, Quiroga-González R, Camprubí M, et al. (2009) Reducing errors in the management of hyperbilirubinaemia: validating a software application. Archives of Disease in Childhood Fetal and Neonatal Edition 94(1): F45-47	Reason for exclusion: Not relevant
Balas EA, Krishna S, Kretschmer RA, et al. (2004) Computerized knowledge management in diabetes care (Structured abstract). Medical Care 42(6): 610-21	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Bediang G, Bagayoko CO, Geissbuhler A. (2010) Medical decision support systems in Africa. Yearbook of Medical Informatics 47-54	Reason for exclusion: Not relevant
Bennett JW, Glasziou PP, Sim I. (2003). Review: Computerised reminders and feedback can improve provider medication management. Evidence-Based Medicine 8(6): 190	Reason for exclusion: Published before the year 2009
Berner ES, Houston TK, Ray MN, et al. (2006). Improving ambulatory prescribing safety with a handheld decision support system: a randomized controlled trial. Journal of the American Medical Informatics Association 13(2): 171-79	Reason for exclusion: Published before the year 2009
Bochicchio GV, Smit PA, Moore R, et al. (2006). Pilot study of a web-based antibiotic decision management guide. Journal of the American College of Surgeons 202(3): 459-67	Reason for exclusion: Not relevant intervention
Bosworth HB, Olsen MK, Oddone EZ. (2005) Improving blood pressure control by tailored feedback to patients and clinicians. American Heart Journal 149(5): 795-803	Reason for exclusion: Not relevant
Bosworth HB, Olsen MK, McCant F, et al. (2007). Hypertension Intervention Nurse Telemedicine Study (HINTS): testing a multifactorial tailored behavioural/educational and a medication management intervention for blood pressure control. American Heart Journal 153(6): 918-24	Reason for exclusion: Not relevant intervention
Boyle R, Solberg L, Fiore M. (2011) Use of electronic health records to support smoking cessation. Cochrane Database of Systematic Reviews (12): CD008743	Reason for exclusion: Not relevant
Bright TJ, Wong A, Dhurjati R, et al. (2012) Effect of clinical decision-support systems: a systematic review. Annals of Internal Medicine 157(1): 29-43	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Bryan C, Boren SA (2008) The use and effectiveness of electronic clinical decision support tools in the ambulatory/primary care	Reason for exclusion: Systematic review, not all

Author	Reason for Exclusion
setting: a systematic review of the literature. Informatics in Primary Care 16(2): 79-91	studies relevant. Relevant studies extracted and included in analysis
Carling CL, Kirkehei I, Dalsbo TK, et al. (2013) Risks to patient safety associated with implementation of electronic applications for medication management in ambulatory care - A systematic review. BMC Medical Informatics & Decision Making 13: 133	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Chaudhry B, Wang J, Wu S, et al. (2006). Systematic review: impact of health information technology on quality, efficiency, and costs of medical care. Annals of Internal Medicine 144(10): 742-52	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Christakis DA, Zimmerman FJ, Wright JA, et al. (2001) A randomized controlled trial of point-of-care evidence to improve the antibiotic prescribing practices for otitis media in children. Pediatrics 107(2): E15	Reason for exclusion: Published before the year 2009
Cleveringa FG, Gorter KJ, Van den Donk M, et al. (2008) Combined task delegation, computerized decision support and feedback improve cardiovascular risk for type 2 diabetic patients: a cluster randomized trial in primary care. Diabetes Care 31(12): 2273-75	Reason for exclusion: Not relevant intervention
Cleveringa FG, Welsing PM, van den Donk M. (2010) Cost-effectiveness of the diabetes care protocol, a multifaceted computerized decision support diabetes management intervention that reduces cardiovascular risk. Diabetes Care 33(2): 258-63	Reason for exclusion: Not relevant study
Cleveringa FG, Gorter KJ, Van den Donk M, et al. (2013) Computerized decision support systems in primary care for type 2 diabetes patients only improve patients' outcomes when combined with feedback on performance and case management: a systematic review. Diabetes Technology & Therapeutics 15(2): 180-92	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Co JP, Johnson SA, Poon EG, et al. (2010) Electronic health record decision support and quality of care for children with ADHD. Pediatrics 126(2): 239-46	Reason for exclusion: Not relevant
Cobos A, Vilaseca J, Asenjo C, et al. (2005) Cost effectiveness of a clinical decision support system based on the recommendations of the European Society of Cardiology and other societies for the management of hypercholesterolemia: Report of a cluster-randomized trial. Disease Management and Health Outcomes 13(6): 421-32	Reason for exclusion: Not relevant study
Coiera E, Lau AY, Tsafnat G, et al. (2009). The changing nature of clinical decision support systems: a focus on consumers, genomics, public health and decision safety. Yearbook of Medical Informatics: 84-95	Reason for exclusion: not an RCT
Conroy S, Sweis D, Planner C, et al. (2007) Interventions to reduce dosing errors in children: a systematic review of the literature. Drug Safety 30(12): 1111-25	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Cordingley JJ, Vlasselaers D, Dormand NC, et al. (2009) Intensive insulin therapy: enhanced Model Predictive Control algorithm versus standard care. Intensive Care Medicine 35(1): 123-28	Reason for exclusion: Abstract only
Cortes MA, Gomez E, Hervas A, et al. (2006) Validatino of the computerized decision support software Taocheck to monitor oral anticoagulant therapy. Haematologica 91 (Suppl 1)	Reason for exclusion: Abstract only
Cox ZL, Nelsen CL, Waitman LR, et al. (2011) Effects of clinical decision support on initial dosing and monitoring of tobramycin and	Reason for exclusion: Not an RCT

Author	Reason for Exclusion
amikacin. American Journal of Health-System Pharmacy 68(7): 624-32	
Cresswell K, Majeed A, Bates DW, et al. (2012) Computerised decision support systems for healthcare professionals: an interpretative review. Informatics in Primary Care 20(2): 115-28	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Curtain C, Peterson GM, Tenni P, et al. (2011). Outcomes of a decision support prompt in community pharmacy-dispensing software to promote step-down of proton pump inhibitor therapy. British Journal of Clinical Pharmacology 71(5): 780-84	Reason for exclusion: Not relevant
Damiani G, Pinnarelli L, Colosimo SC, et al. (2010) The effectiveness of computerized clinical guidelines in the process of care: a systematic review. BMC Health Services Research 10: 2	Reason for exclusion: Not relevant
Davey P, Brown E, Charani E, et al. (2013) Interventions to improve antibiotic prescribing practices for hospital inpatients. Cochrane Database of Systematic Reviews (4)	Reason for exclusion: Not relevant
Davis RL, Wright J, Chalmers F, et al. (2007) A cluster randomized clinical trial to improve prescribing patterns in ambulatory pediatrics. Plos Clinical Trials 2(5): e25	Reason for exclusion: Published before the year 2009
De Belvis AG, Pelone F, Biasco A, et al. (2009) Can primary care professionals' adherence to Evidence Based Medicine tools improve quality of care in Type 2 diabetes mellitus? Diabetes Research and Clinical Practice 85(2): 119-31	
Dexter PR, Perkins S, Overhage JM, et al. (2001) A computerized reminder system to increase the use of preventive care for hospitalized patients. New England Journal of Medicine 345(13): 965-70	Reason for exclusion: No relevant outcomes
Downs M, Turner S, Bryans M, et al. (2006) Effectiveness of educational interventions in improving detection and management of dementia in primary care: cluster randomised controlled study. BMJ 332(7543): 692-96	Reason for exclusion: Not relevant
Duke JD, Li X, Dexter P. (2013) Adherence to drug-drug interaction alerts in high-risk patients: a trial of context-enhanced alerting. Journal of the American Medical Informatics Association 20(3): 494-98	Reason for exclusion: No relevant outcomes
Durieux P, Trinquart L, Colombet I, et al. (2008). Computerized advice on drug dosage to improve prescribing practice. Cochrane Database of Systematic Reviews (3)	Reason for exclusion: Not relevant
Eccles M, McColl E, Steen N, et al. (2012) Effect of computerised evidence based guidelines on management of asthma and angina in adults in primary care: cluster randomised controlled trial. BMJ 325(7370): 941 Reason for exclusion: Published before the year 2009	Reason for exclusion: Published before the year 2009
Eisenstein EL, Kawamoto K, Anstrom KJ, et al. (2011) Clinical and economic results from a randomized trial of clinical decision support in a rural health network. Studies in Health Technology & Informatics 164: 77-81	Reason for exclusion: Not relevant
Eisenstein, EL, Anstrom KJ, Edwards R, et al. (2012) Population-based clinical decision support: a clinical and economic evaluation. Studies in Health Technology & Informatics 180: 343-47	Reason for exclusion: Not relevant
Erler A, Beyer M, Petersen JJ, et al. (2012) How to improve drug dosing for patients with renal impairment in primary care - a cluster-randomized controlled trial. BMC Family Practice 13: 91 intervention	Reason for exclusion: Not relevant intervention

Author	Reason for Exclusion
Eslami S, Abu-Hanna A, de JE, et al. (2009) Tight glycaemic control and computerized decision-support systems: a systematic review. Intensive Care Medicine 35(9): 1505-17	Reason for exclusion: Not relevant intervention
Ferlin M, Noraz N, Hertogh C, et al. (2000) Anticoagulation management in primary care: A trial-based economic evaluation. British Journal of Haematology 111(2): 530-33	Reason for exclusion: Not relevant study
Fillmore CL, Bray BE, Kawamoto K. (2013) Systematic review of clinical decision support interventions with potential for inpatient cost reduction. BMC Medical Informatics & Decision Making 13: 135	Reason for exclusion: Not relevant study
Fitzgerald M, Cameron P, Mackenzie C, et al. (2011) Trauma resuscitation errors and computer-assisted decision support. Archives of Surgery, 146(2): 218-25	Reason for exclusion: Not relevant intervention
Fitzmaurice DA, Hobbs FD, Murray ET, et al. (2000) Oral anticoagulation management in primary care with the use of computerized decision support and near-patient testing: a randomized, controlled trial. Archives of Internal Medicine 160(15): 2343-48 intervention	Reason for exclusion: Not relevant intervention
Fitzmaurice DA, Hobbs FD, Murray ET, et al. (2001) A nurse led clinic and computer decision support software for anticoagulation decisions were as effective as a hospital clinic. Evidence-Based Medicine 6: 61 intervention	Reason for exclusion: Not relevant intervention
Fonarow GC, Albert NM, Curtis AB, et al (2010) Improving evidence-based care for heart failure in outpatient cardiology practices: primary results of the Registry to Improve the Use of Evidence-Based Heart Failure Therapies in the Outpatient Setting. Circulation 122(6): 585-96	Reason for exclusion: Not relevant intervention
Forrest CB, Fiks AG, Bailey LC, et al. (2013) Improving adherence to otitis media guidelines with clinical decision support and physician feedback. Pediatrics 131(4): e1071-81	Reason for exclusion: Not relevant
Frances CD, Alperin P, Adler JS, et al. (2001). Does a fixed physician reminder system improve the care of patients with coronary artery disease? A randomized controlled trial. Western Journal of Medicine 175(3): 165-66	Reason for exclusion: No results given
Fransen J, Twisk JW, Creemers MC, et al. (2004) Design and analysis of a randomized controlled trial testing the effects of clinical decision support on the management of rheumatoid arthritis. Arthritis & Rheumatism 51(1): 124-27	Reason for exclusion: Not relevant
Fricton J, Rindal DB, Rush W, et al. (2011) The effect of electronic health records on the use of clinical care guidelines for patients with medically complex conditions. Journal of the American Dental Association 142(10): 1133-42	
Frijling BD, Lobo CM, Hulscher ME, et al. (2012) Multifaceted support to improve clinical decision making in diabetes care: a randomized controlled trial in general practice. Diabetic Medicine 19(10): 836-42	Reason for exclusion: Not relevant intervention
Garg AX, Adhikari NK, McDonald H, et al. (2005) Effects of computerized clinical decision support systems on practitioner performance and patient outcomes: a systematic review. JAMA 293(10): 1223-38	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Georgiou, A, Prgomet M, Paoloni R, et al. (2013) The effect of	Reason for exclusion:

Author	Reason for Exclusion
computerized provider order entry systems on clinical care and work processes in emergency departments: a systematic review of the quantitative literature. Annals of Emergency Medicine, 61(6): 644-53	Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Gillaizeau, F, Chan E, Trinquart L, et al. (2013) Computerized advice on drug dosage to improve prescribing practice. Cochrane Database of Systematic Reviews (11)	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Gilmer TP, O'Connor PJ, Sperl-Hillen JM, et al. (2012) Cost-effectiveness of an electronic medical record based clinical decision support system. Health Services Research 47(6): 2137-58	Reason for exclusion: Not relevant study
Gilutz H, Novack L, Shvartzman P, et al. (2009) Computerized community cholesterol control (4C): meeting the challenge of secondary prevention. Israel Medical Association Journal 11(1): 23-29	Reason for exclusion: Not relevant
Glasgow RE, Nutting PA, King DK, et al. (2005). Randomized effectiveness trial of a computer-assisted intervention to improve diabetes care. Diabetes Care 28(1): 33-39	Reason for exclusion: Not relevant intervention
Goldberg GR, Morrison RS. (2007). Pain management in hospitalized cancer patients: a systematic review. Journal of Clinical Oncology 25(13): 1792-1801	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Gonzales R, Anderer T, McCulloch CE, et al. (2013) A cluster randomized trial of decision support strategies for reducing antibiotic use in acute bronchitis. JAMA Internal Medicine 173(4): 267-73	Reason for exclusion: Not relevant intervention
Goud R, de Keizer NF, ter RG, et al. (2009) Effect of guideline based computerised decision support on decision making of multidisciplinary teams: cluster randomised trial in cardiac rehabilitation. BMJ 338: b1440	Reason for exclusion: Not relevant intervention
Griffey RT, Lo HG, Burdick E, et al. (2012) Guided medication dosing for elderly emergency patients using real-time, computerized decision support. Journal of the American Medical Informatics Association 19(1): 86-93	Reason for exclusion: Not relevant
Gurwitz JH, Field TS, Rochon P, et al. (2008). Effect of computerized provider order entry with clinical decision support on adverse drug events in the long-term care setting. Journal of the American Geriatrics Society 56(12): 2225-33	Reason for exclusion: Published before the year 2009
Hemens BJ, Holbrook A, Tonkin M, et al. (2011) Computerized clinical decision support systems for drug prescribing and management: a decision-maker-researcher partnership systematic review. [Review]. Implementation Science, 6: 89	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Hender K. (2000) How effective are computer assisted decision support systems (CADSS) in improving clinical outcomes of patients? Health Technology Assessment Database (4): 22	Reason for exclusion: Not relevant
Heselmans A, Van d V, Donceel P, et al. (2009) Effectiveness of electronic guideline-based implementation systems in ambulatory care settings - a systematic review. Implementation Science 4: 82	Reason for exclusion: Systematic review, not all studies relevant. Relevant

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	studies extracted and included in analysis
Hetlevik I, Holmen J, Kruger O, et al. (2000) Implementing clinical guidelines in the treatment of diabetes mellitus in general practice. Evaluation of effort, process, and patient outcome related to implementation of a computer-based decision support system. International Journal of Technology Assessment in Health Care 16(1): 210-27	Reason for exclusion: Published before the year 2009
Hicks LS, Sequist TD, Ayanian JZ, et al. (2008) Impact of computerized decision support on blood pressure management and control: a randomized controlled trial. Journal of General Internal Medicine 23(4): 429-41	Reason for exclusion: Published before the year 2009
Hodgkinson B, Koch S, Nay R, et al. (2006) Strategies to reduce medication errors with reference to older adults. International Journal of Evidence-Based Healthcare 4(1): 2-41	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Holbrook A, Keshavjee K, Lee H, et al. (2005) Individualized electronic decision support and reminders can improve diabetes care in the community. AMIA Annual: Symposium	Reason for exclusion: Abstract only
Iankowitz N, Dowden M, Palomino S, et al. (2012) The effectiveness of computer system tools on potentially inappropriate medications ordered at discharge for adults older than 65 years of age: A systematic review. JBI Database of Systematic Reviews and Implementation Reports 10(13): 798-831	Reason for exclusion: Unable to source
Jaspers MW, Smeulers M, Vermeulen H, et al. (2011) Effects of clinical decision-support systems on practitioner performance and patient outcomes: a synthesis of high-quality systematic review findings. Journal of the American Medical Informatics Association 18(3): 327-34	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Jeffery R, Iserman E, Haynes RB, et al. (2013) Can computerized clinical decision support systems improve diabetes management? A systematic review and meta-analysis. Diabetic Medicine 30(6): 739-45	Reason for exclusion: No relevant comparator
Jousimaa J, Makela M, Kunnamo I, et al. (2012) Primary care guidelines on consultation practices: the effectiveness of computerized versus paper-based versions. A cluster randomized controlled trial among newly qualified primary care physicians. International Journal of Technology Assessment in Health Care, 18(3): 586-96	Reason for exclusion: Not relevant
Kahn SR, Morrison DR, Cohen JM, et al. (2013) Interventions for implementation of thromboprophylaxis in hospitalized medical and surgical patients at risk for venous thromboembolism. Cochrane Database of Systematic Reviews (7)	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Kaki R, Elligsen M, Walker S, et al. (2011) Impact of antimicrobial stewardship in critical care: a systematic review. Journal of Antimicrobial Chemotherapy 66(6): 1223-30	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Karbing DS, Allerod C, Thorgaard P, et al. (2010) Prospective evaluation of a decision support system for setting inspired oxygen in intensive care patients. Journal of Critical Care 25(3): 367-74	Reason for exclusion: Not relevant
Kastner M, Straus SE. (2009) Clinical decision support tools for osteoporosis disease management: A systematic review of	Reason for exclusion: Systematic review, not all

Author	Reason for Exclusion
randomized controlled trials. Journal of General Internal Medicine 24(2): 287	studies relevant. Relevant studies extracted and included in analysis
Kaushal R, Shojania KG & Bates DW. (2003) Effects of computerized physician order entry and clinical decision support systems on medication safety: a systematic review. Archives of Internal Medicine 163(12): 1409-16	Reason for exclusion: Not relevant
Kawamoto K, Lobach DF. (2003) Clinical decision support provided within physician order entry systems: a systematic review of features effective for changing clinician behaviour. AMIA Annual: Symposium 5	Reason for exclusion: Not relevant
Kawamoto K, Houlihan CA, Balas EA, et al. (2005) Improving clinical practice using clinical decision support systems: a systematic review of trials to identify features critical to success. BMJ 330(7494): 765	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Kooij FO, Klok T, Hollmann MW, et al. (2008). Decision support increases guideline adherence for prescribing postoperative nausea and vomiting prophylaxis. Anesthesia & Analgesia 106(3): 893-98	Reason for exclusion: not an RCT
Kortteisto T, Raitanen J, Komulainen J, et al. (2014) Patient-specific computer-based decision support in primary healthcare - A randomized trial. Implementation Science 9: 15	Reason for exclusion: No relevant outcomes
Kucher N, Koo S, Quiroz R, et al. (2005) Electronic alerts to prevent venous thromboembolism among hospitalized patients. New England Journal of Medicine 352(10): 969-77	Reason for exclusion: Published before the year 2009
Lainer M, Mann E, Sonnichsen A. (2013) Information technology interventions to improve medication safety in primary care: a systematic review. International Journal for Quality in Health Care 25(5): 590-98	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Lavigne JV, Dulcan MK, LeBailly SA, et al. (2011) Computer-assisted management of attention-deficit/hyperactivity disorder. Pediatrics 128(1): e46-53	Reason for exclusion: Not relevant intervention
Lees KR, Sim I, Wier CJ, et al. (2003) Cluster-randomized, controlled trial of computer-based decision support for selecting long-term anti-thrombotic therapy after acute ischaemic stroke. QJM: An International Journal of Medicine 96: 143-53	Reason for exclusion: Published before the year 2009
Lesourd F, Avril C, Boujennah A, et al (2012) A computerized decision support system for ovarian stimulation by gonadotropins. Fertility & Sterility 77(3): 456-60	Reason for exclusion: Not relevant
Lester WT, Grant R, Barnett GO, et al. (2004) Facilitated lipid management using interactive e-mail: preliminary results of a randomized controlled trial. Studies in Health Technology & Informatics 107(Pt.1): 1-6	Reason for exclusion: Not relevant intervention
Lester WT, Grant RW, Barnett GO, et al. (2006) Randomized controlled trial of an informatics-based intervention to increase statin prescription for secondary prevention of coronary disease. Journal of General Internal Medicine 21(1): 22-29	Reason for exclusion: Not relevant intervention
Lewis K. (2012) Electronic decision support system to reduce vascular risk improved processes but not outcomes: Commentary. Journal of Clinical Outcomes Management 19(1): 5-7	Reason for exclusion: Not relevant intervention
Lim S, Kang SM, Shin H, et al. (2011) Improved glycaemic control without hypoglycaemia in elderly diabetic patients using the ubiquitous healthcare service, a new medical information system. Diabetes Care 34(2): 308-13	Reason for exclusion: Not relevant intervention

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Lobach D, Sanders GD, Bright TJ, et al. (2012) Enabling health care decision making through clinical decision support and knowledge management. Evidence Report/Technology Assessment (203):1-784	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Loganathan M, Singh S, Franklin BD, et al. (2011) Interventions to optimise prescribing in care homes: systematic review. Age & Ageing 40(2): 150-62	Reason for exclusion: Not relevant intervention
Mack EH, Wheeler DS, Embi PJ. (2009) Clinical decision support systems in the pediatric intensive care unit. Pediatric Critical Care Medicine 10(1): 23-28	Reason for exclusion: Not an RCT
Maclean CD, Gagnon M, Callas P, et al. (2009) The Vermont diabetes information system: a cluster randomized trial of a population based decision support system. Journal of General Internal Medicine, 24(12): 1303-10	Reason for exclusion: Not relevant intervention
Makela M. (2010) Evidence based medicine decision support system integrated with EPRs. Health Technology Assessment Database (4)	Reason for exclusion: Not relevant
Manias E, Williams A, Liew D. (2012) Interventions to reduce medication errors in adult intensive care: a systematic review. British Journal of Clinical Pharmacology 74(3): 411-23	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Mann EA, Jones JA, Wolf SE, et al. (2011) Computer decision support software safely improves glycaemic control in the burn intensive care unit: a randomized controlled clinical study. Journal of Burn Care & Research 32(2): 246-55	Reason for exclusion: Not relevant
Manotti C, Moia M, Palareti G, et al. (2001) Effect of computer-aided management on the quality of treatment in anticoagulated patients: a prospective, randomized, multicenter trial of APROAT (Automated Program for Oral Anticoagulant Treatment). Haematologica 86(10): 1060-70	Reason for exclusion: Not relevant intervention
Marco F, Sedano C, Bermúdez A, et al. (2003) A prospective controlled study of a computer-assisted acenocoumarol dosage program. Pathophysiology of Haemostasis and Thrombosis 33(2): 59-63	Reason for exclusion: Not relevant intervention
Marcum ZA, Handler SM, Wright R, et al. (2010) Interventions to improve suboptimal prescribing in nursing homes: A narrative review. American Journal of Geriatric Pharmacotherapy 8(3): 183-200	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Martens JD, van der Aa A, Panis B, et al. (2006) Design and evaluation of a computer reminder system to improve prescribing behaviour of GPs. Studies in Health Technology & Informatics 124: 617-23	Reason for exclusion: Published before the year 2009
McCowan C, Neville RG, Ricketts IW, et al. (2001) Lessons from a randomized controlled trial designed to evaluate computer decision support software to improve the management of asthma. Medical Informatics & the Internet in Medicine 26(3): 191-201	Reason for exclusion: Published before the year 2009
McGregor JC, Weekes E, Forrest GN, et al. (2006) Impact of a computerized clinical decision support system on reducing inappropriate antimicrobial use: a randomized controlled trial. Journal of the American Medical Informatics Association 13(4): 378-84	Reason for exclusion: Not relevant intervention
McMullin ST, Lonergan TP, Rynearson CS. (2005) Twelve-month drug cost savings related to use of an electronic prescribing system	Reason for exclusion: No relevant outcomes

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with integrated decision support in primary care. Journal of Managed Care Pharmacy 11(4): 322-32	
Mitra R, Marciello MA, Brain C, et al. (2005) Efficacy of computer-aided dosing of warfarin among patients in a rehabilitation hospital. American Journal of Physical Medicine & Rehabilitation 84(6): 423-27	Reason for exclusion: Not relevant intervention
Montani S, Bellazzi R, Quaglini S, et al. (2001) Meta-analysis of the effect of the use of computer-based systems on the metabolic control of patients with diabetes mellitus. Diabetes Technology & Therapeutics 3(3): 347-56	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Montgomery AA, Fahey T, Peters TJ, et al. (2000) Evaluation of computer based clinical decision support system and risk chart for management of hypertension in primary care: randomised controlled trial. BMJ 320(7236): 686-90	Reason for exclusion: Not relevant intervention
Murray MD, Harris LE, Overhage JM, et al. (2004) Failure of computerized treatment suggestions to improve health outcomes of outpatients with uncomplicated hypertension: results of a randomized controlled trial. Pharmacotherapy 24(3): 324-37	Reason for exclusion: Published before the year 2009
Newton CA, Smiley D, Bode BW, et al. (2010) A comparison study of continuous insulin infusion protocols in the medical intensive care unit: computer-guided vs. standard column-based algorithms. Journal of Hospital Medicine, 5(8): 432-37	Reason for exclusion: Not relevant intervention
Nies J, Colombet I, Degoulet P, et al. (2006) Determinants of success for computerized clinical decision support systems integrated in CPOE systems: a systematic review. AMIA Annual: Symposium 8	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Nieuwlaat R, Connolly SJ, Mackay JA, et al. (2011) Computerized clinical decision support systems for therapeutic drug monitoring and dosing: a decision-maker-researcher partnership systematic review. Implementation Science 6: 90	Reason for exclusion: Not relevant intervention
Nieuwlaat R, Hubers LM, Spyropoulos AC, et al. (2012) Randomised comparison of a simple warfarin dosing algorithm versus a computerised anticoagulation management system for control of warfarin maintenance therapy. Thrombosis and Haemostasis 108(6): 1228-35	Reason for exclusion: Not relevant intervention
Nirantharakumar K, Chen YF, Marshall T, et al. (2012) Clinical decision support systems in the care of inpatients with diabetes in non-critical care setting: systematic review. Diabetic Medicine, 29(6): 698-708	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
O'Reilly D, Holbrook A, Blackhouse G, et al. (2012) Cost-effectiveness of a shared computerized decision support system for diabetes linked to electronic medical records. Journal of the American Medical Informatics Association, 19(3): 341-45	Reason for exclusion: Not relevant study
O'Reilly D, Tarride JE, Goeree R, et al. (2012) The economics of health information technology in medication management: a systematic review of economic evaluations. [Review]. Journal of the American Medical Informatics Association, 19(3): 423-438	Reason for exclusion: Not relevant
Okelo SO, Butz AM, Sharma R et al. (2013) Interventions to modify Health care provider adherence to asthma guidelines: A systematic review. Pediatrics 132(3): 517-34 Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis

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Oluoch T, Santas X, Kwaro D et al. (2012) The effect of electronic medical record-based clinical decision support on HIV care in resource-constrained settings: a systematic review. International Journal of Medical Informatics 81(10): e83-92	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Overgaard K, Corell P, Madsen P. (2002) A digital communication and intelligent decision support system of anticoagulant therapy. 7th International Symposium on Thrombolysis and Acute Stroke Therapy: 85	Reason for exclusion: Unable to source
Parrino TA. (2005) Controlled trials to improve antibiotic utilization: a systematic review of experience 1984-2004. Pharmacotherapy: The Journal of Human Pharmacology & Drug Therapy 25(2): 289-98	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Pasricha A, Deinstadt RTM, Moher D, et al. (2013) Chronic care model decision support and clinical information systems interventions for people living with HIV: A systematic review. Journal of General Internal Medicine 28(1): 127-35	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Paterno MD, Cina JL, Goldhaber SZ, et al. (2006) Preventing DVT and PE in hospitalized patients: improving a successful electronic alert. AMIA Annual Symposium Proceedings/AMIA Symposium 1058	Reason for exclusion: Not relevant
Patterson SM, Hughes C, Kerse N, et al. (2012) Interventions to improve the appropriate use of polypharmacy for older people. Cochrane Database of Systematic Reviews 5: CD008165	Reason for exclusion: Not relevant intervention
Pearson SA, Moxey A, Robertson J et al. (2009) Do computerised clinical decision support systems for prescribing change practice? A systematic review of the literature (1990-2007) BMC Health Services Research 9: 154	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Peremans L, Rethans JJ, Verhoeven V, et al. (2010) Empowering patients or general practitioners? A randomised clinical trial to improve quality in reproductive health care in Belgium. European Journal of Contraception & Reproductive Health Care 15(4): 280-89	Reason for exclusion: No relevant outcomes
Plaza V, Cobos A, Ignacio-García JM, et al. (2005) Cost-effectiveness of an intervention based on the Global INitiative for Asthma (GINA) recommendations using a computerized clinical decision support system: a physicians randomized trial. Medicina Clínica 124(6): 201-06	Reason for exclusion: unable to source copy in English
Poller L, Keown M, Ibrahim S, et al. (2008) A multicentre randomised clinical endpoint study of PARMA 5 computer-assisted oral anticoagulant dosage. British Journal of Haematology 143(2): 274-83	Reason for exclusion: Not relevant
Poller L, Keown M, Ibrahim S, et al. (2008) An international multi-center randomized study of computer-assisted oral anticoagulant dosage vs. medical staff dosage. Journal of Thrombosis and Haemostasis: 6(6): 935-43	Reason for exclusion: Not relevant
Pombo N, Araujo P, Viana J. (2014) Knowledge discovery in clinical decision support systems for pain management: a systematic review. Artificial Intelligence in Medicine 60(1): 1-11	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Raebel MA, Carroll NM, Kelleher JA, et al. (2007) Randomized trial to improve prescribing safety during pregnancy. Journal of the American Medical Informatics Association: 14(4): 440-50	Reason for exclusion: Not relevant intervention

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Raebel MA, Charles J, Dugan J, et al. (2007)Randomized trial to improve prescribing safety in ambulatory elderly patients. Journal of the American Geriatrics Society 55(7): 977-85	Reason for exclusion: Not relevant intervention
Reynolds CJ, O'Donoghue DJ. (2011) Clinical decision support systems and the management of CKD by primary care physicians. American Journal of Kidney Diseases 58(6): 868-69	Reason for exclusion: Not an RCT
Robbins GK, Lester W, Johnson KL, et al. (2012) Efficacy of a clinical decision-support system in an HIV practice: a randomized trial. Annals of Internal Medicine 157(11): 757-66	Reason for exclusion: Not relevant intervention
Robbins GK, Lester W, Johnson KL. (2013) A clinical decision-support system with interactive alerts improved CD4 cell count in HIV. Annals of Internal Medicine 158(8): JC11	Reason for exclusion: Not relevant
Roberts GW, Farmer CJ, Cheney PC, et al. (2010) Clinical decision support implemented with academic detailing improves prescribing of key renally cleared drugs in the hospital setting. Journal of the American Medical Informatics Association 17(3): 308-12	Reason for exclusion: Not an RCT
Robertson J, Walkom E, Pearson SA, et al. (2010) The impact of pharmacy computerised clinical decision support on prescribing, clinical and patient outcomes: a systematic review of the literature. International Journal of Pharmacy Practice 18(2): 69-87	Reason for exclusion: Not relevant intervention
Rollman BL, Hanusa BH, Lowe HJ et al. (2002) A randomized trial using computerized decision support to improve treatment of major depression in primary care. Journal of General Internal Medicine 17(7): 493-503	Reason for exclusion: Published before the year 2009
Roshanov PS, Fernandes N, Wilczynski JM, et al. (2013) Features of effective computerised clinical decision support systems: meta-regression of 162 randomised trials. BMJ 346: f657	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Roukema J, Steyerberg EW, van der Lei J, et al. (2008) Randomized trial of a clinical decision support system: impact on the management of children with fever without apparent source. Journal of the American Medical Informatics Association 15(1): 107-13	Reason for exclusion: Not relevant intervention
Rudkin SE, Langdorf MI, Macias D, et al. (2006) Personal digital assistants change management more often than paper texts and foster patient confidence. European Journal of Emergency Medicine 13(2): 92-96	Reason for exclusion: Not relevant intervention
Saager L, Collins GL, Burnside B, et al. (2008) A randomized study in diabetic patients undergoing cardiac surgery comparing computer-guided glucose management with a standard sliding scale protocol. Journal of Cardiothoracic and Vascular Anesthesia, 22(3): 377-82	Reason for exclusion: Not relevant intervention
Sahota N, Lloyd R, Ramakrishna A, et al. (2011) Computerized clinical decision support systems for acute care management: a decision-maker-researcher partnership systematic review of effects on process of care and patient outcomes. Implementation Science 6: 91	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Samore MH, Bateman K, Alder SC, et al. (2005) Clinical decision support and appropriateness of antimicrobial prescribing: a randomized trial. JAMA 294(18): 2305-14	Reason for exclusion: Not relevant intervention
Schedlbauer A, Prasad V, Mulvaney C, et al. (2009) What evidence supports the use of computerized alerts and prompts to improve clinicians' prescribing behaviour? Journal of the American Medical Informatics Association 16(4): 531-38	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis

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Scheepers-Hoeks AM, Grouls RJ, Neef C et al. (2013) Physicians' responses to clinical decision support on an intensive care unit - comparison of four different alerting methods. Artificial Intelligence in Medicine 59(1): 33-38	Reason for exclusion: Not relevant intervention
Schwarz EB, Burch EJ, Parisi SM, et al. (2013) Computer-assisted provision of hormonal contraception in acute care settings. Contraception 87(2): 242-50	Reason for exclusion: Not relevant intervention
Scott GP, Shah P, Wyatt JC, et al. (2011) Making electronic prescribing alerts more effective: scenario-based experimental study in junior doctors. Journal of the American Medical Informatics Association 18(6): 789-98	Reason for exclusion: No relevant comparator
Shah S, Singh K, Ali MK, et al. (2012) Improving diabetes care: Multi-component cardiovascular disease risk reduction strategies for people with diabetes in South Asia, The CARRS Multi-center Translation Trial. Diabetes Research and Clinical Practice 98(2): 285-94	Reason for exclusion: not relevant intervention
Shebl NA, Franklin BD, Barber N. (2007) Clinical decision support systems and antibiotic use. Pharmacy World & Science 29(4): 342-49	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Sheehan J, Sherman KA. (2012) Computerised decision aids: a systematic review of their effectiveness in facilitating high-quality decision-making in various health-related contexts. Patient Education & Counseling 88(1): 69-86	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Simon SR, Smith DH, Feldstein AC et al. (2006) Computerized prescribing alerts and group academic detailing to reduce the use of potentially inappropriate medications in older people. Journal of the American Geriatrics Society 54(6): 963-68	Reason for exclusion: No relevant outcomes
Sintchenko V, Magrabi F, Tipper S. (2007) Are we measuring the right end-points? Variables that affect the impact of computerised decision support on patient outcomes: a systematic review. Medical Informatics & the Internet in Medicine 32(3): 225-40	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Sintchenko V, Coiera E, Gilbert GL. (2008) Decision support systems for antibiotic prescribing. Current Opinion in Infectious Diseases 21(6): 573-79	Reason for exclusion: Not an RCT
Smith MY, DePue JD, Rini C. (2007) Computerized decision-support systems for chronic pain management in primary care (Provisional abstract). Pain Medicine 8 (Supplement 3): S155-66	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Sondergaard S, Wall P, Cocks K, et al. (2012) High concordance between expert anaesthetists' actions and advice of decision support system in achieving oxygen delivery targets in high-risk surgery patients. British Journal of Anaesthesia 108(6): 966-72	Reason for exclusion: Not relevant intervention
Souza NM, Sebaldt RJ, Mackay JA et al. (2011) Computerized clinical decision support systems for primary preventive care: a decision-maker-researcher partnership systematic review of effects on process of care and patient outcomes. Implementation Science 6: 87	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Strom BL, Schinnar R, Bilker W, et al. (2010) Randomized clinical trial of a customized electronic alert requiring an affirmative response compared to a control group receiving a commercial	Reason for exclusion: No relevant outcomes

Author	Reason for Exclusion
passive CPOE alert: NSAID--warfarin co-prescribing as a test case. Journal of the American Medical Informatics Association 17(4): 411-1	
Stuerzlinger H, Hiebinger C, Pertl D, et al. (2009) Computerized physician order entry - effectiveness and efficiency of electronic medication ordering with decision support systems. Health Technology Assessment Database (4)	Reason for exclusion: Not relevant study
Stultz JS, Nahata MC. (2012) Computerized clinical decision support for medication prescribing and utilization in paediatrics. Journal of the American Medical Informatics Association 19(6): 942-53	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Subramanian S, Hoover S, Wagner JL, et al. (2012) Immediate financial impact of computerized clinical decision support for long-term care residents with renal insufficiency: a case study. Journal of the American Medical Informatics Association 19(3): 439-42	Reason for exclusion: Not a RCT
Tamblyn R, Huang A, Perreault R, et al. (2003) The medical office of the 21st century (MOXXI): effectiveness of computerized decision-making support in reducing inappropriate prescribing in primary care. CMAJ Canadian Medical Association Journal 169(6): 549-56	Reason for exclusion: Published before the year 2009
Tamblyn R, Huang A, Taylor L, et al. (2008) A randomized trial of the effectiveness of on-demand versus computer-triggered drug decision support in primary care. Journal of the American Medical Informatics Association 15(4): 430-38	Reason for exclusion: Published before the year 2009
Tan K, Dear PR, Newell SJ (2005) Clinical decision support systems for neonatal care. Cochrane Database of Systematic Reviews (2): CD004211	Reason for exclusion: Not relevant
Tawadrous D, Shariff SZ, Haynes RB et al. (2011) Use of clinical decision support systems for kidney-related drug prescribing: a systematic review. American Journal of Kidney Diseases 58(6): 903-14	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Taylor B, Dinh M, Kwok R et al. (2008) Electronic interface for emergency department management of asthma: a randomized control trial of clinician performance. Emergency Medicine Australasia 20(1): 38-44	Reason for exclusion: No relevant outcomes
Thomas SK, Coleman JJ. (2012) The impact of computerised physician order entry with integrated clinical decision support on pharmacist-physician communication in the hospital setting: A systematic review of the literature. European Journal of Hospital Pharmacy: Science and Practice 19(4): 349-54	Reason for exclusion: No relevant intervention
Tierney WM, Overhage JM, Murray MD, et al. (2003) Effects of computerized guidelines for managing heart disease in primary care. Journal of General Internal Medicine 18(12): 967-76	Reason for exclusion: Published before the year 2009
Tierney WM, Overhage JM, Murray MD, et al. (2005) Can computer-generated evidence-based care suggestions enhance evidence-based management of asthma and chronic obstructive pulmonary disease? A randomized controlled trial. Health Services Research 40(2): 477-97	Reason for exclusion: Published before the year 2009
Tolman C, Richardson D, Bartlett C, et al. (2005) Structured conversion from thrice weekly to weekly erythropoietic regimens using a computerized decision-support system: a randomized clinical study. Journal of the American Society of Nephrology 16(5): 1463-70	Reason for exclusion: Not relevant intervention
Ulbricht C, Basch E, Vora M, et al. (2003) Chaparral monograph: a	Reason for exclusion: Not

Author	Reason for Exclusion
clinical decision support tool. Journal of Herbal Pharmacotherapy 3(1): 121-33	relevant
van Wyk JT, van Wijk MA, Moorman PW et al. (2003) Cholgate - a randomized controlled trial comparing the effect of automated and on-demand decision support on the management of cardiovascular disease factors in primary care. AMIA Annual: Symposium	Reason for exclusion: Abstract only
van Wyk JT, van Wijk MA, Sturkenboom MC et al. (2008) Electronic alerts versus on-demand decision support to improve dyslipidemia treatment: a cluster randomized controlled trial. Circulation 117(3): 371-78	Reason for exclusion: Published before the year 2009
Warren JR, Noone JT, Smith BJ, et al. (2001) Automated attention flags in chronic disease care planning. Medical Journal of Australia 175(6): 308-12	Reason for exclusion: Not relevant
Weir CJ, Lees KR. (2001) Evaluation of a decision-support system for selection of long-term antithrombotic treatment following acute ischaemic stroke or TIA: the PRISM Study. Cerebrovascular Diseases 11 (Suppl 4): 35	Reason for exclusion: Abstract only
Weir CJ, Lees KR, MacWalter RS et al. (2003) Cluster-randomized, controlled trial of computer-based decision support for selecting long-term anti-thrombotic therapy after acute ischaemic stroke. Qjm 96(2): 143-53	Reason for exclusion: Abstract only
Were MC, Nyandiko WM, Huang KTL, et al. (2013) Computer-generated reminders and quality of pediatric HIV care in a resource-limited setting. Pediatrics 131(3): e789-96	Reason for exclusion: Not relevant intervention
Wexler DJ, Shrader P, Burns SM, et al. (2010). Effectiveness of a computerized insulin order template in general medical in patients with type 2 diabetes: a cluster randomized trial. Diabetes Care 33(10): 2181-83	Reason for exclusion: Not relevant
Wolfstadt JI, Gurwitz JH, Field TS, et al. (2008) The effect of computerized physician order entry with clinical decision support on the rates of adverse drug events: a systematic review. [39 refs]. Journal of General Internal Medicine 23(4): 451-58	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Wong K, Yu SKH, Holbrook A. (2010) A systematic review of medication safety outcomes related to drug interaction software. Canadian Journal of Clinical Pharmacology 17(2): e243-55	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Wyk JT, Wijk MA, Moorman PW et al. (2003) Cholgate - a randomized controlled trial comparing the effect of automated and on-demand decision support on the management of cardiovascular disease factors in primary care. AMIA Symposium 1040	Reason for exclusion: Abstract only
Wyk JT, Wijk MA, Sturkenboom MC, et al. (2008) Electronic alerts versus on-demand decision support to improve dyslipidemia treatment: a cluster randomized controlled trial. Circulation 117(3): 371-78	Reason for exclusion: Published before the year 2009
Yourman L, Concato J, Agostini JV. (2008) Use of computer decision support interventions to improve medication prescribing in older adults: a systematic review. American Journal of Geriatric Pharmacotherapy 6(2): 119-29	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Zaal RJ, Jansen MM, Duisenberg-van EM, et al. (2013) Identification of drug-related problems by a clinical pharmacist in addition to computerized alerts. International Journal of Clinical Pharmacy 35(5): 753-62	Reason for exclusion: Not an RCT
Ziemer DC, Tsui C, Caudle J, et al. (2006) An informatics-supported	Reason for exclusion: Not an

Author	Reason for Exclusion
intervention improves diabetes control in a primary care setting. AMIA, Annual: Symposium	RCT

C.5.8 Medicines-related models of organisational and cross-sector working

Author	Reason for Exclusion
Ali M, Schifano F, Robinson P et al. (2012) Impact of community pharmacy diabetes monitoring and education programme on diabetes management: a randomized controlled study Diabetic Medicine 29(9):e326-33	Reason for exclusion: Not relevant intervention
Al-Jazairi AS, Al-Agil AA, Asiri YA et al. (2008) The impact of clinical pharmacist in a cardiac-surgery intensive care unit Saudi Medical Journal 29(2): 277-81	Reason for exclusion: Not an RCT
Al-Rashed SA, Wright DJ, Roebuck N et al. (2002) The value of inpatient pharmaceutical counselling to elderly patients prior to discharge British Journal of Clinical Pharmacology 54(6): 657-64	Reason for exclusion: Not relevant intervention
Altowaijri A, Phillips CJ, Fitzsimmons D. (2013) A systematic review of the clinical and economic effectiveness of clinical pharmacist intervention in secondary prevention of cardiovascular disease. Journal of Managed Care Pharmacy 19(5): 408-16	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Anon. (2008) Five-year follow-up of an evidence-based prescribing intervention Psychiatric Bulletin 32 (4) May-186	Reason for exclusion: Not an RCT
Antonicelli R, Mazzanti I, Abbatecola AM, et al. (2010) Impact of home patient telemonitoring on use of beta-blockers in congestive heart failure. Drugs & Aging 27(10): 801-05	Reason for exclusion: Not relevant intervention
Aslani P, Rose G, Chen TF, et al. (2011) A community pharmacist delivered adherence support service for dyslipidaemia. European Journal of Public Health 21(5): 567-72	Reason for exclusion: Not an RCT
Atayee RS, Best BM, Daniels CE. (2008) Development of an ambulatory palliative care pharmacist practice. Journal of Palliative Medicine 11(8):1077-83	Reason for exclusion: Not an RCT
Babamoto KS, Sey KA, Camilleri AJ, et al. (2009) Improving diabetes care and health measures among hispanics using community health workers: results from a randomized controlled trial. Health Education & Behavior 36(1): 113-26	Reason for exclusion: Not relevant
Bain-Brickley D, Butler LM, Kennedy GE, et al. (2011) Interventions to improve adherence to antiretroviral therapy in children with HIV infection. Cochrane Database of Systematic Reviews (12): CD009513-CD009	Reason for exclusion: Not relevant
Baishnab E, Karner C. (2012) Primary care based clinics for asthma. Cochrane Database of Systematic Reviews 4: CD003533	Reason for exclusion: Not relevant
Bell S, McLachlan AJ, Aslani P, et al. (2005) Community pharmacy services to optimise the use of medications for mental illness: A systematic review. Australia and New Zealand Health Policy 2 (1)	Reason for exclusion: Not relevant intervention
Bennett MI, Bagnall AM, Raine G, et al. (2011) Educational interventions by pharmacists to patients with chronic pain: systematic review and meta-analysis. Clinical Journal of Pain 27(7): 623-30	Reason for exclusion: Not relevant
Bergman-Evans B. (2013) AIDES to improving medication adherence in older adults. Geriatric Nursing 27(3): 174-82	Reason for exclusion: Not relevant
Berk M, Berk L, Castle D. (2004) A collaborative approach to the treatment alliance in bipolar disorder. Bipolar Disorders 6(6) 504-18	Reason for exclusion: Not an RCT

Author	Reason for Exclusion
Bevilacqua S, Demore B, Erpelding ML et al. (2011) Effects of an operational multidisciplinary team on hospital antibiotic use and cost in France: a cluster controlled trial. International Journal of Clinical Pharmacy 33(3): 521-28	Reason for exclusion: Not an RCT
Blalock SJ, Roberts AW, Lauffenburger JC, et al. (2013) The effect of community pharmacy-based interventions on patient health outcomes: a systematic review. Medical Care Research & Review 70(3): 235-66	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Bonnet-Zamponi D, d'Arailh L, Konrat C, et al. (2013) Drug-related readmissions to medical units of older adults discharged from acute geriatric units: results of the Optimization of Medication in AGEd multicenter randomized controlled trial. Journal of the American Geriatrics Society 61(1): 113-21	Reason for exclusion: Not relevant
Bosworth HB, Olsen MK, McCant F, et al. (2007) Hypertension Intervention Nurse Telemedicine Study (HINTS): testing a multifactorial tailored behavioral/educational and a medication management intervention for blood pressure control. American Heart Journal 153(6): 918-24	Reason for exclusion: Not relevant intervention
Boudreau DM, Capoccia KL, Sullivan SD, et al. (2002) Collaborative care model to improve outcomes in major depression. Annals of Pharmacotherapy 36(4): 585-91	Reason for exclusion: Not relevant
Brown RL. (2009) The home health model: reducing hospitalizations by improving medication reconciliation and communication. Journal of the Arkansas Medical Society 105(9): 204-05	Reason for exclusion: Not relevant
Brulhart MI, Wermeille JP. (2011) Multidisciplinary medication review: evaluation of a pharmaceutical care model for nursing homes International Journal of Clinical Pharmacy 33(3): 549-57	Reason for exclusion: Not relevant intervention
Bryant JR. (2004) Models of care for drug service provision.	
Castro MS, Fuchs FD, Santos MC, et al. (2006) Pharmaceutical care program for patients with uncontrolled hypertension. Report of a double-blind clinical trial with ambulatory blood pressure monitoring. American Journal of Hypertension 19(5): 528-33	Reason for exclusion: No relevant comparator
Chabot I, Moisan J, Gregoire JP, et al. (2003) Pharmacist intervention program for control of hypertension. Annals of Pharmacotherapy 37(9): 1186-93	Reason for exclusion: Not an RCT
Chapman NRM, Fotis MA, Yarnold PR, et al. (2004) Pharmacist interventions to improve the management of coronary artery disease American Journal of Health-System Pharmacy 61(24): 2672-79	Reason for exclusion: Not relevant
Cheong EA, Ng K. (2003) Home Pharmacy Service: Three Years' Experience. Journal of Pharmacy Practice and Research 33(3): 212-15	Reason for exclusion: Not relevant
Chew LC, Yee SL. (2013) The rheumatology monitoring clinic in Singapore - A novel advanced practice nurse-/pharmacist-led clinic. Proceedings of Singapore Healthcare 22(1): 48-55	Reason for exclusion: Not relevant
Chin WY, Lam CLK, Lo SV. (2011) Quality of care of nurse-led and allied health personnel-led primary care clinics. Hong Kong Medical Journal 17(3): 217-30	Reason for exclusion: Not relevant
Clark CE, Smith LFP, Taylor RS, et al. (2010) Nurse Led Interventions to Improve Control of Blood Pressure in People with Hypertension: Systematic Review and Meta-Analysis. British Medical Journal 341 (7771): 491	Reason for exclusion: Not relevant intervention
Coulthard MG, Lambert HJ, Matthews JNS, et al. (2005) A nurse	Reason for exclusion: Not

Author	Reason for Exclusion
led education and direct access service for the management of urinary tract infections in children: prospective controlled trial. British Medical Journal 327(7416): 656-59	an RCT
Cronin M, Hill T, Reich DA, et al. (2009) Implementation of a multidisciplinary, pharmacy-led, thromboprophylaxis program in total-joint arthroplasty patients. American Journal of Health-System Pharmacy 66(2): 171-75	Reason for exclusion: Not relevant
Davidsson M, Vibe OE, Ruths S, et al. (2011) A multidisciplinary approach to improve drug therapy in nursing homes. Journal of multidisciplinary healthcare 4: 9-13	Reason for exclusion: Not relevant intervention
Denneboom W, Dautzenberg MG, Grol R, et al. (2007) Treatment reviews of older people on polypharmacy in primary care: cluster controlled trial comparing two approaches. British Journal of General Practice 57: (542) 723-31	Reason for exclusion: Not relevant intervention
Ditusa L, Luzier AB, Brady PG, et al. (2001) A pharmacy-based approach to cholesterol management. American Journal of Managed Care 7(10): 973-79	Reason for exclusion: Not an RCT
Doughty RN, Gamble GD, Muncaster S, et al. (2003) The effect of an integrated care approach for heart failure on general practice. Family Practice 20(6): 642-45	Reason for exclusion: Not relevant
Evans CD, Eurich DT, Taylor JG, et al. (2010) The Collaborative Cardiovascular Risk Reduction in Primary Care (CCARP) study. Pharmacotherapy: The Journal of Human Pharmacology & Drug Therapy 30(8): 766-75	Reason for exclusion: Not relevant
Farmer A, Hardeman W, Hughes D, et al. (2012) An explanatory randomised controlled trial of a nurse-led, consultation-based intervention to support patients with adherence to taking glucose lowering medication for type 2 diabetes. BMC Family Practice 13: 30	Reason for exclusion: Not relevant
Farsaei S, Sabzghabaee AM, Zargarzadeh AH, et al. (2011) Effect of pharmacist-led patient education on glycemic control of type 2 diabetics: a randomized controlled trial. Journal of Research in Medical Sciences 16(1): 43-49	Reason for exclusion: Not relevant
Fathima M, Naik-Panvelkar P, Saini B, et al. (2013) The role of community pharmacists in screening and subsequent management of chronic respiratory diseases: A systematic review Pharmacy Practice 11(4): 228-45	Reason for exclusion: No relevant outcomes
Fortney JC, Pyne JM, Edlund MJ, et al. (2007) A randomized trial of telemedicine-based collaborative care for depression Journal of General Internal Medicine 22(8): 1086-93	Reason for exclusion: Not relevant
Gammaitoni AR, Gallagher RM, Welz M, et al. (2000) Palliative pharmaceutical care: a randomized, prospective study of telephone-based prescription and medication counseling services for treating chronic pain. Pain Medicine 1(4): 317-31	Reason for exclusion: Not an RCT
Gustafson D, Wise M, Bhattacharya A, et al. (2012) The effects of combining Web-based eHealth with telephone nurse case management for pediatric asthma control: a randomized controlled trial. Journal of Medical Internet Research 14(4): e101	Reason for exclusion: Not relevant intervention
Hale LS, Goehring M. (2003) A multidisciplinary approach to managing osteoporosis. Annals of Long-Term Care 11(6): 40-47	Reason for exclusion: Not relevant
Harris IM, Baker E, Berry TM, et al. (2008) Developing a business-practice model for pharmacy services in ambulatory settings. Pharmacotherapy: The Journal of Human Pharmacology & Drug Therapy 28(2): 285	Reason for exclusion: Not relevant
Hebert R, Robichaud L, Roy PM, et al. (2001) Efficacy of a nurse-	Reason for exclusion: Not

Author	Reason for Exclusion
led multidimensional preventive programme for older people at risk of functional decline. A randomized controlled trial. Age and Ageing 30(2): 147-53	relevant
Hegel MT, Unutzer J, Tang L, et al. (2005) Impact of comorbid panic and posttraumatic stress disorder on outcomes of collaborative care for late-life depression in primary care. American Journal of Geriatric Psychiatry 13(1): 48-58	Reason for exclusion: Not relevant
Heisler M, Hofer TP, Schmittdiel JA, et al. (2012) Improving blood pressure control through a clinical pharmacist outreach program in patients with diabetes mellitus in 2 high-performing health systems: the adherence and intensification of medications cluster randomized, controlled pragmatic trial. Circulation 125(23): 2863-72	Reason for exclusion: Not relevant
Hellstrom LM, Bondesson A, Hoglund P, et al. (2011) Impact of the Lund Integrated Medicines Management (LIMM) model on medication appropriateness and drug-related hospital revisits. European Journal of Clinical Pharmacology 67 (7) 741-52	Reason for exclusion: Not an RCT
Hick HL, Deady PE, Wright DJ, et al. (2001) The impact of the pharmacist on an elective general surgery pre-admission clinic. Pharmacy World & Science 23(2): 65-69	Reason for exclusion: Not an RCT
Hickman DE, Stebbins MR, Hanak JR, et al. (2003) Pharmacy-based intervention to reduce antibiotic use for acute bronchitis. Annals of Pharmacotherapy 37(2): 187-91	Reason for exclusion: Not an RCT
Ho PM, Lambert-Kerzner A, Carey EP, et al. (2014) Multifaceted intervention to improve medication adherence and secondary prevention measures after acute coronary syndrome hospital discharge: a randomized clinical trial JAMA Internal Medicine 174(2): 186-93	Reason for exclusion: Not relevant
Hoffman L, Enders J, Luo J, et al. (2003) Impact of an antidepressant management program on medication adherence. American Journal of Managed Care 9(1): 70-80	Reason for exclusion: Not relevant
Hoffmann W, Herzog B, Muhlig S, et al. (2008) Pharmaceutical care for migraine and headache patients: a community-based, randomized intervention. Annals of Pharmacotherapy 42(12): 1804-13	Reason for exclusion: Not relevant
Holland R, Brooksby I, Lenaghan E, et al. (2007) Effectiveness of visits from community pharmacists for patients with heart failure: HeartMed randomised controlled trial. BMJ 334 (7603): 1098	Reason for exclusion: Not relevant
Hua TD, Vormfelde SV, Abu AM, et al. (2011) Practice nursed-based, individual and video-assisted patient education in oral anticoagulation. Protocol of a cluster-randomized controlled trial. BMC Family Practice 12: 17	Reason for exclusion: Not relevant
Hung W. (2013) Home blood pressure monitoring and pharmacist management improved blood pressure control among adults with uncontrolled hypertension. Journal of Clinical Outcomes Management 20(9): 394-95	Reason for exclusion: Not an RCT
Inglis SC, Clark RA, McAlister FA, et al. (2010) Structured telephone support or telemonitoring programmes for patients with chronic heart failure. Cochrane Database of Systematic Reviews (8): CD007228-CD007	Reason for exclusion: Not relevant
Iyer R, Coderre P, McKelvey T, et al. (2010) An employer-based, pharmacist intervention model for patients with type 2 diabetes. American Journal of Health-System Pharmacy 67(4): 312-16	Reason for exclusion: Not relevant intervention
Jackson GL, Oddone EZ, Olsen MK, et al. (2012) Racial differences in the effect of a telephone-delivered hypertension disease management program Journal of General Internal Medicine 27(12): 1682-89	Reason for exclusion: Not relevant

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Jackson SH, Mangoni AA, Batty GM. (2004) Optimization of drug prescribing. British Journal of Clinical Pharmacology 57(3): 231-36	Reason for exclusion: Not relevant
Janet OPIE, Doyle C, O'Connor DW. (2002) Challenging behaviours in nursing home residents with dementia: a randomized controlled trial of multidisciplinary interventions. International Journal of Geriatric Psychiatry 17: 6-13	Reason for exclusion: Not relevant
Jarab AS, Alqudah SG, Khdour M, et al. (2012) Impact of pharmaceutical care on health outcomes in patients with COPD. International Journal of Clinical Pharmacy 34(1): 53-62	Reason for exclusion: Not relevant intervention
Jensen L (2003) Self-administered cardiac medication program evaluation Canadian Journal of Cardiovascular Nursing 13 (2) 35-44	Reason for exclusion: Not relevant intervention
Jerant AF, Azari R, Martinez C et al. (2003) A randomized trial of telenursing to reduce hospitalization for heart failure: patient-centered outcomes and nursing indicators Home Health Care Services Quarterly 22 (1) 1-20	Reason for exclusion: Not relevant
Jiang X (2007) The effect of a nurse-led cardiac rehabilitation programme on patients with coronary heart disease in Chengdu, China. Journal of Clinical Nursing.16 (10):1886-97	Reason for exclusion: Not relevant
Johansen OE, Gullestad L, Blaasaas KG, et al. (2007) Effects of structured hospital-based care compared with standard care for Type 2 diabetes - The Asker and Baerum Cardiovascular Diabetes Study, a randomized trial. Diabetic medicine: A Journal of the British Diabetic Association 24(9): 1019-27	Reason for exclusion: Not relevant
Jongen PJ, Hengstman G, Hupperts R, et al. (2011) Drug adherence and multidisciplinary care in patients with multiple sclerosis: protocol of a prospective. Dutch cohort study in glatiramer acetate treated patients. (CAIR study) BMC Neurology 11: 40	Reason for exclusion: Not relevant
Kenya S, Chida N, Symes S, et al. (2011) Can community health workers improve adherence to highly active antiretroviral therapy in the USA? A review of the literature. HIV Medicine 12(9): 525-34	Reason for exclusion: Not relevant
Khdour MR, Kidney JC, Smyth BM, et al. (2009) Clinical pharmacy-led disease and medicine management programme for patients with COPD. British Journal of Clinical Pharmacology 68(4): 588-98	Reason for exclusion: Not relevant intervention
King MA, Roberts MS. (2001) Multidisciplinary case conference reviews: improving outcomes for nursing home residents, carers and health professionals Pharmacy World & Science 23 (2): 41-45	Reason for exclusion: Not an RCT
Kruis AL, Smidt N, Assendelft-Willem JJ, et al. (2013) Integrated disease management interventions for patients with chronic obstructive pulmonary disease. Cochrane Database of Systematic Reviews 2013, Issue 10	Reason for exclusion: Not relevant
Kucukarslan SN, Hagan AM, Shimp LA, et al. (2011) Integrating medication therapy management in the primary care medical home: A review of randomized controlled trials. American Journal of Health-System Pharmacy 68(4): 335-45	Reason for exclusion: Not relevant
Kutzleb J, Reiner D. (2006) The impact of nurse-directed patient education on quality of life and functional capacity in people with heart failure. Journal of the American Academy of Nurse Practitioners 18(3): 116-23	Reason for exclusion: Not relevant intervention
Lalonde L, Martineau J, Blais N, et al. (2008) Is long-term pharmacist-managed anticoagulation service efficient? A pragmatic randomized controlled trial American Heart Journal 156 (1):148-154	Reason for exclusion: Not relevant
Lambrinou E, Kalogirou F, Lamnisos D, et al. (2012) Effectiveness of heart failure management programmes with nurse-led discharge planning in reducing re-admissions: A systematic review and meta-	Reason for exclusion: Not relevant

Author	Reason for Exclusion
analysis. International Journal of Nursing Studies 49(5): 610-25	
Lapane KL, Hughes CM, Daiello LA, et al. (2011) Effect of a pharmacist-led multicomponent intervention focusing on the medication monitoring phase to prevent potential adverse drug events in nursing homes. Journal of the American Geriatrics Society 59(7): 1238-45	Reason for exclusion: Not relevant
Lau R, Stewart K, McNamara KP, et al. (2010) Evaluation of a community pharmacy-based intervention for improving patient adherence to anti hypertensives: a randomised controlled trial. BMC Health Services Research 10 34	Reason for exclusion: Not relevant
Levy RW, Rayner CR, Fairley CK et al. (2004) Multidisciplinary HIV adherence intervention: a randomized study. AIDS Patient Care & Standards 18(12): 728-35	Reason for exclusion: Not relevant
Lightbody E, Watkins C, Leathley M, et al. (2002) Evaluation of a nurse-led falls prevention programme versus usual care: a randomized controlled trial. Age and Ageing 31(3): 203-10	Reason for exclusion: Not relevant
Lipton HL. (2009) Home is where the health is: advancing team-based care in chronic disease management. Archives of Internal Medicine 169(21): 1945-48	Reason for exclusion: Not relevant
López CC, Falces SC, Cubí QD, et al. (2006) Randomized clinical trial of a postdischarge pharmaceutical care program vs regular follow-up in patients with heart failure Farmacia hospitalaria : órgano oficial de expresión científica de la Sociedad Española de Farmacia Hospitalaria 30(6): 328-42	Reason for exclusion: Not relevant
Lowrie R, Mair FS, Greenlaw N, et al. (2012) Pharmacist intervention in primary care to improve outcomes in patients with left ventricular systolic dysfunction European Heart Journal 33(3): 314-324	Reason for exclusion: Not relevant
MacMahon TJ, Agha A, Sherlock M, et al. (2009) An intensive nurse-led, multi-interventional clinic is more successful in achieving vascular risk reduction targets than standard diabetes care. Irish Journal of Medical Science 178(2): 179-86	Reason for exclusion: Not relevant
Makowsky MJ, Koshman SL, Midodzi WK, et al. (2009) Capturing outcomes of clinical activities performed by a rounding pharmacist practicing in a team environment: the COLLABORATE study. Medical Care 47(6): 642-50	Reason for exclusion: Not an RCT
Margolis KL, Kerby TJ, Asche SE, et al. (2012) Design and rationale for Home Blood Pressure Telemonitoring and Case Management to Control Hypertension (HyperLink): a cluster randomized trial. Contemporary Clinical Trials 33(4): 794-803	Reason for exclusion: Not an RCT
Marra CA, Tsuyuki RT, Soon JA, et al. (2008) Design of a randomized trial of a multidisciplinary intervention for knee osteoarthritis: Pharmacist Initiated Intervention Trial in Osteoarthritis. Canadian Pharmacists Journal 141(1): 33-38	Reason for exclusion: Not relevant
McLean DL, McAlister FA, Johnson JA, et al. (2008) A randomized trial of the effect of community pharmacist and nurse care on improving blood pressure management in patients with diabetes mellitus: study of cardiovascular risk intervention by pharmacists-hypertension. Archives of Internal Medicine 168(21): 2355-61	Reason for exclusion: Not relevant
Miller G, Franklin BD, Jacklin A. (2011) Including pharmacists on consultant-led ward rounds: a prospective non-randomised controlled trial Clinical Medicine 11(4): 312-16	Reason for exclusion: Not an RCT
Morgado MP, Morgado SR, Mendes LC, et al. (2011) Pharmacist interventions to enhance blood pressure control and adherence to antihypertensive therapy: review and meta-analysis. American	Reason for exclusion: Systematic review, not all studies relevant. Relevant

Author	Reason for Exclusion
Journal of Health-System Pharmacy 68(3) 241-54	studies extracted and included in analysis
Moullec G, Gour-Provencal G, Bacon SL, et al. (2012) Efficacy of interventions to improve adherence to inhaled corticosteroids in adult asthmatics: impact of using components of the chronic care model. Respiratory Medicine 106(9): 1211-25	Reason for exclusion: Not relevant intervention
Murray MD, Young J, Hoke S et al. (2007) Pharmacist intervention to improve medication adherence in heart failure: a randomized trial. Annals of Internal Medicine 146(10): 714-25	Reason for exclusion: Not relevant
Phansalkar S, Hoffman JM, Nebeker JR, et al. (2007) Pharmacists versus non pharmacists in adverse drug event detection: a meta-analysis and systematic review. American Journal of Health-System Pharmacy 64(8): 842-49	Reason for exclusion: Not relevant
Pieters G. (2002) Collaborative care led to greater recovery, improvement and adherence than usual care at 12 months in panic disorder. Evidence Based Mental Health 5(2): 49-50	Reason for exclusion: Not relevant intervention
Pugh J, Lawrence V. (2004) A nurse-facilitator intervention improved the use of +□-blockers in outpatients with stable congestive heart failure. ACP Journal Club 140(1): 22-23 Reason for exclusion: Abstract only	Reason for exclusion: Abstract only
RESPECT trial team. (2010) Effectiveness of shared pharmaceutical care for older patients: RESPECT trial findings. British Journal of General Practice 60(570): e10-e19	Reason for exclusion: Not relevant intervention
Rondinini L, Coceani M, Borelli G, et al. (2008) Survival and hospitalization in a nurse-led domiciliary intervention for elderly heart failure patients. Journal of Cardiovascular Medicine 9(5): 470-75	Reason for exclusion: Not an RCT
Rubenfire M. (2008) Nurse-coordinated multidisciplinary, family-based cardiovascular disease prevention programme (EUROACTION) for patients with coronary heart disease and asymptomatic individuals at high risk of cardiovascular disease. A paired, cluster-randomised controlled trial. ACC Cardiosource Review Journal 17(8):17-18	Reason for exclusion: Abstract only
Russell CL. (2010) A clinical nurse specialist-led intervention to enhance medication adherence using the plan-do-check-act cycle for continuous self-improvement. Clinical Nurse Specialist 24(2): 69-75	Reason for exclusion: Not relevant
Ryder M, Beattie JM, O'Hanlon R, et al. (2011) Multi-disciplinary heart failure management and end of life care. Current Opinion in Supportive & Palliative Care 5(4): 317-21	Reason for exclusion: Not relevant
Saini B, Filipovska J, Bosnic-Anticevich S, et al. (2008) An evaluation of a community pharmacy-based rural asthma management service. Australian Journal of Rural Health 16(2):100-108	Reason for exclusion: Not an RCT
Sanchez UA, Gallardo LS, Pons LN, et al. (2012) Pharmaceutical intervention upon hospital discharge to strengthen understanding and adherence to pharmacological treatment. Farmacia Hospitalaria 36(3): 118-23	Reason for exclusion: Not relevant intervention
Santschi V, Colosimo AL, Chiolero A, et al. (2012) Pharmacist interventions to improve cardiovascular disease risk factors in diabetes: A systematic review and meta-analysis of randomized controlled trials. Diabetes Care 35(12): 2706-17	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Saokaew S, Sapoo U, Nathisuwan S, et al. (2012) Anticoagulation	Reason for exclusion: Not an

Author	Reason for Exclusion
control of pharmacist-managed collaborative care versus usual care in Thailand. International Journal of Clinical Pharmacy 34 (1): 105-112	RCT
Schroeder K, Fahey T, Hollinghurst S, et al. (2005) Nurse-led adherence support in hypertension: a randomized controlled trial Family Practice 22(2): 144-151	Reason for exclusion: Not relevant
Schulz M, Verheyen F, Muhlig S, et al. (2001) Pharmaceutical care services for asthma patients: a controlled intervention study. Journal of Clinical Pharmacology 41(6): 668-76	Reason for exclusion: Not an RCT
Silveira M, Guttier Ml, Page K, et al. (2014) Randomized Controlled Trial to Evaluate the Impact of Pharmaceutical Care on Therapeutic Success in HIV-Infected Patients in Southern Brazil. AIDS & Behavior 18: 75-85	Reason for exclusion: Not relevant
Simoni JM, Chen WT, Huh D et al. (2011) A Preliminary Randomized Controlled Trial of a Nurse-Delivered Medication Adherence Intervention Among HIV-Positive Outpatients Initiating Antiretroviral Therapy in Beijing, China AIDS and Behavior 15 (5) 919-929	Reason for exclusion: Not relevant
Simpson SH, Johnson JA, Biggs RS, et al. (2004) Greater effect of enhanced pharmacist care on cholesterol management in patients with diabetes mellitus: a planned subgroup analysis of the Study of Cardiovascular Risk Intervention by Pharmacists. Pharmacotherapy: The Journal of Human Pharmacology & Drug Therapy 24(3) 389-94	Reason for exclusion: Not relevant intervention
Simpson SH, Majumdar SR, Tsuyuki RT, et al. (2011) Effect of adding pharmacists to primary care teams on blood pressure control in patients with type 2 diabetes: A randomized controlled trial. Diabetes Care 34(1): 20-26	Reason for exclusion: Not relevant intervention
Sisk JE, Hebert PL, Horowitz CR, et al. (2006) Improving patient care. Effects of nurse management on the quality of heart failure care in minority communities: a randomized trial. Annals of Internal Medicine 145(4): 273	Reason for exclusion: Not relevant
Smith SM, Allwright S, O'Dowd T. (2008) Does sharing care across the primary-specialty interface improve outcomes in chronic disease? A systematic review. American Journal of Managed Care 14(4): 213-24	Reason for exclusion: Not relevant
Smith SM, Soubhi H, Fortin M et al. (2012) Managing patients with multimorbidity: systematic review of interventions in primary care and community settings. [Review] BMJ 345 e5205	Reason for exclusion: Not relevant
Stange D, Kriston L, von-Wolff A, et al. (2013) Reducing cardiovascular medication complexity in a German university hospital: effects of a structured pharmaceutical management intervention on adherence Journal of Managed Care Pharmacy 19 (5): 396-407	Reason for exclusion: Observational study
Stone RA, Sevick MA, Rao RH, et al. (2012) The Diabetes Telemonitoring Study Extension: an exploratory randomized comparison of alternative interventions to maintain glycemic control after withdrawal of diabetes home telemonitoring. Journal of the American Medical Informatics Association 19(6): 973-79	Reason for exclusion: Not relevant
Tan EC, Stewart K, Elliott RA, et al. (2013) Pharmacist services provided in general practice clinics: a systematic review and meta-analysis. (Provisional abstract) Database of Abstracts of Reviews of Effects (1): epub	Reason for exclusion: Systematic review, not all studies relevant. Relevant studies extracted and included in analysis
Till LT, Voris JC, Horst JB. (2003) Assessment of clinical pharmacist management of lipid-lowering therapy in a primary care	Reason for exclusion: Not an RCT

Author	Reason for Exclusion
setting. Journal of Managed Care Pharmacy 9(3): 269-73	
Torisson G, Minthon L, Stavenow L, et al. (2013) Multidisciplinary intervention reducing readmissions in medical inpatients: A prospective, non-randomized study. Clinical Interventions in Aging (8): 1295-1304	Reason for exclusion: Not an RCT
Tran HN, Tafreshi J, Hernandez EA, et al. (2013) A multidisciplinary atrial fibrillation clinic. Current Cardiology Reviews 9(1): 55-62	Reason for exclusion: Not an RCT
Triller DM, Hamilton RA. (2007) Effect of pharmaceutical care services on outcomes for home care patients with heart failure. American Journal of Health-System Pharmacy 64(21): 2244-49	Reason for exclusion: Not relevant intervention

C.6 Economic excluded studies

C.6.1 Identifying, reporting and learning from medicines-related patient safety incidents

Reference	Reason for exclusion
Alonso AH, Gonzalez CGR, Saez MS. Information technology and automation in hospitals: Strategies and experience in a tertiary hospital in Spain. EJHP Practice. 2011;17(4):26-31.	No full economic analysis
Avery AJ, Rodgers S, Cantrill JA, Armstrong S, Cresswell K, Eden M, et al. A pharmacist-led information technology intervention for medication errors (PINCER): a multicentre, cluster randomised, controlled trial and cost-effectiveness analysis.[Erratum appears in Lancet. 2012 Jun 16;379(9833):2242]. Lancet. 2012;379(9823):1310-9.	Duplicate – Erratum version included
Colpaert K, Claus B, Somers A, Vandewoude K, Robays H, Decruyenaere J. Impact of computerized physician order entry on medication prescription errors in the intensive care unit: A controlled cross-sectional trial. Critical Care. 2006;10(1).	No full economic analysis and intervention does not match protocol
De GI, Fonzo-Christe C, Cingria L, Caredda B, Meyer V, Pfister RE, et al. Risk and pharmacoeconomic analyses of the injectable medication process in the paediatric and neonatal intensive care units. Int J Qual Health Care. 2010;22(3):170-8.	Intervention does not fit within protocol - CPOE
Dunning TL, Leach H, Van DV, Williams AF, Buckley J, Jackson J, et al. Do high-risk medicines alerts influence practice? Journal of Pharmacy Practice and Research. 2010;40(3):203-6.	No full economic analysis
Hohmann C, Eickhoff C, Klotz JM, Schulz M, Radziwill R. Development of a classification system for drug-related problems in the hospital setting (APS-Doc) and assessment of the inter-rater reliability. J Clin Pharm Ther. 2012;37(3):276-81.	No full economic analysis
Karnon J. Medication errors - What is the best way to reduce their impact on patients' health? J Health Serv Res Policy. 2010;15(SUPPL. 1):60-3.	Intervention does not fit within protocol – medicine reconciliation
Karnon J, McIntosh A, Dean J, Bath P, Hutchinson A, Oakley J, et al. Modelling the expected net benefits of interventions to reduce the burden of medication errors. J Health Serv Res Policy. 2008;13(2):85-91.	No full economic analysis
Kopp BJ, Mrsan M, Erstad BL, Duby JJ. Cost implications of and potential adverse events prevented by interventions of a critical care pharmacist. Am J Health Syst Pharm. 2007;64(23):2483-7.	Intervention does not fit within protocol - CPOE
Lee SBC, Lee LLY, Yeung RSD, Chan JTS. A continuous quality improvement project to reduce medication error in the emergency department. World Journal of Emergency Medicine. 2013;4(3):179-82.	No full economic analysis

Reference	Reason for exclusion
Li K, Naganawa S, Wang K, Li P, Kato K, Li X, et al. Study of the cost-benefit analysis of electronic medical record systems in general hospital in China. J Med Syst. 2012;36(5):3283-91.	Intervention does not fit within protocol - CPOE
Maviglia SM, Yoo JY, Franz C, Featherstone E, Churchill W, Bates DW, et al. Cost-benefit analysis of a hospital pharmacy bar code solution. Arch Intern Med. 2007;167(8):788-94.	Intervention does not fit within protocol – Bar coding
Nerich V, Borg C, Villanueva C, Thiery-Vuillemin A, Helias P, Rohrlich PS, et al. Economic impact of prescribing error prevention with computerized physician order entry of injectable antineoplastic drugs. Journal of Oncology Pharmacy Practice. 2013;19(1):8-17.	Intervention does not fit within protocol - CPOE
Piontek F, Kohli R, Conlon P, Ellis JJ, Jablonski J, Kini N. Effects of an adverse-drug-event alert system on cost and quality outcomes in community hospitals. Am J Health Syst Pharm. 2010;67(8):613-20	No full economic analysis
Sakowski JA, Ketchel A. The cost of implementing inpatient bar code medication administration. Am J Manag Care. 2013;19(2):e38-e45.	Intervention does not fit within protocol – Bar coding
Van Den Bemt PMLA, Postma MJ, Van Roon EN, Chow MC, Fijn R, Brouwers JRBJ. Cost-benefit analysis of the detection of prescribing errors by hospital pharmacy staff. Drug Saf. 2002;25(2):135-43.	Intervention does not fit within protocol - CPOE
Wang SJ, Middleton B, Prosser LA, Bardon CG, Spurr CD, Carchidi PJ, et al. A cost-benefit analysis of electronic medical records in primary care. Am J Med. 2003;114(5):397-403	Intervention does not fit within protocol - CPOE
Zwarenstein MF, Dainty KN, Quan S, Kiss A, Adhikari NKJ. A cluster randomized trial evaluating electronic prescribing in an ambulatory care setting. Trials. 2007;8:28.	No full economic analysis

C.6.2 Medicines-related communication systems when patients move from one care setting to another

Reference	Reason for exclusion
Anderson C, Deepak BV, Amoateng-Adjepong Y, Zarich S. Benefits of comprehensive inpatient education and discharge planning combined with outpatient support in elderly patients with congestive heart failure. Congestive Heart Failure. 2005;11(6):315-21.	No full economic analysis, not about medicines
Anttila SK, Huhtala HS, Pekurinen MJ, Pitkajarvi TK. Cost-effectiveness of an innovative four-year post-discharge programme for elderly patients--prospective follow-up of hospital and nursing home use in project elderly and randomized controls. Scandinavian Journal of Public Health. 2000;28(1):41-6.	Intervention is multifaceted, not about medicines
Atienza F, Anguita M, Martinez-Alzamora N, Osca J, Ojeda S, Almenar L, et al. Multicenter randomized trial of a comprehensive hospital discharge and outpatient heart failure management program. European Journal of Heart Failure. 2004;6(5):643-52.	Not about medicines
Balaban RB, Weissman JS, Samuel PA, Woolhandler S. Redefining and redesigning hospital discharge to enhance patient care: a randomized controlled study. Journal of General Internal Medicine. 2008;23(8):1228-33.	No full economic analysis
Beach M, Miller P, Goodall I. Evaluating telemedicine in an accident and emergency setting. Computer Methods & Programs in Biomedicine. 2001;64(3):215-23.	Study protocol only
Bernocchi P, Scalvini S, Tridico C, Borghi G, Zanaboni P, Masella C, et al. Healthcare continuity from hospital to territory in Lombardy: TELEMACO project. American Journal of Managed Care. 2012;18(3):e101-e8.	Not about medicines

Reference	Reason for exclusion
Brock J, Mitchell J, Irby K, Stevens B, Archibald T, Goroski A, et al. Association between quality improvement for care transitions in communities and rehospitalizations among medicare beneficiaries. JAMA - Journal of the American Medical Association. 2013;309(4):381-91.	No full economic analysis, not about medicines
Costantino ME. The influence of a postdischarge intervention on reducing hospital readmissions in a Medicare population. Population Health Management. 2013;16(5):310-316.	Not about medicines
Cua YM, Kripalani S. Medication use in the transition from hospital to home. Annals of the Academy of Medicine Singapore. 2008;37(2):136-41.	Opinion article
Daucourt V, Sicotte C, Pelletier-Fleury N, Petitjean ME, Chateil JF, Michel P. Cost-minimization analysis of a wide-area teleradiology network in a French region. International Journal for Quality in Health Care. 2006;18(4):287-93.	Not about medicines
Dharmar M, Sadorra CK, Leigh P, Yang NH, Nesbitt TS, Marcin JP. The financial impact of a pediatric telemedicine program: a children's hospital's perspective. Telemedicine Journal & E-Health. 2013;19(7):502-8.	Not about medicines
Field TS, Garber L, Gagne SJ, Tjia J, Preusse P, Donovan JL, et al. Technological resources and personnel costs required to implement an automated alert system for ambulatory physicians when patients are discharged from hospitals to home. Informatics in Primary Care. 2012;20(2):87-93.	No comparator
Fleming MO, Haney TT. Improving patient outcomes with better care transitions: the role for home health. Cleveland Clinic Journal of Medicine. 2013;80:Electronic-6.	No full economic analysis
Forster AJ, van WC. Using an interactive voice response system to improve patient safety following hospital discharge. Journal of Evaluation in Clinical Practice. 2007;13(3):346-51.	No full economic analysis
Kind AJ, Jensen L, Barczi S, Bridges A, Kordahl R, Smith MA, et al. Low-cost transitional care with nurse managers making mostly phone contact with patients cut rehospitalization at a VA hospital. Health Affairs. 2012;31(12):2659-68.	Intervention is multifaceted
Kunz R, Wegscheider K, Guyatt G, Zielinski W, Rakowsky N, Donner-Banzhoff N, et al. Impact of short evidence summaries in discharge letters on adherence of practitioners to discharge medication. A cluster-randomised controlled trial. Quality & Safety in Health Care. 2007;16(6):456-61.	No full economic analysis
Lagoe RJ, Dauley-Altwarg J, Mnich SE, Winks LM. A community-wide program to improve the efficiency of care between nursing homes and hospitals. Topics in Advanced Practice Nursing. 2005;5(2).	No full economic analysis
Lalonde L, Lampron AM, Vanier MC, Levasseur P, Khaddag R, Chaar N. Effectiveness of a medication discharge plan for transitions of care from hospital to outpatient settings. American Journal of Health-System Pharmacy. 2008;65(15):1451-7.	No full economic analysis
Lester H, Allan T, Wilson S, Jowett S, Roberts L. A cluster randomised controlled trial of patient-held medical records for people with schizophrenia receiving shared care. British Journal of General Practice. 2003;53(488):197-203.	No full economic analysis
McGaw J, Conner DA, Delate TM, Chester EA, Barnes CA. A multidisciplinary approach to transition care: a patient safety innovation study. Permanente Journal. 2007;11(4):4-9.	Costing study (one arm only), no cost comparisons
Nace GS, Graumlich JF, Aldag JC. Software design to facilitate	No full economic analysis

Reference	Reason for exclusion
information transfer at hospital discharge. Informatics in Primary Care. 2006;14(2):109-19.	
Naylor MD. Transitional care for older adults: a cost-effective model. LDI Issue Brief. 2004;9(6):1-4.	No full economic analysis
Newcomer R, Kang T, Graham C. Outcomes in a nursing home transition case-management program targeting new admissions. Gerontologist. 2006;46(3):385-90.	No full economic analysis
Ornstein K, Smith KL, Foer DH, Lopez-Cantor MT, Soriano T. To the hospital and back home again: a nurse practitioner-based transitional care program for hospitalized homebound people. Journal of the American Geriatrics Society. 2011;59(3):544-51.	Not about medicines
Ota KS, Beutler DS, Loli AI. Postdischarge transitional care management: a reimbursable service in 2013. Journal of the American Geriatrics Society. 2013;61(4):665-6.	Letter
Phillips CO, Wright SM, Kern DE, Singa RM, Shepperd S, Rubin HR. Comprehensive discharge planning with postdischarge support for older patients with congestive heart failure: a meta-analysis.[Erratum appears in JAMA. 2004 Sep 1;292(9):1022]. JAMA. 2004;291(11):1358-67.	Intervention is multifaceted, not about medicines
Preen DB, Bailey BE, Wright A, Kendall P, Phillips M, Hung J, et al. Effects of a multidisciplinary, post-discharge continuance of care intervention on quality of life, discharge satisfaction, and hospital length of stay: a randomized controlled trial. International Journal for Quality in Health Care. 2005;17(1):43-51.	No full economic analysis
Saleh SS, Freire C, Morris-Dickinson G, Shannon T. An effectiveness and cost-benefit analysis of a hospital-based discharge transition program for elderly Medicare recipients. Journal of the American Geriatrics Society. 2012;60(6):1051-6.	Intervention is multifaceted, not about medicines
Simoens S, Spinewine A, Foulon V, Paulus D. Review of the cost-effectiveness of interventions to improve seamless care focusing on medication. International Journal of Clinical Pharmacy. 2011;33(6):909-17.	Review including irrelevant studies. Unpicked and checked included studies for relevance (none included)
Van WC, Taljaard M, Etchells E, Bell CM, Stiell IG, Zarnke K, et al. The independent association of provider and information continuity on outcomes after hospital discharge: implications for hospitalists. Journal of Hospital Medicine (Online). 2010;5(7):398-405.	No full economic analysis
Watkins L, Hall C, Kring D. Hospital to home: a transition program for frail older adults. Professional Case Management.17(3):117-23.	Not about medicines, no comparator
Williams TA, Leslie G, Finn J, Brearley L, Asthifa M, Hay B, et al. Clinical effectiveness of a critical care nursing outreach service in facilitating discharge from the intensive care unit. American Journal of Critical Care. 2010;19(5):e63-e72.	No full economic analysis, not about medicines
Wong FK, Chau J, So C, Tam SK, McGhee S. Cost-effectiveness of a health-social partnership transitional program for post-discharge medical patients. BMC Health Services Research. 2012;12:479.	Not about medicines
Yao GL, Novielli N, Manaseki-Holland S, Chen YF, Van Der Klink M, Barach P, et al. Evaluation of a predevelopment service delivery intervention: An application to improve clinical handovers. BMJ Quality and Safety. 2012;21(SUPPL. 1):i29-i38.	No communication system
Zhao Y, Wong FK. Effects of a postdischarge transitional care programme for patients with coronary heart disease in China: a randomised controlled trial. Journal of Clinical Nursing. 2009;18(17):2444-55.	No full economic analysis

C.6.3 Medicines reconciliation

Reference	Reason for exclusion
Agrawal A. Medication errors: prevention using information technology systems. British Journal of Clinical Pharmacology. 2009;67(6):681-6.	Opinion article
Aldridge VE, Park HK, Bounthavong M, Morreale AP. Implementing a comprehensive, 24-hour emergency department pharmacy program. American Journal of Health-System Pharmacy. 2009;66(21):1943-7.	Intervention is multifaceted (includes medicine reconciliation and discharge counselling), no comparator group
Amara S, Lew I, Adamson RT. Optimizing anemia management through medication reconciliation: Applying the 2010 Joint Commission Patient Safety Goal requirements. P and T. 2010;35(3):166-74.	Medicine reconciliation refers to specific named drugs
Bayley KB, Savitz LA, Maddalone T, Stoner SE, Hunt JS, Wells R. Evaluation of patient care interventions and recommendations by a transitional care pharmacist. Therapeutics and Clinical Risk Management. 2007;3(4):695-703.	Intervention is multifaceted, no full economic analysis
Benson JM, Snow G. Impact of medication reconciliation on medication error rates in community hospital cardiac care units. Hospital Pharmacy. 2012;47(12):927-32.	No full economic analysis
Blenkinsopp A, Hassey A. Effectiveness and acceptability of community pharmacy-based interventions in type 2 diabetes: A critical review of intervention design, pharmacist and patient perspectives. International Journal of Pharmacy Practice. 2005;13(4):231-40.	Review with no studies including an economic analysis
Boso-Ribelles V, Montero-Hernandez M, Font-Noguera I, Hernandez-Martin J, Martin-Ciges ES, Poveda-Andres JL. Evaluation of a plan for cardiology medication reconciliation on admission, and patient information at discharge, in a teaching hospital. EJHP Practice. 2011;17(1):26-30.	No full economic analysis
Brown RL. The home health model: reducing hospitalizations by improving medication reconciliation and communication. [Review] [0 refs]. Journal of the Arkansas Medical Society. 2009;105(9):204-5.	Opinion article
Buckley MS, Harinstein LM, Clark KB, Smithburger PL, Eckhardt DJ, Alexander E, et al. Impact of a clinical pharmacy admission medication reconciliation program on medication errors in "high-risk" patients. Annals of Pharmacotherapy. 2013;47(12):1599-610.	No comparator
DiLascia C, Vogenberg FR. Medication reconciliation efforts meeting needs and showing promise. Formulary. 2013;48(5):173-6.	Opinion article
Drury J. A closer look at medication reconciliation. Pharmacy Times. 2012;78(9).	Opinion article
Etchells E, Koo M, Daneman N, McDonald A, Baker M, Matlow A, et al. Comparative economic analyses of patient safety improvement strategies in acute care: a systematic review. [Review]. BMJ Quality & Safety. 2012;21(6):448-56.	Review, relevant study included from search results (Karnon et al., 2009)
Etemad LR, Hay JW. Cost-effectiveness analysis of pharmaceutical care in a medicare drug benefit program. Value in Health. 2003;6(4):425-35.	Intervention is not medicine reconciliation (medication review)
Feldman LS, Costa LL, Feroli ER, Jr., Nelson T, Poe SS, Frick KD, et al. Nurse-pharmacist collaboration on medication reconciliation prevents potential harm. Journal of Hospital Medicine (Online). 2012;7(5):396-401.	No comparator
Frei P, Huber LC, Simon RW, Bonani M, Luscher TF. Insufficient medication documentation at hospital admission of cardiac patients: A challenge for medication reconciliation. Journal of Cardiovascular	No full economic analysis

Reference	Reason for exclusion
Pharmacology. 2009;54(6):497-501.	
Hawes EM, Maxwell WD, White SF, Mangun J, Lin FC. Impact of an outpatient pharmacist intervention on medication discrepancies and health care resource utilization in posthospitalization care transitions. Journal of Primary Care & Community Health. 2014;5(1):14-8.	No full economic analysis
Hohmann C, Neumann-Haefelin T, Klotz JM, Freidank A, Radziwill R. Drug-related problems in patients with ischemic stroke in hospital. International Journal of Clinical Pharmacy. 2012;34(6):828-31.	No full economic analysis
Kaboli PJ, Fernandes O. Medication reconciliation. Archives of Internal Medicine. 2012;172(14):1069-70.	Opinion article
Karapinar-Carkit F, Borgsteede SD, Zoer J, Egberts TC, van den Bemt PM, van TM. Effect of medication reconciliation on medication costs after hospital discharge in relation to hospital pharmacy labor costs. Annals of Pharmacotherapy. 2012;46(3):329-38.	No comparator
Kind AJ, Jensen L, Barczi S, Bridges A, Kordahl R, Smith MA, et al. Low-cost transitional care with nurse managers making mostly phone contact with patients cut rehospitalization at a VA hospital. Health Affairs. 2012;31(12):2659-68.	Intervention is not medicines reconciliation
Kramer JS, Hopkins PJ, Rosendale JC, Garrelts JC, Hale LS, Nester TM, et al. Implementation of an electronic system for medication reconciliation.[Erratum appears in Am J Health Syst Pharm. 2007 Apr 1;64(7):684]. American Journal of Health-System Pharmacy. 2007;64(4):404-22.	No full economic analysis
Lingaratnam S, Aranda S, Pearce T, Kirsa S. A controlled before and after study to evaluate a patient and health professional partnership model towards effective medication reconciliation. Journal of Oncology Pharmacy Practice. 2013;19(1):48-56.	No full economic analysis
Martin CM. Avoiding errors during transitions of care: medication reconciliation. Consultant Pharmacist. 2012;27(11):764-9.	Opinion article
Nana B, Lee-Such S, Allen G. Initiation of an emergency department pharmacy program during economically challenging times. American Journal of Health-System Pharmacy. 2012;69(19):1682-6.	No full economic analysis
Pal A, Babbott S, Wilkinson ST. Can the targeted use of a discharge pharmacist significantly decrease 30-day readmissions? Hospital Pharmacy. 2013;48(5):380-8.	No full economic analysis
Redmond P, Grimes T, McDonnell R, Boland F, Hughes C, Fahey T. Tackling transitions in patient care: The process of medication reconciliation. Family Practice. 2013;30(5):483-4.	Opinion article
Ruder AD, Smith DL, Madsen MT, Kass FH, III. Is there a benefit to having a clinical oncology pharmacist on staff at a community oncology clinic? Journal of Oncology Pharmacy Practice. 2011;17(4):425-32.	Intervention is multifaceted, no full economic analysis
Steurbaut S, Leemans L, Leysen T, De BE, Cornu P, Mets T, et al. Medication history reconciliation by clinical pharmacists in elderly inpatients admitted from home or a nursing home. Annals of Pharmacotherapy. 2010;44(10):1596-603.	No full economic analysis
Strunk LB, Maison AW, Steinke D. Impact of a pharmacist on medication reconciliation on patient admission to a veterans affairs medical center. Hospital Pharmacy. 2008;43(8):643-9.	No full economic analysis
Terry DR, Solanki GA, Sinclair AG, Marriott JF, Wilson KA. Clinical significance of medication reconciliation in children admitted to a UK pediatric hospital: observational study of neurosurgical patients.	No full economic analysis

Reference	Reason for exclusion
Paediatric Drugs. 2010;12(5):331-7.	
Trygstad TK, Christensen DB, Wegner SE, Sullivan R, Garmise JM. Analysis of the North Carolina long-term care polypharmacy initiative: a multiple-cohort approach using propensity-score matching for both evaluation and targeting. Clinical Therapeutics. 2009;31(9):2018-37.	Intervention is multifaceted, no full economic analysis

C.6.4 Medication review

Reference	Reason for exclusion
Author unknown. Why medication reviews pay. Pharmaceutical Journal.2002;269(7225):730.	No full economic analysis
Barnett MJ, Frank J, Wehring H, Newland B, VonMuenster S, Kumbera P, et al. Analysis of pharmacist-provided Medication Therapy Management (MTM) services in community pharmacies over 7 years. Journal of Managed Care Pharmacy. 2009;15(1):18-31.	No comparator of usual care/no medication review
Branham AR, Katz AJ, Moose JS, Ferreri SP, Farley JF, Marciniak MW. Retrospective analysis of estimated cost avoidance following pharmacist-provided medication therapy management services. Journal of Pharmacy Practice. 2013;26(4):420-7.	Not applicable to guidance (excluded by GDG as too outdated)
Bruce R. Pharmacy input in medications review improves prescribing and cost-efficiency in care homes. Pharmacy in Practice. 2007;17(7):243-6.	No comparator of usual care/no medication review
Burns A. Pharmacist medication review in nursing homes: a cost analysis. International Journal of Geriatric Psychopharmacology. 2000;2:137-141.	No full economic analysis
Crotty S. Measuring the impact of medication review in care homes with nursing facilities. Pharmacy in Practice. 2007;17(6):206-10.	No full economic analysis
Etemad LR, Hay JW. Cost-effectiveness analysis of pharmaceutical care in a medicare drug benefit program. Value in Health. 2003;6(4):425-35.	Not applicable to the guidance (following quality assessment)
Feldman LS, Costa LL, Feroli ER, Jr., Nelson T, Poe SS, Frick KD, et al. Nurse-pharmacist collaboration on medication reconciliation prevents potential harm. Journal of Hospital Medicine (Online). 2012;7(5):396-401.	Intervention was not a medication review – was medicine reconciliation
Ghatnekar O, Bondesson A, Persson U, Eriksson T. Health economic evaluation of the Lund Integrated Medicines Management Model (LIMM) in elderly patients admitted to hospital. BMJ Open. 2013;3(1):2013.	Intervention was multifaceted including both medication review and medication reconciliation
Hugtenburg JG, Borgsteede SD, Beckeringh JJ. Medication review and patient counselling at discharge from the hospital by community pharmacists. Pharmacy World & Science. 2009;31(6):630-7.	No full economic analysis and multifaceted intervention
Karapinar-Carkit F, Borgsteede SD, Zoer J, Egberts TC, van den Bemt PM, van TM. Effect of medication reconciliation on medication costs after hospital discharge in relation to hospital pharmacy labor costs. Annals of Pharmacotherapy. 2012;46(3):329-38.	Intervention was not a medication review – was medicine reconciliation
Karnon J, Campbell F, Czoski-Murray C. Model-based cost-effectiveness analysis of interventions aimed at preventing medication error at hospital admission (medicines reconciliation). Journal of Evaluation in Clinical Practice. 2009;15(2):299-306.	Intervention was not a medication review – was medicine reconciliation
Kopp BJ, Mrsan M, Erstad BL, Duby JJ. Cost implications of and potential adverse events prevented by interventions of a critical care pharmacist. American Journal of Health-System Pharmacy. 2007;64(23):2483-7.	Intervention was not a medication review

Reference	Reason for exclusion
Moore JM, Shartle D, Faudskar L, Matlin OS, Brennan TA. Impact of a patient-centered pharmacy program and intervention in a high-risk group. Journal of Managed Care Pharmacy. 2013;19(3):228-36.	Not applicable to the guidance (following quality assessment)
Pinto SL, Kumar J, Partha G, Bechtol RA. Improving the economic and humanistic outcomes for diabetic patients: Making a case for employer-sponsored medication therapy management. ClinicoEconomics and Outcomes Research. 2013;5(1):153-9.	Not applicable to the guidance (following quality assessment)
Pope G, Wall N, Peters CM, O'Connor M, Saunders J, O'Sullivan C, et al. Specialist medication review does not benefit short-term outcomes and net costs in continuing-care patients. Age & Ageing. 2011;40(3):307-12.	Study was deemed to have very serious limitations following quality assessment
Read H, Ladds S, Rhodes B, Brown D, Portlock J. The impact of a supplementary medication review and counselling service within the oncology outpatient setting. British Journal of Cancer. 2007;96(5):744-51.	Study was deemed to have very serious limitations following quality assessment
Rhodes SA, Reynolds AE, Marciniak MW, Ferreri SP. Evaluating the economic impact of a targeted medication intervention program. Journal of Pharmacy Practice. 2013;26(6):562-73.	No comparator group or intervention
Sorensen L, Stokes JA, Purdie DM, Woodward M, Elliott R, Roberts MS. Medication reviews in the community: results of a randomized, controlled effectiveness trial.[Erratum appears in Br J Clin Pharmacol. 2005 Mar;59(3):376]. British Journal of Clinical Pharmacology. 2004;58(6):648-64.	Not applicable to the guidance (following quality assessment)
Sturgess IK, McElnay JC, Hughes CM, Crealey G. Community pharmacy based provision of pharmaceutical care to older patients. Pharmacy World & Science, 2003. 25(5): p. 218-226.	Study was deemed to have very serious limitations following quality assessment
Tierney M, Manns B, Members of the Canadian Expert Drug Advisory C. Optimizing the use of prescription drugs in Canada through the Common Drug Review. [Review] [10 refs]. CMAJ Canadian Medical Association Journal. 2008;178(4):432-5.	No full economic analysis
Trygstad TK, Christensen D, Garmise J, Sullivan R, Wegner S. Pharmacist response to alerts generated from Medicaid pharmacy claims in a long-term care setting: results from the North Carolina polypharmacy initiative. Journal of Managed Care Pharmacy. 2005;11(7):575-83.	No full economic analysis
Williams ME, Pulliam CC, Hunter R, Johnson TM, Owens JE, Kincaid J, et al. The short-term effect of interdisciplinary medication review on function and cost in ambulatory elderly people. Journal of the American Geriatrics Society. 2004;52(1):93-8.	No full economic analysis
Zermansky AG, Alldred DP, Petty DR, Raynor DK, Freemantle N, Eastaugh J, et al. Clinical medication review by a pharmacist of elderly people living in care homes--randomised controlled trial. Age & Ageing. 2006;35(6):586-91.	No full economic analysis

C.6.5 Self-management plans

Reference	Reason for exclusion
Abedi H, Salimi SJ, Feizi A, Safari S. Effect of self-efficacy enhancement program on self-care behaviors in chronic obstructive pulmonary disease. Iranian Journal of Nursing and Midwifery Research. 2013;18(5):421-4.	No full economic evaluation
Aghili R. Structured self monitoring of blood glucose in Iranian people with type 2 diabetes; a cost consequence analysis. DARU Journal of Pharmaceutical Sciences. 2012;20(1):32.	Not compared to usual care
Al-Haddad M, Ibrahim MMI, Sulaiman SAS, Shafie AA, Maarup N. Cost benefit analysis of the diabetes self management program at a	No full economic evaluation

Reference	Reason for exclusion
university health centre in Malaysia. Journal of Clinical and Diagnostic Research. 2010;4(3):2521-30.	
Banister NA, Jastrow ST, Hodges V, Loop R, Gillham MB. Diabetes self-management training program in a community clinic improves patient outcomes at modest cost. Journal of the American Dietetic Association. 2004;104(5):807-10.	Not compared to usual care (no comparator)
Berg J, Young M, Grobler N. Diabetes self-management education. Journal of Endocrinology, Metabolism and Diabetes of South Africa. 2012;17(2 SUPPL. 1):S13-S4.	No self-management of medicines
Bourbeau J, Collet JP, Schwartzman K, Ducruet T, Nault D, Bradley C. Economic benefits of self-management education in COPD. Chest. 2006;130(6):1704-11.	Multifaceted intervention
Bourbeau J, Julien M, Maltais F, Rouleau M, Beaupre A, Begin R, et al. Reduction of hospital utilization in patients with chronic obstructive pulmonary disease: a disease-specific self-management intervention. Archives of Internal Medicine. 2003;163(5):585-91.	No full economic evaluation
Boyers D, McNamee P, Clarke A, Jones D, Martin D, Schofield P, et al. Cost-effectiveness of self-management methods for the treatment of chronic pain in an aging adult population: a systematic review of the literature. [Review]. Clinical Journal of Pain. 2013;29(4):366-75.	Unpicked and no included studies with self-management of medicines
Brady TJ. Cost implications of self-management education intervention programmes in arthritis. [Review]. Best Practice & Research in Clinical Rheumatology. 2012;26(5):611-25.	Unpicked and included studies have multifaceted interventions
Brownson CA, Hoerger TJ, Fisher EB, Kilpatrick KE. Cost-effectiveness of diabetes self-management programs in community primary care settings. Diabetes Educator. 2009;35(5):761-9.	Multifaceted intervention
Chuang C, Levine SH, Rich J. Enhancing cost-effective care with a patient-centric chronic obstructive pulmonary disease program. Population Health Management. 2011;14(3):133-6.	No self-management of medicines
Cobden DS, Niessen LW, Barr CE, Rutten FF, Redekop WK. Relationships among self-management, patient perceptions of care, and health economic outcomes for decision-making and clinical practice in type 2 diabetes. [Review] [99 refs]. Value in Health. 2010;13(1):138-47.	Interventions are multifaceted
Cocosila M, Coursaris C, Yuan Y. M-healthcare for patient self-management: a case for diabetics. International Journal of Electronic Healthcare. 2004;1(2):221-41.	No cost-effectiveness analysis (budget impact analysis)
De Asis ML, Greene R. A cost-effectiveness analysis of a peak flow-based asthma education and self-management plan in a high-cost population. [Review] [25 refs]. Journal of Asthma. 2004;41(5):559-65.	Duplicate of included study
Dunn NJ, Rehm LP, Schillaci J, Souchek J, Mehta P, Ashton CM, et al. A randomized trial of self-management and psychoeducational group therapies for comorbid chronic posttraumatic stress disorder and depressive disorder. Journal of Traumatic Stress. 2007;20(3):221-37.	Not compared to usual care
Effing T, Kerstjens H, van dV, Zielhuis G, van der Palen J. (Cost)-effectiveness of self-treatment of exacerbations on the severity of exacerbations in patients with COPD: the COPE II study. Thorax. 2009;64(11):956-62.	Not compared to usual care
Engh CA, Culpepper WJ, Charette PA, Brown R. Patient self-testing of prothrombin time after hip arthroplasty (Structured abstract). Journal of the Southern Orthopaedic Association. 2001;10(3):140-6.	No self-management of medicines
Feenstra TL, Rutten-Van Molken MP, Jager JC, Van Essen-	No patient self-management

Reference	Reason for exclusion
Zandvliet LE. Cost effectiveness of guideline advice for children with asthma: a literature review. [Review] [57 refs]. Pediatric Pulmonology. 2002;34(6):442-54.	
Fera T, Bluml BM, Ellis WM. Diabetes Ten City Challenge: final economic and clinical results. Journal of the American Pharmacists Association: JAPhA. 2009;49(3):383-91.	No comparator, intervention is multifaceted
Furze G, Cox H, Morton V, Chuang LH, Lewin RJ, Nelson P, et al. Randomized controlled trial of a lay-facilitated angina management programme. Journal of Advanced Nursing. 2012;68(10):2267-79.	No self-management of medicines
Gadisseur AP, Kaptein AA, Breukink-Engbers WG, van der Meer FJ, Rosendaal FR. Patient self-management of oral anticoagulant care vs. management by specialized anticoagulation clinics: positive effects on quality of life. Journal of Thrombosis & Haemostasis. 2004;2(4):584-91.	No economic evaluation
Gillespie P. The cost-effectiveness of the SPHERE intervention for the secondary prevention of coronary heart disease. International Journal of Technology Assessment in Health Care. 2010;26(3):263-271.	Intervention is multifaceted
Gilmer TP, Roze S, Valentine WJ, Emy-Albrecht K, Ray JA, Cobden D, et al. Cost-effectiveness of diabetes case management for low-income populations (Structured abstract). Health Services Research. 2007;42(5):1943-59.	Intervention is multifaceted
Gregory D, Kimmelstiel C, Perry K, Parikh A, Konstam V, Konstam MA. Hospital cost effect of a heart failure disease management program: the specialized primary and networked care in heart failure (SPAN-CHF) trial (Provisional abstract). American Heart Journal. 2006;151(5):1013-8.	No self-management of medicines
Jacobsen PB, Phillips KM, Jim HS, Small BJ, Faul LA, Meade CD, et al. Effects of self-directed stress management training and home-based exercise on quality of life in cancer patients receiving chemotherapy: a randomized controlled trial. Psycho-Oncology. 2013;22(6):1229-35.	No self-management of medicines
Joseph CL, Peterson E, Havstad S, Johnson CC, Hoerauf S, Stringer S, et al. A web-based, tailored asthma management program for urban African-American high school students. American Journal of Respiratory & Critical Care Medicine. 2007;175(9):888-95.	No self-management of medicines (more education focused), no full economic evaluation
Kennedy A, Nelson E, Reeves D, Richardson G, Roberts C, Robinson A, et al. A randomised controlled trial to assess the impact of a package comprising a patient-orientated, evidence-based self-help guidebook and patient-centred consultations on disease management and satisfaction in inflammatory bowel disease. Health Technology Assessment (Winchester, England). 2003;7(28):iii-113.	Intervention is multifaceted
Kennedy A, Reeves D, Bower P, Lee V, Middleton E, Richardson G, et al. The effectiveness and cost effectiveness of a national lay-led self care support programme for patients with long-term conditions: a pragmatic randomised controlled trial. Journal of Epidemiology & Community Health. 2007;61(3):254-61.	Self-management of condition, rather than of medicines
Kennedy AP, Nelson E, Reeves D, Richardson G, Roberts C, Robinson A, et al. A randomised controlled trial to assess the effectiveness and cost of a patient orientated self management approach to chronic inflammatory bowel disease. Gut. 2004;53(11):1639-45.	No self-management of medicines
Khdour MR, Agus AM, Kidney JC, Smyth BM, McElnay JC, Crealey GE. Cost-utility analysis of a pharmacy-led self-management	Intervention related to education rather than self-

Reference	Reason for exclusion
programme for patients with COPD.[Erratum appears in Int J Clin Pharm. 2012 Feb;34(1):142 Note: Elnay, James C [corrected to McElnay, James C]]. International Journal of Clinical Pharmacy. 2011;33(4):665-73.	management
Lorig KR, Ritter P, Stewart AL, Sobel DS, Brown BW, Jr., Bandura A, et al. Chronic disease self-management program: 2-year health status and health care utilization outcomes. Medical Care. 2001;39(11):1217-23.	Intervention related to education rather than self-management and also included as a duplicate
McCahon D, Murray ET, Murray K, Holder RL, Fitzmaurice DA. Does self-management of oral anticoagulation therapy improve quality of life and anxiety? Family Practice. 2011;28(2):134-40.	No economic evaluation
McGillion MH, Croxford R, Watt-Watson J, Lefort S, Stevens B, Coyte P. Cost of illness for chronic stable angina patients enrolled in a self-management education trial. Canadian Journal of Cardiology. 2008;24(10):759-64.	Budget impact analysis rather than cost-effectiveness analysis
McManus RJ. Targets and self monitoring in hypertension: randomised controlled trial and cost effectiveness analysis. British Medical Journal. 2005;331:493-496.	No self-management of medications
Mogasale V, Vos T. Cost-effectiveness of asthma clinic approach in the management of chronic asthma in Australia. Australian & New Zealand Journal of Public Health. 2013;37(3):205-10.	No self-management of medications
Monninkhof E, van dV, Schermer T, van der Palen J, van HC, Zielhuis G. Economic evaluation of a comprehensive self-management programme in patients with moderate to severe chronic obstructive pulmonary disease. Chronic Respiratory Disease. 2004;1(1):7-16.	Multifaceted intervention
Mortimer D, Kelly J. Economic evaluation of the good life club intervention for diabetes self-management. Australian Journal of Primary Health. 2006;12(1):91-100.	Multifaceted intervention
Ninot G, Moullec G, Picot MC, Jaussent A, Hayot M, Desplan M, et al. Cost-saving effect of supervised exercise associated to COPD self-management education program. Respiratory Medicine. 2011;105(3):377-85.	Multifaceted intervention
Noble AJ, McCrone P, Seed PT, Goldstein LH, Ridsdale L. Clinical- and cost-effectiveness of a nurse led self-management intervention to reduce emergency visits by people with epilepsy. PLoS ONE [Electronic Resource]. 2014;9(3):e90789.	Multifaceted intervention
Patel A, Buszewicz M, Beecham J, Griffin M, Rait G, Nazareth I, et al. Economic evaluation of arthritis self management in primary care. BMJ. 2009;339:b3532.	Not compared to usual care
Polisena J, Tam S, Lodha A, Laporte A, Coyte PC, Ungar WJ. An economic evaluation of asthma action plans for children with asthma. Journal of Asthma. 2007;44(7):501-8.	Not compare to usual care
Rhee H, Pesis-Katz I, Xing J. Cost benefits of a peer-led asthma self-management program for adolescents. Journal of Asthma. 2012;49(6):606-13.	Multifaceted intervention
Richardson G, Epstein D, Chew-Graham C, Dowrick C, Bentall RP, Morriss RK, et al. Cost-effectiveness of supported self-management for CFS/ME patients in primary care. BMC Family Practice. 2013;14:12.	No self-management of medicines
Richardson G, Gravelle H, Weatherly H, Ritchie G. Cost-effectiveness of interventions to support self-care: a systematic review. [Review] [55 refs]. International Journal of Technology Assessment in Health Care. 2005;21(4):423-32.	No self-management of medicines (self-management of condition)
Richardson G, Kennedy A, Reeves D, Bower P, Lee V, Middleton	No self-management of

Reference	Reason for exclusion
E, et al. Cost effectiveness of the Expert Patients Programme (EPP) for patients with chronic conditions. Journal of Epidemiology & Community Health. 2008;62(4):361-7.	medicines – individual papers sifted
Richardson G, Sculpher M, Kennedy A, Nelson E, Reeves D, Roberts C, et al. Is self-care a cost-effective use of resources? Evidence from a randomized trial in inflammatory bowel disease. Journal of Health Services & Research Policy. 2006;11(4):225-30.	No self-management of medicines
Robinson A, Thompson DG, Wilkin D, Roberts C, Northwest Gastrointestinal Research G. Guided self-management and patient-directed follow-up of ulcerative colitis: a randomised trial. Lancet. 2001;358(9286):976-81.	No economic analysis
Runge C, Lecheler J, Horn M, Tews JT, Schaefer M. Outcomes of a web-based patient education program for asthmatic children and adolescents (Structured abstract). Chest. 2006;129(3):581-93.	Intervention is education focused (rather than self-management focused)
Ryan D, Price D, Musgrave SD, Malhotra S, Lee AJ, Ayansina D, et al. Clinical and cost effectiveness of mobile phone supported self monitoring of asthma: multicentre randomised controlled trial. BMJ. 2012;344:e1756.	Not compared to usual care
Schwartz SM, Day B, Wildenhaus K, Silberman A, Wang C, Silberman J. The impact of an online disease management program on medical costs among health plan members. American Journal of Health Promotion. 2010;25(2):126-33.	Multifaceted intervention
Simon J. Cost effectiveness of self monitoring of blood glucose in patients with non-insulin treated type 2 diabetes: economic evaluation of data from the DiGEM trial. British Medical Journal. 2008;336:1177-1180.	No self-management of medicines
Staessen JA, Hond E, Celis H, Fagard R, Keary L, Vandenhoven G, et al. Antihypertensive treatment based on blood pressure measurement at home or in the physician's office: a randomized controlled trial (Structured abstract). JAMA. 2004;291(8):955-64.	No self-management of medicines
Stoddart A, Hanley J, Wild S, Pagliari C, Paterson M, Lewis S, et al. Telemonitoring-based service redesign for the management of uncontrolled hypertension (HITS): cost and cost-effectiveness analysis of a randomised controlled trial (Provisional abstract). BMJ Open. 2013;3:e002681(1).	No self-management of medicines
Taylor SJ, Sohanpal R, Bremner SA, Devine A, McDaid D, Fernandez JL, et al. Self-management support for moderate-to-severe chronic obstructive pulmonary disease: a pilot randomised controlled trial. British Journal of General Practice. 2012;62(603):e687-e95.	No self-management of medicines
Van Der Meer MV, van den Hout WB, Bakker MJ, Rabe KF, Sterk PJ, Assendelft WJ, et al. Cost-effectiveness of Internet-based self-management compared with usual care in asthma. PLoS ONE [Electronic Resource]. 2011;6(11):e27108.	Intervention is multifaceted
Van Der Meer MV, Hout WB, Bakker MJ, Rabe KF, Sterk PJ, Assendelft WJ, et al. Cost-effectiveness of internet-based self-management compared with usual care in asthma (Structured abstract). PLoS ONE. 2011;6(11):e27108.	Duplicate of study above
van Os-Medendorp H, Koffijberg H, Eland-de Kok PC, van der Zalm A, de Bruin-Weller MS, Pasmans SG, et al. E-health in caring for patients with atopic dermatitis: a randomized controlled cost-effectiveness study of internet-guided monitoring and online self-management training. British Journal of Dermatology. 2012;166(5):1060-8.	Multifaceted intervention
Wang V, Smith VA, Bosworth HB, Oddone EZ, Olsen MK, McCant F, et al. Economic evaluation of telephone self-management	Multifaceted intervention

Reference	Reason for exclusion
interventions for blood pressure control. American Heart Journal. 2012;163(6):980-6.	
Wheeler JR, Janz NK, Dodge JA. Can a disease self-management program reduce health care costs? The case of older women with heart disease.[Erratum appears in Med Care. 2003 Sep;41(9):1085]. Medical Care. 2003;41(6):706-15.	No self-management of medicines
Willems DC, Joore MA, Hendriks JJ, Wouters EF, Severens JL. Cost-effectiveness of self-management in asthma: a systematic review of peak flow monitoring interventions. [Review] [34 refs]. International Journal of Technology Assessment in Health Care. 2006;22(4):436-42.	Individual studies sifted for inclusion

C.6.6 Patient decision aids used in consultations about medicines

Reference	Reason for exclusion
Al Mazroui NR, Kamal MM, Ghabash NM, Yacout TA, Kole PL, McElnay JC. Influence of pharmaceutical care on health outcomes in patients with Type 2 diabetes mellitus. British Journal of Clinical Pharmacology. 2009;67(5):547-57.	No full economic analysis, no use of patient decision aids
Apkon M, Mattera JA, Lin Z, Herrin J, Bradley EH, Carbone M, et al. A randomized outpatient trial of a decision-support information technology tool. Archives of Internal Medicine. 2005;165(20):2388-94.	Patient decision aid not used in a consultation
Audet AM, Doty MM, Peugh J, Shamasdin J, Zapert K, Schoenbaum S. Information technologies: when will they make it into physicians' black bags? Medgenmed [Computer File]: Medscape General Medicine. 2004;6(4):2.	Qualitative study
Chaudhry R, Schietel SM, North F, Dejesus R, Kesman RL, Stroebel RJ. Improving rates of herpes zoster vaccination with a clinical decision support system in a primary care practice. Journal of Evaluation in Clinical Practice. 2013;19(2):263-6.	No full economic analysis, no use of patient decision aids
Chertow GM, Lee J, Kuperman GJ, Burdick E, Horsky J, Seger DL, et al. Guided medication dosing for inpatients with renal insufficiency. JAMA. 2001;286(22):2839-44.	No use of patient decision aids
Darnell K. Disproportionate utilization of healthcare resources among veterans with COPD: a retrospective analysis of factors associated with COPD healthcare cost. Cost Effectiveness and Resource Allocation. 2013;11(1):13.	No comparator
Holbrook AM, Janjusevic V, Goldsmith CH, Shcherbatykh IY, Compete I. A comprehensive appropriateness of prescribing questionnaire was validated by nominal consensus group. [Review] [34 refs]. Journal of Clinical Epidemiology. 2007;60(10):1022-8.	No use of patient decision aid, no comparator
Montgomery AA, Fahey T, Peters TJ. A factorial randomised controlled trial of decision analysis and an information video plus leaflet for newly diagnosed hypertensive patients. British Journal of General Practice. 2003;53(491):446-53.	No full economic evaluation
Protheroe J, Fahey T, Montgomery AA, Peters TJ. Effects of patients' preferences on the treatment of atrial fibrillation: observational study of patient-based decision analysis. Western Journal of Medicine. 2001;174(5):311-5.	No full economic evaluation
Raghavendra P. Time constraint is a major barrier to the implementation of shared decision-making in clinical practice, but more research is needed to develop a theoretical basis and strategies for implementation. Evidence-Based Communication Assessment and Intervention. 2010;4(3):116-9.	Opinion article
Veroff D, Marr A, Wennberg DE. Enhanced support for shared	No medicine related patient

Reference	Reason for exclusion
decision making reduced costs of care for patients with preference-sensitive conditions. Health Affairs. 2013;32(2):285-93.	decision aid
Vuorma S, Rissanen P, Aalto AM, Hurskainen R, Kujansuu E, Teperi J.A randomized trial among women with heavy menstruation – impact of a decision aid on treatment outcomes and costs. Health Expectations 2004;7:327-37.	Deemed not applicable to guidance
Willis JM, Edwards R, Anstrom KJ, Johnson FS, Del FG, Kawamoto K, et al. Decision support for evidence-based pharmacotherapy detects adherence problems but does not impact medication use. Studies in Health Technology & Informatics. 2013;183:116-25.	No use of patient decision aid
Wilson SR, Strub P, Buist AS, Knowles SB, Lavori PW, Lapidus J, et al. Shared treatment decision making improves adherence and outcomes in poorly controlled asthma. American Journal of Respiratory & Critical Care Medicine. 2010;181(6):566-77.	Patient decision aid not used in a consultation

C.6.7 Clinical decision support

Reference	Reason for exclusion
Apkon M, Mattera JA, Lin Z, Herrin J, Bradley EH, Carbone M, et al. A randomized outpatient trial of a decision-support information technology tool. Archives of Internal Medicine. 2005;165(20):2388-94.	No cost-effectiveness analysis and pre 2009
Bassa A, Del VM, Cobos A, Torremade E, Bergonon S, Crespo C, et al. Impact of a clinical decision support system on the management of patients with hypercholesterolemia in the primary healthcare setting. Disease Management and Health Outcomes. 2005;13(1):65-72.	No cost-effectiveness analysis and pre 2009
Bright TJ, Wong A, Dhurjati R, Bristow E, Bastian L, Coeytaux RR, et al. Effect of clinical decision-support systems: a systematic review. [Review]. Annals of Internal Medicine. 2012;157(1):29-43.	Systematic review unpicked and no relevant studies
Calloway S, Akilo HA, Bierman K. Impact of a clinical decision support system on pharmacy clinical interventions, documentation efforts, and costs. Hospital Pharmacy. 2013;48(9):744-52.	Clinical decision aid not used for prescribing or medicines
Chertow GM, Lee J, Kuperman GJ, Burdick E, Horsky J, Seger DL, et al. Guided medication dosing for inpatients with renal insufficiency. JAMA. 2001;286(22):2839-44.	Clinical decision aid not used for prescribing or medicines and pre 2009
Cleveringa FG, Welsing PM, van den Donk M, Gorter KJ, Niessen LW, Rutten GE, et al. Cost-effectiveness of the diabetes care protocol, a multifaceted computerized decision support diabetes management intervention that reduces cardiovascular risk. Diabetes Care. 2010;33(2):258-63.	Intervention is multifaceted
Cobos A, Vilaseca J, Asenjo C, Pedro-Botet J, Sanchez E, Val A, et al. Cost effectiveness of a clinical decision support system based on the recommendations of the European Society of Cardiology and other societies for the management of hypercholesterolemia: Report of a cluster-randomized trial. Disease Management and Health Outcomes. 2005;13(6):421-32.	No cost-effectiveness analysis and pre 2009
Curtain C, Peterson GM, Tenni P, Bindoff IK, Williams M. Outcomes of a decision support prompt in community pharmacy-dispensing software to promote step-down of proton pump inhibitor therapy. British Journal of Clinical Pharmacology. 2011;71(5):780-4.	No cost-effectiveness analysis
Field TS, Rochon P, Lee M, Gavendo L, Subramanian S, Hoover S, et al. Costs associated with developing and implementing a computerized clinical decision support system for medication dosing for patients with renal insufficiency in the long-term care setting. Journal of the American Medical Informatics Association.	No comparator and pre 2009

Reference	Reason for exclusion
2008;15(4):466-72.	
Fillmore CL, Bray BE, Kawamoto K. Systematic review of clinical decision support interventions with potential for inpatient cost reduction. BMC Medical Informatics & Decision Making. 2013;13:135.	Systematic review unpicked and no relevant studies
Fitzmaurice DA, Hobbs FDR, Murray ET, Holder RL, Allan TF, Rose PE. Oral anticoagulation management in primary care with the use of computerized decision support and near-patient testing: A randomized, controlled trial. Archives of Internal Medicine. 2000;160(15):2343-8.	Clinical decision aid relates to dosing, not choice of drug and pre 2009
Fitzmaurice DA, Hobbs FD, Murray ET. A nurse led clinic and computer decision support software for anticoagulation decisions were as effective as a hospital clinic. Evidence-Based Medicine. 2001;6(2):61.	Clinical decision aid relates to dosing, not choice of drug and pre 2009
Fitzmaurice DA. Oral anticoagulation control: the European perspective. [Review] [29 refs]. Journal of Thrombosis & Thrombolysis. 2006;21(1):95-100.	Clinical decision aid relates to dosing, not choice of drug and pre 2009
Furukawa MF, Raghu TS, Shao BB. Electronic medical records and cost efficiency in hospital medical-surgical units. Inquiry. 2010;47(2):110-23.	No clinical decision support
Furuno JP, Schweizer ML, McGregor JC, Perencevich EN. Economics of infection control surveillance technology: cost-effective or just cost?. [Review] [36 refs]. American Journal of Infection Control. 2008;36(3:Suppl):Suppl-7.	No clinical decision support and pre 2009
Goundrey-Smith S. The impact of clinical decision support tools on patient safety and the quality of patient care in clinical research. PharmacoVigilance Review. 2011;5(2):4-7.	Paper could not be retrieved
Hayes J, Vogel B, Reker DM. Factors associated with VHA costs of care for first 12 months after first stroke. Journal of Rehabilitation Research & Development. 2008;45(9):1375-84.	No clinical decision support and pre 2009
Helmons PJ, Grouls RJ, Roos AN, Bindels AJ, Wessels-Basten SJ, Ackerman EW, et al. Using a clinical decision support system to determine the quality of antimicrobial dosing in intensive care patients with renal insufficiency. Quality & Safety in Health Care. 2010;19(1):22-6.	No comparator, no cost-effectiveness analysis
Horowitz N, Moshkowitz M, Leshno M, Ribak J, Birkenfeld S, Kenet G, et al. Clinical trial: evaluation of a clinical decision-support model for upper abdominal complaints in primary-care practice. Alimentary Pharmacology & Therapeutics. 2007;26(9):1277-83.	No cost-effectiveness analysis and pre 2009
Khan S, MacLean CD, Littenberg B. The effect of the vermont diabetes information system on inpatient and emergency department Use: Results from a randomized trial. Health Outcomes Research in Medicine. 2010;1(1):e61-e6.	No prescribing/use of medicines
Kim HH, Cho KW, Kim HS, Kim JS, Kim JH, Han SP, et al. New integrated information system for pusan national university hospital. Healthcare Informatics Research. 2011;17(1):67-75.	No comparator
Lecumberri R, Panizo E, Gomez-Guiu A, Varea S, Garcia-Quetglas E, Serrano M, et al. Economic impact of an electronic alert system to prevent venous thromboembolism in hospitalised patients. Journal of Thrombosis & Haemostasis. 2011;9(6):1108-15.	No prescribing/use of medicines
Leibovici L, Paul M, Andreassen S. Balancing the benefits and costs of antibiotic drugs: the TREAT model. Clinical Microbiology & Infection. 2010;16(12):1736-9.	No full economic evaluation
Levin RI, Koenig KL, Corder MP, Bhalla NP, Rosenzweig BP, Recht PA. Risk stratification and prevention in chronic coronary artery	Multifaceted intervention, no comparator and pre 2009

Reference	Reason for exclusion
disease: Use of a novel prognostic and computer-based clinical decision support system in a large primary managed-care group practice. Disease Management. 2002;5(4):197-213.	
Liu J, Wyatt JC, Altman DG. Decision tools in health care: focus on the problem, not the solution. BMC Medical Informatics & Decision Making. 2006;6:4.	Opinion paper
Liu JLY, Wyatt JC, Deeks JJ, Clamp S, Keen J, Verde P, et al. Systematic reviews of clinical decision tools for acute abdominal pain. Health Technology Assessment. 2006;10(47):iii-87.	Systematic review included old studies. Individual studies unpicked.
Liu JLY, Wyatt JC. The case for randomized controlled trials to assess the impact of clinical information systems. Journal of the American Medical Informatics Association. 2011;18(2):173-80.	Opinion paper
Lobach D, Sanders GD, Bright TJ, Wong A, Dhurjati R, Bristow E, et al. Enabling health care decisionmaking through clinical decision support and knowledge management. [Review]. Evidence Report/Technology Assessment. 2012 (203):1-784.	Systematic review unpicked and no relevant studies
McGinn TG, McCullagh L, Kannry J, Knaus M, Sofianou A, Wisnivesky JP, et al. Efficacy of an evidence-based clinical decision support in primary care practices: a randomized clinical trial. JAMA Internal Medicine. 2013;173(17):1584-91.	No cost-effectiveness analysis
McGregor JC, Weekes E, Forrest GN, Standiford HC, Perencevich EN, Furuno JP, et al. Impact of a computerized clinical decision support system on reducing inappropriate antimicrobial use: a randomized controlled trial. Journal of the American Medical Informatics Association. 2006;13(4):378-84.	No prescribing/use of medicines and pre 2009
McMullin ST, Lonergan TP, Rynearson CS, Doerr TD, Veregge PA, Scanlan ES. Impact of an evidence-based computerized decision support system on primary care prescription costs. Annals of Family Medicine. 2004;2(5):494-8.	No cost-effectiveness analysis and pre 2009
McMullin ST, Lonergan TP, Rynearson CS. Twelve-month drug cost savings related to use of an electronic prescribing system with integrated decision support in primary care. Journal of Managed Care Pharmacy. 2005;11(4):322-32.	No cost-effectiveness analysis and pre 2009
O'Reilly D, Holbrook A, Blackhouse G, Troyan S, Goeree R. Cost-effectiveness of a shared computerized decision support system for diabetes linked to electronic medical records. Journal of the American Medical Informatics Association. 2012a;19(3):341-5.	No prescribing/use of medicines
O'Reilly D, Tarride JE, Goeree R, Lokker C, McKibbon KA. The economics of health information technology in medication management: a systematic review of economic evaluations. [Review]. Journal of the American Medical Informatics Association. 2012b;19(3):423-38.	Systematic review - individual studies unpicked
Parry D, Fitzmaurice D, Raftery J. Anticoagulation management in primary care: a trial-based economic evaluation. British Journal of Haematology. 2000;111(2):530-3.	Clinical decision aid relates to dosing, not choice of drug and pre 2009
Sturzlinger H, Hiebinger C, Pertl D, Traurig P. Computerized Physician Order Entry - effectiveness and efficiency of electronic medication ordering with decision support systems. GMS Health Technology Assessment. 2009;5:Doc07.	No clinical decision support (CPOE focused), no relevant included studies
Teufel RJ, Kazley AS, Ebeling MD, Basco WT, Jr. Hospital electronic medical record use and cost of inpatient pediatric care. Academic pediatrics. 2012;12(5):429-35.	No clinical decision support
Wright A, Sittig DF. SANDS: A service-oriented architecture for clinical decision support in a National Health Information Network. Journal of Biomedical Informatics. 2008;41(6):962-81.	Opinion article and pre 2009

Reference	Reason for exclusion
Zamora A, Fernandez De BF, Carrion C, Vazquez G, Paluzie G, Elosua R, et al. Pilot study to validate a computer-based clinical decision support system for dyslipidemia treatment (HTE-DLP). Atherosclerosis. 2013;231(2):401-4.	No cost-effectiveness analysis

C.6.8 Medicines-related models of organisational and cross-sector working

Reference	Reason for exclusion
Altavela JL, Jones MK, Ritter M. A prospective trial of a clinical pharmacy intervention in a primary care practice in a capitated payment system. Journal of Managed Care Pharmacy. 2008;14(9):831-43.	No full economic analysis
Ansari F, Gray K, Nathwani D, Phillips G, Ogston S, Ramsay C, et al. Outcomes of an intervention to improve hospital antibiotic prescribing: interrupted time series with segmented regression analysis. Journal of Antimicrobial Chemotherapy. 2003;52(5):842-8.	Intervention out of scope, no active comparator
Barrett JM, Hebron BS. An examination of the impact of a ward-based pharmacist on the ability of a diabetes medical ward to cope with winter pressures. Pharmaceutical Journal. 2002;268(7180):28-31.	No full economic analysis, no active comparator
Bevilacqua S, Demore B, Erpelding ML, Boschetti E, May T, May I, et al. Effects of an operational multidisciplinary team on hospital antibiotic use and cost in France: a cluster controlled trial. International Journal of Clinical Pharmacy. 2011;33(3):521-8.	No full economic analysis
Birtcher KK, Bowden C, Ballantyne CM, Huyen M. Strategies for implementing lipid-lowering therapy: Pharmacy-based approach. American Journal of Cardiology. 2000;85(3 SUPPL. 1):30-5.	No full economic analysis
Blakey SA, Hixson-Wallace JA. Clinical and economic effects of pharmacy services in geriatric ambulatory clinic. Pharmacotherapy:The Journal of Human Pharmacology & Drug Therapy. 2000;20(10):1198-203.	Intervention out of scope
Brulhart MI, Wermeille JP. Multidisciplinary medication review: evaluation of a pharmaceutical care model for nursing homes. International Journal of Clinical Pharmacy. 2011;33(3):549-57.	No full economic analysis
Buck TC, Brandstrup L, Brandslund I, Kampmann JP. The effects of introducing a clinical pharmacist on orthopaedic wards in Denmark. Pharmacy World & Science. 2007;29(1):12-8.	Intervention out of scope
Carrion JA, Gonzalez-Colominas E, Garcia-Retortillo M, Canete N, Cirera I, Coll S, et al. A multidisciplinary support programme increases the efficiency of pegylated interferon alfa-2a and ribavirin in hepatitis C (Provisional abstract). Journal of Hepatology. 2013;59(5):926-33.	Intervention out of scope
Chung C, Collins A, Cui N. Development and implementation of an interdisciplinary oncology program in a community hospital. American Journal of Health-System Pharmacy. 2011;68(18):1740-7.	No active comparator
Coleman CI, Reddy P, Quercia RA, Gousse G. Cost-benefit analysis of a pharmacy-managed medication assistance program for hospitalized indigent patients. American Journal of Health-System Pharmacy. 2003;60(4):378-82.	Intervention out of scope
Connor SE, Snyder ME, Snyder ZJ, Steinmetz PK. Provision of clinical pharmacy services in two safety net provider settings. Pharmacy Practice. 2009;7(2):94-9.	No active comparator
Crowson K, Collette D, Dang M, Rittase N. Transformation of a pharmacy department: impact on pharmacist interventions, error prevention, and cost. Joint Commission Journal on Quality	No full economic analysis

Reference	Reason for exclusion
Improvement. 2002;28(6):324-30.	
DeName B, Divine H, Nicholas A, Steinke DT, Johnson CL. Identification of medication-related problems and health care provider acceptance of pharmacist recommendations in the DiabetesCARE program. Journal of the American Pharmacists Association: JAPhA. 2008;48(6):731-6.	No active comparator
Dolder NM, Wilhardt MS, Morreale AP. Justifying a multidisciplinary high-intensity hepatitis C clinic by using decision analysis. American Journal of Health-System Pharmacy. 2002;59(9):867-71.	Intervention out of scope
Elliott RA, Barber N, Clifford S, Horne R, Hartley E. The cost effectiveness of a telephone-based pharmacy advisory service to improve adherence to newly prescribed medicines. Pharmacy World & Science. 2008;30(1):17-23.	Intervention out of scope
Fertleman M, Barnett N, Patel T. Improving medication management for patients: the effect of a pharmacist on post-admission ward rounds.[Erratum appears in Qual Saf Health Care. 2005 Aug;14(4):312]. Quality & Safety in Health Care. 2005;14(3):207-11.	No active comparator
Finley PR, Bluml BM, Bunting BA, Kiser SN. Clinical and economic outcomes of a pilot project examining pharmacist-focused collaborative care treatment for depression. Journal of the American Pharmacists Association: JAPhA. 2011;51(1):40-9.	No active comparator
Gillespie U, Alassaad A, Henrohn D, Garmo H, Hammarlund-Udenaes M, Toss H, et al. A comprehensive pharmacist intervention to reduce morbidity in patients 80 years or older: a randomized controlled trial. Archives of Internal Medicine. 2009;169(9):894-900.	Intervention out of scope
Gloth FM, Gloth MJ. A Comparative Effectiveness Trial Between a Post-Acute Care Hospitalist Model and a Community-Based Physician Model of Nursing Home Care. Journal of the American Medical Directors Association. 2011;12(5):384-6.	No full economic analysis
Grymonpre RE, Williamson DA, Montgomery PR. Impact of a pharmaceutical care model for non-institutionalised elderly: Results of a randomised, controlled trial. International Journal of Pharmacy Practice. 2001;9(4):235-41.	No full economic analysis
Guignard AP, Couray-Targe S, Colin C, Chamba G. Economic impact of pharmacists' interventions with nonsteroidal antiinflammatory drugs. Annals of Pharmacotherapy. 2003;37(3):332-8.	Intervention out of scope
Hall D, Buchanan J, Helms B, Eberts M, Mark S, Manolis C, et al. Health care expenditures and therapeutic outcomes of a pharmacist-managed anticoagulation service versus usual medical care. Pharmacotherapy:The Journal of Human Pharmacology & Drug Therapy. 2011;31(7):686-94.	Intervention out of scope
Hamblin S, Rumbaugh K, Miller R. Prevention of adverse drug events and cost savings associated with PharmD interventions in an academic Level I trauma center: an evidence-based approach. The Journal of Trauma and Acute Care Surgery. 2012;73(6):1484-90.	No active comparator
Haumschild MJ, Karfonta TL, Haumschild MS, Phillips SE. Clinical and economic outcomes of a fall-focused pharmaceutical intervention program (Structured abstract). American Journal of Health-System Pharmacy. 2003;60(10):1029-32.	Intervention out of scope, no full economic analysis
Hussainy SY, Box M, Scholes S. Piloting the role of a pharmacist in a community palliative care multidisciplinary team: An Australian experience. BMC Palliative Care. 2011;10.	No full economic analysis

Reference	Reason for exclusion
Klopotowska JE, Kuiper R, van Kan HJ, de Pont AC, Dijkgraaf MG, Lie AH, et al. On-ward participation of a hospital pharmacist in a Dutch intensive care unit reduces prescribing errors and related patient harm: an intervention study. Critical Care (London, England). 2010;14(5):R174.	No active comparator
Kogut SJ, Johnson S, Higgins T, Quilliam BJ. Evaluation of a program to improve diabetes care through intensified care management activities and diabetes medication copayment reduction. Journal of Managed Care Pharmacy. 2012;18(4):297-310.	Intervention out of scope
Kroner BA, Billups SJ, Garrison KM, Lyman AE, Delate T. Actual versus projected cost avoidance for clinical pharmacy specialist-initiated medication conversions in a primary care setting in an integrated health system. Journal of Managed Care Pharmacy. 2008;14(2):155-63.	No active comparator
Lalonde L, Martineau J, Blais N, Montigny M, Ginsberg J, Fournier M, et al. Is long-term pharmacist-managed anticoagulation service efficient? A pragmatic randomized controlled trial. American Heart Journal. 2008;156(1):148-54.	Intervention out of scope
Lowey A, Moore S, Norris C, Wright D, Silcock J, Hammond P. The cost-effectiveness of pharmacist-led treatment of cardiac risk in patients with type 2 diabetes. Pharmacy World & Science. 2007;29(5):541-5.	No active comparator
MacLaren R, Bond CA. Effects of pharmacist participation in intensive care units on clinical and economic outcomes of critically ill patients with thromboembolic or infarction-related events. Pharmacotherapy:The Journal of Human Pharmacology & Drug Therapy. 2009;29(7):761-8.	No full economic analysis
Maeng DD, Graham J, Graf TR, Liberman JN, Dermes NB, Tomcavage J, et al. Reducing long-term cost by transforming primary care: evidence from Geisinger's medical home model. American Journal of Managed Care. 2012;18(3):149-55.	Intervention out of scope, no active comparator
Malone DC, Carter BL, Billups SJ, Valuck RJ, Barnette DJ, Sintek CD, et al. An economic analysis of a randomized, controlled, multicenter study of clinical pharmacist interventions for high-risk veterans: the IMPROVE study. Impact of Managed Pharmaceutical Care Resource Utilization and Outcomes in Veterans Affairs Medical Centers. Pharmacotherapy:The Journal of Human Pharmacology & Drug Therapy. 2000;20(10):1149-58.	Intervention out of scope
Mainie PM, Moore G, Riddell JW, Adgey AA. To examine the effectiveness of a hospital-based nurse-led secondary prevention clinic. European Journal of Cardiovascular Nursing. 2005;4(4):308-13.	No full economic analysis
McRae IS, Butler JRG, Sibthorpe BM, Ruscoe W, Snow J, Rubiano D, et al. A cost effectiveness study of integrated care in health services delivery: A diabetes program in Australia. BMC Health Services Research. 2008;8.	Intervention out of scope
Monte SV, Slazak EM, Albanese NP, Adelman M, Rao G, Paladino JA. Clinical and economic impact of a diabetes clinical pharmacy service program in a university and primary care-based collaboration model. Journal of the American Pharmacists Association: JAPhA. 2009;49(2):200-8.	No active comparator
Murray MD, Young J, Hoke S, Tu W, Weiner M, Morrow D, et al. Pharmacist intervention to improve medication adherence in heart failure: a randomized trial. Annals of Internal Medicine. 2007;146(10):714-25.	Intervention out of scope

Reference	Reason for exclusion
Ng CK, Wu TC, Chan WM, Leung YS, Li CK, Tsang DN, et al. Clinical and economic impact of an antibiotics stewardship programme in a regional hospital in Hong Kong. Quality & Safety in Health Care. 2008;17(5):387-92.	No active comparator, intervention out of scope
Novak CJ, Hastanan S, Moradi M, Terry DF. Reducing unnecessary hospital readmissions: the pharmacist's role in care transitions. Consultant Pharmacist. 2012;27(3):174-9.	No full economic analysis
Nurgat ZA, Al-Jazairi AS, Abu-Shraie N, Al-Jedai A. Documenting clinical pharmacist intervention before and after the introduction of a web-based tool. International Journal of Clinical Pharmacy. 2011;33(2):200-7.	No full economic analysis
Ownby RL, Waldrop-Valverde D, Jacobs RJ, Acevedo A, Caballero J. Cost effectiveness of a computer-delivered intervention to improve HIV medication adherence. BMC Medical Informatics & Decision Making. 2013;13:29.	Intervention out of scope
Patel NP, Brandt CP, Yowler CJ. A prospective study of the impact of a critical care pharmacist assigned as a member of the multidisciplinary burn care team. Journal of Burn Care & Research. 2006;27(3):310-3.	No active comparator
Patel R, Butler K, Garrett D, Badger N, Cheoun D, Hallman L. The impact of a pharmacist's participation on hospitalists' rounds. Hospital Pharmacy. 2010;45(2):129-34.	No active comparator
Patterson SM, Hughes CM, Cardwell C, Lapane KL, Murray AM, Crealey GE. A cluster randomized controlled trial of an adapted U.S. model of pharmaceutical care for nursing home residents in Northern Ireland (Fleetwood Northern Ireland study): a cost-effectiveness analysis. Journal of the American Geriatrics Society. 2011;59(4):586-93.	Intervention out of scope
Pickette SG, Muncey L, Wham D. Implementation of a standard pharmacy clinical practice model in a multihospital system. American Journal of Health-System Pharmacy. 2010;67(9):751-6.	No active comparator
Raftery JP. Cost effectiveness of nurse led secondary prevention clinics for coronary heart disease in primary care: follow up of a randomised controlled trial. British Medical Journal. 2005;330(7493):707-710.	Intervention out of scope
Rossiter LF. The impact of disease management on outcomes and cost of care: a study of low-income asthma patients. Inquiry. 2000;37:188-202.	No active comparator, intervention out of scope
Saini B, Krass I, Armour C. Development, implementation, and evaluation of a community pharmacy-based asthma care model. Annals of Pharmacotherapy. 2004;38(11):1954-60.	No full economic analysis
Saokaew S, Maphanta S, Thangsomboon P. Impact of pharmacist's interventions on cost of drug therapy in intensive care unit. Pharmacy Practice. 2009;7(2):81-7.	Deemed not applicable following quality assessment
Schackman BR, Finkelstein R, Neukermans CP, Lewis L, Eldred L, Center For Adherence S, et al. The cost of HIV medication adherence support interventions: results of a cross-site evaluation. AIDS Care. 2005;17(8):927-37.	Intervention out of scope
Schroeder K, Fahey T, Hollinghurst S, Peters TJ. Nurse-led adherence support in hypertension: a randomized controlled trial. Family Practice. 2005;22(2):144-51.	Intervention out of scope
Scott A, Tinelli M, Bond C, Community Pharmacy Medicines Management Evaluation T. Costs of a community pharmacist-led medicines management service for patients with coronary heart disease in England: healthcare system and patient perspectives.	Intervention out of scope

Reference	Reason for exclusion
Pharmacoeconomics. 2007;25(5):397-411.	
Simon GE, Katon WJ, VonKorff M, Unutzer J, Lin EH, Walker EA, et al. Cost-effectiveness of a collaborative care program for primary care patients with persistent depression. American Journal of Psychiatry. 2001;158(10):1638-44.	Intervention out of scope
Simon GE, von KM, Ludman EJ, Katon WJ, Rutter C, Unutzer J, et al. Cost-effectiveness of a program to prevent depression relapse in primary care. Medical Care. 2002;40(10):941-50.	Intervention out of scope
Smith DH, Feldstein AC, Perrin NA, Yang X, Rix MM, Raebel MA, et al. Improving laboratory monitoring of medications: An economic analysis alongside a clinical trial. American Journal of Managed Care. 2009;15(5):281-9.	Intervention out of scope
Stacy JN, Schwartz SM, Ershoff D, Shreve MS. Incorporating tailored interactive patient solutions using interactive voice response technology to improve statin adherence: results of a randomized clinical trial in a managed care setting. Population Health Management. 2009;12(5):241-54.	Intervention out of scope, qualitative study
Taylor SJ, Milanova T, Hourihan F, Krass I, Coleman C, Armour CL. A cost-effectiveness analysis of a community pharmacist-initiated disease state management service for type 2 diabetes mellitus (Structured abstract). International Journal of Pharmacy Practice. 2005;13(1):33-40.	Intervention out of scope
Terceros Y, Chahine-Chakhtoura C, Malinowski JE, Rickley WF. Impact of a pharmacy resident on hospital length of stay and drug-related costs. Annals of Pharmacotherapy. 2007;41(5):742-8.	No full economic analysis
Torisson G, Minthon L, Stavenow L, Londos E. Multidisciplinary intervention reducing readmissions in medical inpatients: A prospective, non-randomized study. Clinical Interventions in Aging. 2013;8:1295-304.	No full economic analysis
Trygstad TK, Christensen D, Garmise J, Sullivan R, Wegner S. Pharmacist response to alerts generated from Medicaid pharmacy claims in a long-term care setting: results from the North Carolina polypharmacy initiative. Journal of Managed Care Pharmacy. 2005;11(7):575-83.	No full economic analysis, intervention out of scope
Tutty S, Simon G, Ludman E. Telephone counseling as an adjunct to antidepressant treatment in the primary care system. A pilot study. Effective Clinical Practice. 2000;3(4):170-8.	Intervention out of scope
Yokoyama KK, Cryar AK, Griffin KC, Godley PJ, Woodward BW. Cost-effectiveness of a multidisciplinary diabetes care clinic. Drug Benefit Trends. 2002;14(SUPPL. D):36-44.	No full economic analysis
Zhang C, Zhang L, Huang L, Luo R, Wen J. Clinical pharmacists on medical care of pediatric inpatients: a single-center randomized controlled trial. PLoS ONE [Electronic Resource]. 2012;7(1):e30856.	No full economic analysis
Zunker RJ, Carlson DL. Economics of using pharmacists as advisers to physicians in risk-sharing contracts. American Journal of Health-System Pharmacy. 2000;57(8):753-5.	Intervention out of scope

Appendix D: Clinical Evidence Tables and GRADE profiles

D.1 Evidence Tables

D.1.1 Identifying, reporting and learning from medicines-related patient safety incidents

Evidence table 1 Avery AJ et al, 2012

Bibliographic reference	Avery AJ, Rodgers S, Cantrill JA, et al. (2012) A pharmacist-led information technology intervention for medication errors (PINCER): a multicentre, cluster randomised, controlled trial and cost-effectiveness analysis. [Erratum appears in Lancet. 2012 Jun 16;379(9833):2242] Lancet 379 (9823): 1310-1319
Study type	RCT
Study quality	High
Number of patients	n=480,942 randomised
Patient characteristics	**For primary outcomes:** 1.Patients with a history of peptic ulcer who have been prescribed an NSAID without co-prescription of a PPI 2.Patients with asthma who have been prescribed a beta-blocker 3.Patients aged 75 years and older who have been prescribed an ACEI or a loop diuretic long-term who have not had a computer-recorded check of their renal function and electrolytes in the previous 15 months **For secondary outcomes:** 4.Patients with asthma (and no history of coronary heart disease) who had been prescribed a beta-blocker 5.Proportions of women with a past medical history of venous or arterial thrombosis who had been prescribed a combined oral contraceptive 6.Patients receiving methotrexate for at least 3 months who had not had a full blood count recorded in the previous 3 months 7.Patients receiving methotrexate for at least 3 months who had not had a liver function test recorded in the previous 3 months 8.Patients receiving warfarin for at least 3 months who had not had a recorded check of their INR in the previous 12 weeks 9.Patients receiving lithium for at least 3 months who had not had a recorded check of their lithium concentrations in the previous 3 months 10. Patients receiving amiodarone for at least 6 months who had not had a thyroid function test in the previous 6 months 11. Patients receiving prescriptions of methotrexate without instructions that the drug should be taken every week 12. Patients receiving prescriptions of amiodarone for at least 1 month who are receiving a dose of more than 200 mg per day 13. Patients with at least one prescription problem (a combination of outcome measures 1, 2, or 4) 14. Patients with at least one monitoring problem (a combination of outcome measures 3, 5, 6, 7, and 8)
Intervention	Pharmacist-led information technology intervention (PINCER) lasting 12 weeks, composed of feedback, educational outreach, and dedicated support
Comparison	Computer-generated simple feedback for at-risk patients
Length of follow up	At 6 months and 12 months

<table>
<tr><td>Location</td><td>72 UK general practices (computerised with electronic prescribing)</td></tr>
<tr><td>Outcomes measures and effect size</td><td>Primary outcomes (clinical outcomes as reported in the study):
Proportions of patients at 6 months after the intervention who had experienced any of 3 ‘clinically important’ errors shown in the table below
<table>
<tr><th>Patient characteristics</th><th>Simple feedback</th><th>PINCER</th><th>Adjusted OR (95% CI)</th></tr>
<tr><td>Non-selective NSAIDs prescribed to those with a history of peptic ulcer without a PPI</td><td>86/2014 (4%)</td><td>51/1852 (3%)</td><td>0.58(0.38-0.89)</td></tr>
<tr><td>Beta-blockers prescribed to those with a history of asthma</td><td>658/22,224 (3%)</td><td>499/20,312 (2%)</td><td>0.73(0.58-0.91)</td></tr>
<tr><td>Long-term prescription of ACE inhibitors or loop diuretics to those 75 years or older without assessment of urea and electrolytes in preceding 15 months</td><td>436/5329 (8%)</td><td>255/4851 (5%)</td><td>0.51(0.34-0.78)</td></tr>
</table>
Secondary outcomes included the proportion of patients with at least one prescription problem or at risk of at least one prescription problem (PINCER 2.3%, control 2.9%; adjusted OR 0.71, 95% CI 0.59 to 0.86)</td></tr>
<tr><td>Source of funding</td><td>Department of Health, England</td></tr>
<tr><td>Comments</td><td>At 6 months’ follow-up, patients in the PINCER group were significantly less likely to have been prescribed a non-selective NSAID if they had a history of peptic ulcer without gastroprotection; a beta-blocker if they had asthma; or an ACE inhibitor or loop diuretic without appropriate monitoring. The authors state that ‘related qualitative work showed the acceptability of the PINCER intervention to general practices and a parallel longitudinal observational study of prescription errors in over 400 practices shows the high probable generalisability of these findings across the UK</td></tr>
<tr><td></td><td>Allocation concealed to researchers and statisticians involved in processing and analysing data. Allocation not concealed to general practices, pharmacists, patients, or researchers who visited practices to extract data.</td></tr>
<tr><td></td><td>The authors concluded that PINCER substantially reduced the frequency of a range of clinically important prescription and medication monitoring errors</td></tr>
<tr><td colspan="2">Abbreviations: NSAID, non-steroidal anti-inflammatory drug; PPI, proton-pump inhibitor; ACE inhibitor, angiotensin-converting enzyme inhibitor; INR, international normalised ratio; OR, odds ratio; CI, confidence interval; RCT, randomised controlled trial</td></tr>
</table>

Evidence table 2: Chang C et al, 2010

Bibliographic reference	Chang C, Wen C, Chan D. (2010) Potentially inappropriate medications among geriatric outpatients with polypharmacy. Journal of the American Geriatrics Society 58: S159
Study type	Observational study
Study quality	Low
Number of patients	n=193
Patient characteristics	Hospitalised elderly adults (aged ≥65 years) who had either: • been prescribed 8 or more chronic medications (drugs prescribed for

<table>
<tr><td></td><td>≥28 days) or
• visited 3 or more different physicians during a 3-month screening period</td></tr>
<tr><td>Intervention</td><td>6 different criteria to identify potentially inappropriate medicines (PIM):
• Beers criteria – 2003 version (from the US)
• Rancourt (from Canada)
• Laroche (from France)
• Screening Tool of Older Person’s Prescription (STOPP; from Ireland)
• Winit-Watjana (from Thailand)
• Norwegian General Practice (NORGEP) criteria (from Norway)</td></tr>
<tr><td>Comparison</td><td>Comparison of 6 criteria (stated above) applied to a single cohort of patients</td></tr>
<tr><td>Length of follow up</td><td>12 weeks</td></tr>
<tr><td>Location</td><td>National Taiwan University Hospital (NTUH)</td></tr>
<tr><td>Outcomes measures and effect size</td><td>The prevalence of PIM varied significantly when different criteria were applied; see full paper for details. Of the 1713 medications, 5.6-14.8% were considered PIMs</td></tr>
<tr><td></td><td>30-40% of the identified PIMs were reported as drug-related problems (DRP) by expert reviewers; see table below:
<table>
<tr><th>No. of medicines considered PIMs</th><th>Reported as DRP (%)</th><th>DRP follow-up in 24 weeks (%)</th><th>Problem-solving rate* (%)</th></tr>
<tr><td>NORGEP (n=96)</td><td>40 (41.7)</td><td>29 (72.5)</td><td>22 (75.9)</td></tr>
<tr><td>Laroche (n=132)</td><td>51 (38.6)</td><td>36 (70.6)</td><td>26 (72.2)</td></tr>
<tr><td>Rancourt (n=185)</td><td>73 (39.5)</td><td>45 (61.6)</td><td>38 (84.4)</td></tr>
<tr><td>Beers (n=177)</td><td>69 (39)</td><td>43 (62.3)</td><td>31 (72.1)</td></tr>
<tr><td>STOPP (n=199)</td><td>61 (30.7)</td><td>36 (59)</td><td>30 (83.3)</td></tr>
<tr><td>Winit-Watjana (n=254)</td><td>86 (33.9)</td><td>59 (68.6)</td><td>46 (78)</td></tr>
</table>
* Problem totally solved plus problem partly solved/follow-up numbers</td></tr>
<tr><td></td><td>Application of the criteria found that a high number of chronic medications was a common risk factor for having at least one PIM</td></tr>
<tr><td>Source of funding</td><td>Sponsored by the ‘Medication Safety Review Clinic in Taiwanese Elders’ project from the Department of Health, Taiwan</td></tr>
<tr><td>Comments</td><td>The number of statements and availability of PIMs in the local market were major determinants of PIM prevalence. Only 50–89% of listed medications in the 6 criteria were available in Taiwan, with 27–67% available at the NTUH</td></tr>
<tr><td></td><td>The authors concluded that the prevalence of PIM varied significantly when different criteria were applied. Caution should be exercised in applying PIM criteria developed in other regions when medication availability in the local market is limited</td></tr>
<tr><td colspan="2">Potentially inappropriate medications (PIMs) are often defined as medicines with ineffectiveness or high risk-benefit ratio, are an important aspect of preventable medicines-related problems</td></tr>
</table>

Evidence table 3: Field TS et al, 2004

Bibliographic reference	Field TS, Gurwitz JH, Harrold LR, et al. (2004) Strategies for detecting adverse drug events among older persons in the ambulatory setting. J Am Med Inform Assoc 11: 492-98
Study type	Observational study

<table>
<tr><td>Study quality</td><td>Very low</td></tr>
<tr><td>Number of patients</td><td>n=31,757 per month</td></tr>
<tr><td>Patient characteristics</td><td>Patients aged 65 years or above receiving medical care in the ambulatory setting</td></tr>
<tr><td>Intervention</td><td>6 methods of identifying adverse drug events (ADEs):
Healthcare provider reports, including physicians, nurses and pharmacists
Manual review of hospital discharge summaries
Manual review of notes from emergency department visits
Computer-generated signals
Automated free-text review of electronic clinic notes
Manual review of administrative incident reports from affiliated pharmacies concerning medication errors</td></tr>
<tr><td>Comparison</td><td>Comparison of 6 methods stated above</td></tr>
<tr><td>Length of follow up</td><td>12 months</td></tr>
<tr><td>Location</td><td>Large US multispecialty group practice, including 30 ambulatory clinic sites</td></tr>
<tr><td>Outcomes measures and effect size</td><td>During the year of observation, 1,523 ADEs were identified, of which 421 (28%) were considered preventable. Only data on preventable ADEs are reported here. PPVs were generally low for preventable ADEs, with a maximal rate of 8%; see table below:
<table>
<tr><th></th><th>No. preventable ADEs</th><th>PPV (%)</th></tr>
<tr><td>Healthcare provider reports</td><td>27</td><td>8</td></tr>
<tr><td>Manual review of hospital discharge summaries</td><td>58</td><td>2</td></tr>
<tr><td>Manual review of notes from emergency department visits</td><td>70</td><td>1</td></tr>
<tr><td>Computer-generated signals</td><td>157</td><td>2</td></tr>
<tr><td>Automated review of electronic clinic notes</td><td>121</td><td>2</td></tr>
<tr><td>Manual review of incident reports</td><td>3</td><td>3</td></tr>
</table>
The percentage of preventable ADEs identified by each method is shown in the table below. Among preventable ADEs, 4% were identified by a 2nd method
<table>
<tr><th></th><th>% of preventable ADEs</th></tr>
<tr><td>Healthcare provider reports</td><td>6</td></tr>
<tr><td>Manual review of hospital discharge summaries</td><td>14</td></tr>
<tr><td>Manual review of notes from emergency department visits</td><td>17</td></tr>
<tr><td>Computer-generated signals</td><td>37</td></tr>
<tr><td>Automated review of electronic clinic notes</td><td>29</td></tr>
<tr><td>Manual review of incident reports</td><td>2</td></tr>
</table>
Percentages total more than 100% because some preventable ADEs were identified by more than one method</td></tr>
<tr><td>Source of funding</td><td>Research grant from the National Institute on Aging</td></tr>
<tr><td>Comments</td><td>The authors suggest that multiple strategies are required to detect ADEs among older persons in the ambulatory setting</td></tr>
</table>

	Residents of long-term care facilities were excluded from the study
Definitions: ADE, an injury resulting from the use of a drug. The reviewers independently classified incidents using structured implicit review to determine whether an ADE was present and, if so, whether it was preventable; Preventable ADE, an ADE due to an error and was preventable by any means available Abbreviations: PPV, positive predictive value	

Evidence table 4: Flynn EA et al, 2002

Bibliographic reference	Flynn EA, Barker KN, Pepper GA, et al. (2002) Comparison of methods for detecting medication errors in 36 hospitals and skilled-nursing facilities. Am J Health Syst Pharm 59(5): 436-46
Study type	Observational study
Study quality	Low
Number of patients	Not stated
Patient characteristics	Patients in hospital or skilled-nursing facility
Intervention	3 methods for identifying medication errors (administration): • Incident report review • Chart review • Direct observation
Comparison	Comparison of 3 methods (stated above)
Length of follow up	Not stated
Location	36 hospitals and skilled-nursing facilities in Colorado and Georgia, USA
Outcomes measures and effect size	457 pharmacist-confirmed errors were made on 2556 doses. The number of medication administration errors identified by the 3 methods are shown in the table below: **Number of errors (%)** Incident report review: 1 (<1%) Chart review: 17 (4%) Direct observation: 300 (66%) *These data excludes false positives identified by the method*
	The rate of false positives was: Incident report review, 0%; chart review, 0.3%; direct observation, 3.5%
	The rate of false negatives was: Incident report review, >99%; chart review, 96%; direct observation, 34%
Source of funding	Not stated
Comments	**Interventions** **Incident report review:** Data collectors allowed 2-3 weeks to pass after the observation period before analysing incident reports. **Chart review:** A list of up to 10 patients who were directly observed during the medication administration session were provided to the chart reviewer after the observer had completed their work **Direct observation:** A data collector accompanied the nurse administering medications and observed the preparation and administration of each dose
	Medication administration errors were detected by registered nurses (RNs), licensed practical nurses (LPNs) and pharmacy technicians. Each dose evaluated was compared with the prescriber's order. Deviations were considered errors. The authors conclude that pharmacy technicians were more efficient and accurate than RNs and LPNs in

	collecting data about medication
	A pharmacist performed an independent determination of errors to assess the accuracy of each data collector. Clinical significance was judged by a panel of physicians
	A stratified random sample of 36 hospitals and skilled-nursing facilities in Colorado and Georgia was selected
	The authors concluded that direct observation was more efficient and accurate than chart review or incident reports in identifying medication administration errors.
Definitions: Medication error, any discrepancy between the prescriber's interpretable medication order and what was administered to a patient (i.e. medication administration errors).	

Evidence table 5: Franklin BD et al, 2007

Bibliographic reference	Franklin BD, O'Grady K, Paschalides C, et al. (2007) Providing feedback to hospital doctors about prescribing errors: a pilot study. Pharm World Sci 29: 213-20
Study type	Observational study
Study quality	Low
Number of patients	Not stated
Patient characteristics	Hospitalised patients
Intervention	Data collection by the ward pharmacist
Comparison	Prescribing errors reported to the hospital medication incident database
Length of follow up	4 months
Location	1 clinical directorate of a London teaching hospital trust
Outcomes measures and effect size	4,995 new medication orders were examined. Of these, 462 (9.2%; 95% CI 8.5 –10.1%) contained at least one prescribing error. There were 474 errors in total. Pharmacists indicated that they would have reported 19 (4%) of the 474 prescribing errors to the hospital medication incident database as medication incidents
Source of funding	Hammersmith Hospitals NHS Trust Research Trustees
Comments	The authors conclude that incident report data is subject to gross under-reporting when compared to data recorded by ward pharmacists.
	Feedback on the prescribing errors was presented to lead clinicians of 10 clinical specialties. This included graphical summaries showing how the specialty compared with others, and a list of errors identified. This information was well-received by clinicians. The authors recommend that further work should include a larger study to find out whether providing feedback in this way can lead to a measurable reduction in prescribing errors.
Definitions: A prescribing error was therefore defined as a prescribing decision or prescription-writing process that results in an unintentional, significant: (i) reduction in the probability of treatment being timely and effective or (ii) increase in the risk of harm, when compared to generally accepted practice	

Evidence table 6: Franklin BD et al, 2009

Bibliographic reference	Franklin BD, Birch S, Savage I, et al. (2009) Methodological variability in detecting prescribing errors and consequences for the evaluation of interventions. Pharmacoepidemiol Drug Saf 18: 992-99
Study type	Observational study
Study quality	Low
Number of patients	n=129
Patient characteristics	Hospitalised patients

<table>
<tr><td>Intervention</td><td>4 methods for identifying prescribing errors (PE):
• Prospective data collection by the ward pharmacist
• Retrospective health record review
• Retrospective use of a trigger tool
• Spontaneous incident reporting</td></tr>
<tr><td>Comparison</td><td>Comparison of 4 methods (stated above)</td></tr>
<tr><td>Length of follow up</td><td>2 4-week periods</td></tr>
<tr><td>Location</td><td>28-bed general surgery ward in a London teaching hospital</td></tr>
<tr><td>Outcomes measures and effect size</td><td>Health records were retrieved for 93/129 patients pre-CPOE (see ‘Comments’ below). 1258 medication orders were written during the study period and 135 prescribing errors were identified. The table below summarises the errors identified by each method:
<table>
<tr><th></th><th>PE (% all errors)</th><th>PE rate per medication order</th></tr>
<tr><td>Ward pharmacist</td><td>48 (36%)</td><td>3.8%</td></tr>
<tr><td>Retrospective review</td><td>93 (69%)</td><td>7.4%</td></tr>
<tr><td>Trigger tool</td><td>0 (0%)</td><td>0%</td></tr>
<tr><td>Spontaneous reporting</td><td>1 (1%)</td><td>0.1%</td></tr>
</table></td></tr>
<tr><td>Source of funding</td><td>Department of Health, England</td></tr>
<tr><td rowspan="3">Comments</td><td>Prescribing errors were identified using the 4 methods before and after the implementation of a CPOE system. Data are reported for the patients reviewed pre-CPOE only</td></tr>
<tr><td>Interventions
Prospective data collection by the ward pharmacist:
Recording of prescribing errors identified by the ward pharmacist as part of their routine clinical practice
Retrospective health record review:
A research pharmacist completed a retrospective review form, which included: a checklist of data sources used; patient information; medication lists; details of errors identified. The research pharmacist was blinded to the prescribing errors recorded by the ward pharmacist, but could identify any documentation by the ward pharmacist in the patient’s health record
Retrospective use of a trigger tool:
A US trigger tool was adapted for UK use, comprising of 23 triggers for ADEs. The research pharmacist applied the trigger tool after the retrospective review, investigated positive triggers and recorded any prescribing errors identified
Spontaneous reporting:
The study organisation operated an established medication incident reporting system. Details of reports relating to the study ward during the study period were retrieved, and those relating to prescribing errors were identified</td></tr>
<tr><td>Few errors (5%) were identified by more than one method. The authors recommend that are combination of methods are used.</td></tr>
<tr><td colspan="2">Abbreviations: CPOE, computerised physician order entry; ADE, adverse drug event; PE, prescribing error
Definitions: Prescribing error, an established definition was used which lists situations that should be included and excluded as PE</td></tr>
</table>

Evidence table 7: Franklin BD et al, 2010

Bibliographic reference	Franklin BD, Birch S, Schachter M, et al. (2010) Testing a trigger tool as a method of detecting harm from medication errors in a UK hospital: a

	pilot study. Int J Pharm Pract 18: 305-11
Study type	Observational study
Study quality	Low
Number of patients	n=207
Patient characteristics	Hospitalised patients
Intervention	Trigger tool (adapted for UK use) to identify preventable ADEs
Comparison	Retrospective health record review
Length of follow up	2 4-week periods
Location	UK hospital
Outcomes measures and effect size	A total of 168 positive triggers were identified in 127/207 patients, 7 ADEs were identified (only 2 were preventable). Health record review identified 5 ADEs (all preventable errors). The sensitivity of the trigger tool for identifying preventable ADEs was 0.40, when compared to health record review
Source of funding	Department of Health, England
Comments	Retrospective use of a trigger tool: A US trigger tool was adapted for UK use, comprising of 23 triggers for ADEs. The research pharmacist applied the trigger tool and investigated positive triggers Retrospective health record review: Before completing the trigger tool, the research pharmacist completed a full health record review, which focused on the identification of preventable ADEs only
	The sensitivity of the trigger tool for identifying preventable ADEs, compared with health record review was calculated
	The authors concluded that although some ADEs were identified using the trigger tool, more work is needed to refine this to reduce the false positives and increase sensitivity. Retrospective health record review remains the gold standard
Abbreviations: ADE, adverse drug event Definitions: ADE, any harm caused by medication use, where 'harm' was defined very broadly as any identifiable physiological or physical changes. ADEs were considered preventable if they resulted from a medication error; Prescribing error, a prescribing decision or prescription-writing process that results in an unintentional, significant i) reduction in the probability of treatment being timely and effective or ii) increase in the risk of harm when compared to generally accepted practice; Medication administration error, any difference between the medication ordered, including any pharmacists' endorsements, and that were administered to the patient; Sensitivity, number of patients where the trigger tool identified a true positive preventable ADE / number of patients where the trigger tool identified a true positive preventable ADE plus the number for whom the trigger tool gave a false negative	

Evidence table 8: Gallagher PF et al, 2011

Bibliographic reference	Gallagher PF, O'Connor MN, O'Mahony D. (2011) Prevention of potentially inappropriate prescribing for elderly patients: a randomized controlled trial using STOPP/START criteria. Clinical Pharmacology & Therapeutics 89 (6): 845-854
Study type	RCT
Study quality	Low
Number of patients	n=400 randomised (382 included in analysis: intervention = 190; control = 192)
Patient characteristics	Hospitalised patient aged 65 years or over admitted via the emergency department under the care of a general medical physician
Intervention	STOPP/START screening tool

<table>
<tr><td>Comparison</td><td>Usual hospital care</td></tr>
<tr><td>Length of follow up</td><td>6 months after hospital discharge</td></tr>
<tr><td>Location</td><td>A public-funded 800-bed University hospital in the Republic of Ireland</td></tr>
<tr><td>Outcomes measures and effect size</td><td>Primary outcomes (clinical outcomes as reported in the study):
Appropriateness of prescribing measured by the MAI and AOU index at the time of discharge and at 2-month intervals during the 6-month period after discharge. Changes in MAI and AOU scores from hospital admission to discharge are shown in the table below:
<table>
<tr><th></th><th>Control</th><th>STOPP/START</th></tr>
<tr><td>Number (%) patients with improvement in MAI scores</td><td>68 (35.4%)</td><td>135 (71.1%)</td></tr>
<tr><td>Number (%) patients in whom MAI scores stayed same</td><td>60 (31.3%)</td><td>33 (17.4%)</td></tr>
<tr><td>Number (%) patients with deterioration in MAI scores</td><td>64 (33.3%)</td><td>22 (11.5%)</td></tr>
<tr><td colspan="3">Number needed to screen with STOPP/START criteria to produce an improvement in MAI = 2.8 (95% CI 2.2 to 3.8); ARR = 35.7% (95% CI 26.3 to 44.9%)</td></tr>
<tr><td>Number (%) patients with improvement in AOU</td><td>20 (10.4%)</td><td>60 (31.6%)</td></tr>
<tr><td>Number (%) patients in whom AOU stayed same</td><td>160 (83.3%)</td><td>130 (68.4%)</td></tr>
<tr><td>Number (%) patients with deterioration in AOU</td><td>12 (6.3%)</td><td>0 (0%)</td></tr>
<tr><td colspan="3">Number needed to screen with STOPP/START criteria to have an improvement in AOU = 4.7 (95% CI 3.4 to 7.5); ARR = 21.2% (95% CI 13.3 to 29.1%)</td></tr>
</table>
Secondary outcomes :
No significant differences in mortality, frequency of GP visits, hospital readmissions and falls in the 6-month period after discharge, but study not powered to detect this</td></tr>
<tr><td>Source of funding</td><td>Health Research Board of Ireland</td></tr>
<tr><td>Comments</td><td>The validity of STOPP/START was established through a Delphi consensus process in which 18 experts in geriatric pharmacotherapy from the UK and Ireland participated
Significant improvements in prescribing appropriateness (MAI and AOU) were sustained in the STOPP/START group for the 6-month follow-up period, compared with control. The prevalence of potentially inappropriate medicines increased in both groups over the 6-month follow-up. The authors suggest application of STOPP/START at least every 6 months
Study was conducted in a single centre</td></tr>
<tr><td></td><td>Allocation was concealed from the research physician and participants until baseline had been collected and inclusion criteria verified. The intervention was unblinded due to its nature</td></tr>
<tr><td colspan="2">Abbreviations: STOPP, Screening Tool of Older Persons' potentially inappropriate Prescriptions; START, Screening Tool to Alert to Right Treatment; MAI, Medication Appropriateness Index; AOU, Assessment of Underutilisation; CI, confidence interval; ARR, absolute risk reduction</td></tr>
</table>

<Insert Note here>

Evidence table 9: Haw C et al (2007)

Bibliographic reference	Haw C, Stubbs J, Dickens G. (2007) An observational study of medication administration errors in old-age psychiatric inpatients. Int J Qual Health care 19: 210-216

Study type	Observational study
Study quality	Low
Number of patients	Medication administration to 32 patients was observed
Patient characteristics	Elderly hospitalised patients (psychiatric hospital)
Intervention	Direct observation of medication administration errors (MAE)
Comparison	Medication administration errors identified by: • medication chart review • incident reports
Length of follow up	2-week period of direct observation
Location	Two elderly long-stay wards in an independent UK psychiatric hospital
Outcomes measures and effect size	A total of 1423 opportunities for error were studied. The number of MAE identified are shown in the table below: **Number of MAE (%)** Direct observation: 369 (25.9%) Medication chart review: 148 (10.4%) Incident reports: 0 (0%)
Source of funding	Not stated
Comments	**Interventions** **Direct observation:** A pharmacist observed 9 nurses' medication administration of regular and as required (prn) medicines given at each of the 4 routine daily drug rounds. Administration of 'prn' drugs and depot preparations given at other times was not observed. For the purposes of the study, such 'near miss' events were counted as errors. **Medication chart review** A second pharmacist, blind to the results of the direct observation carried out a retrospective chart review of the recording of medication administration for those drug rounds that were directly observed Incident reports The Hospital policy was that all medication errors should be reported on an incident report that is sent to and collated by the responsible senior nurse manager
	Most medication administration errors were not serious and no patient suffered observable harm as a result of errors, although the pharmacist intervened on 4 occasions to prevent patient harm The commonest errors observed were unauthorised tablet crushing or capsule opening, omission without a valid reason and failure to record administration
	The authors concluded that medication administration errors are common and mostly minor. Direct observation is a useful, sensitive method for detecting medication administration errors in psychiatry and detects many more errors than chart review or incident reports
Definitions: Medication administration error, a deviation from a prescriber's valid prescription or the hospital's policy in relation to drug administration, including failure to correctly record the administration of a medication	

Evidence table 10: Hope C et al (2003)

Bibliographic reference	Hope C, Overhage JM, Seger A, et al. (2003) A tiered approach is more cost effective than traditional pharmacist-based review for classifying computer-detected signals as adverse drug events. J Biomed Inform 36: 92-98
Study type	Observational study
Study quality	Low

<table>
<tr><td>Number of patients</td><td>n=52,728</td></tr>
<tr><td>Patient characteristics</td><td>Aged 18 years of age or older with outpatient appointments at ambulatory care clinics during a 4-month period</td></tr>
<tr><td>Intervention</td><td>Tiered review to identify adverse drug events (ADEs) and medication errors</td></tr>
<tr><td>Comparison</td><td>Pharmacist-based chart review</td></tr>
<tr><td>Length of follow up</td><td>4 months</td></tr>
<tr><td>Location</td><td>2 US sites with ambulatory clinics</td></tr>
<tr><td>Outcomes measures and effect size</td><td>The PPVs for ADEs and medication errors between the tiered review and the pharmacist review were compared using the χ^2 test, the results are shown in the table below:
<table>
<tr><th></th><th>Tiered review</th><th>Pharmacist review</th></tr>
<tr><td>PPV of a signal for ADEs (p=0.36)</td><td>9.6%</td><td>10.2%</td></tr>
<tr><td>PPV of a signal for medication error (p<0.001)</td><td>10.0%</td><td>4.4%</td></tr>
</table>
The higher PPV for the tiered system suggests that it is at least as sensitive for identifying medication errors</td></tr>
<tr><td>Source of funding</td><td>Supported by Agency for Healthcare Research and Quality Grant</td></tr>
<tr><td rowspan="3">Comments</td><td>Tiered review was complicated and had 4 levels: computer, data analysts, nurse, and pharmacist or physician:
First tier – randomisation and selection by computer
Computer identification of signals using demographic and administrative data, laboratory reports, progress notes, prescription records, ICD-9 codes, diagnoses, diagnostic procedures, discharge summaries, and other clinical information.
Second tier – analysed by data analysts
Primary function was to exclude signals that did not meet specific criteria, reducing the number of signals that had to be reviewed at the third and fourth tier. The data analysts were not clinically trained, but had degrees and had been working in healthcare for several years
Third tier – analysed by the study nurse
The nurse reviewed the patient’s medical records; then used clinical judgment to classify events, exclude signals, or mark possible ADEs or medication errors for further review and send them to the fourth or pharmacist tier
Fourth tier – analysed by the study pharmacist in consultation with physicians as needed
The pharmacist received the fewest number of signals and made the final classifications of signals as ADEs or medication errors</td></tr>
<tr><td>Tiered review was implemented at one site (Indianapolis), while pharmacist review was implemented at the other (Boston). As the review method is confounded with sites which have different populations and electronic medical records, the differences between groups may not be are completely attributable to the method</td></tr>
<tr><td>The authors concluded that tiered review of ADEs and medication errors by personnel with increasing clinical capability is more cost-efficient than pharmacist review</td></tr>
<tr><td colspan="2">Abbreviations: ADE, adverse drug event; PPV, positive predictive value; ME, medication error
Definitions: ADE, harm associated with a drug; medication error, an error in the medication use process including the prescribing, transcribing, administering, and monitoring steps. If an event is associated with an ADE and ME it is an ADE/ME.</td></tr>
</table>

Evidence table 11: Kaboli PJ et al, 2010

Bibliographic reference	Kaboli PJ, Glasgow JM, Jaipaul CK, et al. (2010) Identifying medication misadventures: Poor agreement among medical record, physician, nurse, and patient reports. Pharmacotherapy 30 (5): 529-538
Study type	Observational study
Study quality	Low
Number of patients	126 hospitalised patients with 133 separate hospital admissions
Patient characteristics	Patients admitted to an inpatient ward, and who remained there for their hospital stay
Intervention	4 different methods of identifying 'medication misadventures': • Physicians report • Nursing report • Patient report • Medical record review
Comparison	Existing hospital medication misadventure reporting system
Length of follow up	8 weeks
Location	48-bed general internal medicine inpatient ward in large academic US teaching hospital
Outcomes measures and effect size	63 patients (47% of 133 hospital admissions) experienced at least 1 medication misadventure
	37 ADEs and 69 medication errors were observed over 1035 patient bed-days. Of the 37ADEs, 6 (16%) were due to medication errors and 10 (27%) were preventable. Nearly 80% of all 106 events were detected by a single intervention method only (see also Venn diagram below): • Physicians report 9% (10 events) • Nursing report 8% (9 events) • Patient report 11% (12 events) • Medical record review 51% (54 events) The voluntary hospital reporting system recorded 8 (7.5%) of the 106 events
Source of funding	Department of Veterans Affairs, US
Comments	**Interventions:** • Physicians report: interaction with house staff during their morning report, a 1-hour educational conference held 6 days/week to review cases. In the first 5 minutes of the conference, a staff physician led a brief discussion on medication misadventures. Participants were given a reporting form and encouraged to report any medication misadventures that had occurred the previous day • Nursing report: nursing staff were instructed to report events on a clipboard attached to drug carts during distribution. There was also a clipboard in the 'break room' for reporting twice daily during shift handovers • Patient report: patient interview by a trained research assistant blinded to the other reporting methods. Interviews occurred at, or within 2 days of discharge, using a previously standardised interview tool for determining whether patient was aware of any medication misadventures • Medical record review: standardised medical record review by 3 physicians and 2 pharmacists with validated 'trigger tools' to identify medication misadventures. All identified events were discussed by the 5 reviewers to reach consensus on whether the events was an ADE, medication error or non-event
	Nurses and physicians were reminded that reporting for the study did not replace the standard hospital reporting system

	The authors conclude that there was little overlap between the 4 interventions and no single method exists to accurately identify all medication misadventures. They suggest the approach needs to be 'multifaceted' with the need to use multiple complementary methods to identify medication misadventures in hospitalised patients
Abbreviations: ADE, adverse drug event Definitions: Medication misadventure, any iatrogenic hazard or incident associated with drug therapy. ADEs and medication errors are two overlapping groups that are a subset of medication misadventure; ADE, any episode in which a medicine causes an injury; medication error, any preventable event that had the potential to lead to inappropriate drug use or harm.	

Evidence table 12: Kennedy AG et al, 2004

Bibliographic reference	Kennedy AG, Littenberg B. (2004) A dictation system for reporting prescribing errors in community pharmacies. International Journal of Pharmacy Practice 12 (1): 13-19
Study type	Prospective, cross-over study
Study quality	Low
Number of patients	Approximately 62,100 prescriptions dispensed during the study
Patient characteristics	Any patients who had prescriptions dispensed in the participating community pharmacies
Intervention	Dictation system for reporting prescribing errors in community pharmacies
Comparison	Paper-based system for reporting prescribing errors in community pharmacies
Length of follow up	12 weeks (6 weeks of one system, then 6 weeks cross-over to the alternative system)
Location	7 community pharmacies in Vermont, USA
Outcomes measures and effect size	80 interventions were completed on 72 reports. Reporting rates of prescribing errors are shown in the table below: **Report completed** / **Report not completed** / **Reporting rate per 100 prescriptions*** Dictation: 33 / 31,017 / 0.11 Paper-based: 39 / 31,011 / 0.13 ** Fisher's exact test P=0.56*
Source of funding	Grant from the Agency for Healthcare Research and Quality
Comments	The authors conclude that dictation does not appear to increase prescribing error reporting, compared with a paper-based system. 7 out of the 9 pharmacists involved in the study preferred the paper-based system
Definitions: Prescribing error, a type of medication error that occurs during the ordering of a medication	

Evidence table 13: Kunac DL et al, 2008

Bibliographic reference	Kunac DL, Reith DM. (2008) Preventable medication-related events in hospitalised children in New Zealand. N Z Med J 121(1272): 17-32
Study type	Observational study
Study quality	Low
Number of patients	n=495
Patient characteristics	Hospitalised children and young people (<17 years)
Intervention	a multi-faceted approach using 4 methods to identify medication-related events

<table>
<tr><td></td><td>

Chart review for all admissions
Attendance at multidisciplinary ward meetings
Interview of parents/carers (and children) when further information or clarification of information was required
Voluntary and verbally solicited reports from staff.

</td></tr>
<tr><td>Comparison</td><td>Hospital incident reporting system</td></tr>
<tr><td>Length of follow up</td><td>12 weeks</td></tr>
<tr><td>Location</td><td>University-affiliated urban general hospital in New Zealand</td></tr>
<tr><td>Outcomes measures and effect size</td><td>3160 medication orders were written, relating to 520 admissions and 3037 patient days of admission. The majority of medication-related events (92.2%) were found to be preventable. Of 761 medication-related events reported during the study period: 630 (83.3%) were identified by chart review; 111 (14.6%) by a voluntary staff quality improvement reporting system; 16 (2.1%) by interview of parents and 4 (0.53%) events via the concurrent routine hospital incident reporting system
<table>
<tr><td></td><td colspan="4">Stage of medication use process</td></tr>
<tr><td></td><td>Prescribing</td><td>Dispensing</td><td>Admin</td><td>Monitoring</td></tr>
<tr><td>Preventable ADEs (n=38)</td><td>32</td><td>2</td><td>10</td><td>18</td></tr>
<tr><td>Potential ADEs (n=75)</td><td>66</td><td>4</td><td>9</td><td>19</td></tr>
<tr><td>Rate of preventable events/100 admissions (95%CI)</td><td>43
(38 to 49)</td><td>7
(5 to 9)</td><td>32
(27 to 37)</td><td>11
(8 to 14)</td></tr>
<tr><td>Rate of preventable events/1000 patient days (95%CI)</td><td>74
(64 to 84)</td><td>11
(8 to 16)</td><td>54
(46 to 63)</td><td>18
(14 to 24)</td></tr>
<tr><td>Rate of preventable events/100 medication orders (95%CI)</td><td>7.1
(6.2 to 8.1)</td><td>1.1
(0.7 to 1.5)</td><td>5.2
(4.4 to 6.0)</td><td>1.7
(1.3 to 2.3)</td></tr>
</table>
</td></tr>
<tr><td>Source of funding</td><td>Child Health Research Foundation of New Zealand</td></tr>
<tr><td>Comments</td><td>The authors concluded that voluntary staff reporting in a quality improvement environment was inferior to chart review for identifying medication-related events, but this was better than the conventional incident reporting system. A multi-faceted approach was recommended</td></tr>
<tr><td></td><td>Patients were excluded if the hospital admission was for less than 24 hours or if medical staff deemed it inappropriate for a patient to be involved</td></tr>
<tr><td></td><td>Characteristics of hospital reporting system not described</td></tr>
<tr><td colspan="2">Abbreviations: ADE, adverse drug event; ADR, adverse drug reaction; CI, confidence interval
Definitions: Medication-related event includes: ADE, actual injuries resulting from medical interventions related to a medicine; preventable ADE, actual injuries resulting from the use of medication in error; non-preventable ADE, actual injuries resulting from the use of a medication not associated with error, also termed ADR; potential ADE, events that have a significant potential for injuring a patient but do not actually cause harm. This may be because they are intercepted before reaching the patient or, due to particular circumstances or chance, the patient is able to tolerate the event</td></tr>
</table>

Evidence table 14: Olsen S et al, 2007

Bibliographic reference	Olsen S, Neale G, Schwab K, et al. (2007) Hospital staff should use more than one method to detect adverse events and potential adverse events: incident reporting, pharmacist surveillance and local real-time record review may all have a place. Quality & Safety in Health Care 16 (1): 40-44
Study type	Observational study
Study quality	Low
Number of patients	288 consecutively discharged or deceased patients from 3 general medical and 3 general surgical teams
Patient characteristics	Discharged from hospital
Intervention	3 different methods of identifying adverse events and potential adverse events: • Incident reports • Active surveillance of prescription charts by pharmacists • Record review at discharge
Comparison	Head to head comparison of 3 methods (stated above) in a single cohort of patients
Length of follow up	Data were collected over periods of 2–3 weeks for each clinical team
Location	850-bed UK district general hospital
Outcomes measures and effect size	The number of adverse events (AE) and potential adverse events (PAE) identified in the cohort of 288 patients by the 3 interventions are shown in the table below: **AE (%)** / **PAE (%)** Incident reports: 0 / 11 Pharmacist surveillance: 0 / 30 Record review: 26 / 40 **Total: 26 / 81** Information obtained from record review was more detailed than that recorded by pharmacists, even when addressing the same problems. Data available from incident reports were less structured and less complete than information from record review or pharmacy surveillance. Although incident reports often included considerable details, some data fields were usually left blank The authors concluded that incident reporting does not provide an adequate assessment of clinical adverse events and that this method needs to be supplemented with other more systematic forms of data collection. Structured record review, carried out by clinicians, provides an important component of an integrated approach to identifying risk in the context of developing a safety and quality improvement programme.
Source of funding	BUPA Foundation
Comments	**Interventions** **Incident reports:** At the time of data collection, hospital risk managers encouraged reporting of adverse events and near misses, but provided no further advice for reporting (except that it was mandatory when security staff were involved. Reporting was confidential but not anonymous. The forms contained both mandatory data fields and space for free text. During the periods of data collection, there were no additional incentives or specific encouragements to enhance reporting **Pharmacist surveillance:** Hospital pharmacists attended wards on weekdays during normal working hours. After discussion with ward doctors, errors and omissions are corrected on the prescription charts. For each intervention a brief

	record is made on a standardised form. **Record review:** Specialist registrars (monitored by external reviewers) assessed all case records within 10 days of discharge of consecutively discharged or deceased patients. The method of review was adapted from that described previously. The occurrence of an AE or PAE was determined for each case. Record review was also carried out by members of the clinical team caring for the patients.
	Study was not powered to make conclusive statements on rates of detection of the methods investigated
	The authors concluded there was little overlap in the nature of events detected by the three methods. Incident reporting does not provide an adequate assessment of clinical adverse events and that this method needs to be supplemented with other more systematic forms of data collection. Structured record review, carried out by clinicians, provides an important component of an integrated approach to identifying risk.
Abbreviations: AE, adverse event; PAE, potential adverse event Definitions: AE, an unintended injury or complication, caused by healthcare management rather than the disease process, which prolonged the admission or led to disability at discharge or death; PAE, an undesirable event in health care management which could have led to harm or did so but had no impact on duration of admission or disability at discharge	

Evidence table 15: Peschek SC et al, 2004

Bibliographic reference	Peshek SC, Cubera K. (2004) Nonpunitive, voice-mail-based medication error reporting system. Hospital Pharmacy 39 (9): 857-863
Study type	Observational study
Study quality	Very low
Number of patients	Not stated
Patient characteristics	Hospitalised patients
Intervention	Nonpunitive, voice-mail-based medication error reporting system
Comparison	Paper-based medication error reporting system – historical reporting process
Length of follow up	Not stated
Location	963-bed hospital in USA
Outcomes measures and effect size	Reporting of medication errors, potential errors and near misses increased following implementation of the new reporting system in June 2002. The average number of reports per quarter was approximately 50 in 2001, 400 in 2002 and 1000 in 2003 (actual numbers not stated in published paper). More than 10% of the 2003 total consisted of near misses or potential errors
Source of funding	Not stated
Comments	**Characteristics of historical reporting system:** • Paper-based system • Only errors that reached the patient were reported to a pharmacy and therapeutics (P&T) committee • Vast majority of reported errors were due to administration errors. Nurses who made these errors were assessed 'points' and disciplinary action was taken based on the number of points • No clear definition of a medication error and the need to initiate a report • The report was subject to individual interpretation • A pharmacist was assigned with reporting the number of errors to the P&T committee. No resources were allocated to investigating the cause of the error

	Characteristics of new reporting system: • Nonpunitive, voicemail-based system via a telephone hotline • The P&T committee developed a written policy which included the definition of medication error • Medication safety co-ordinator pharmacist post was created. The co-ordinator prepares summary reports of errors, with descriptions of possible causes, which are presented at unit or departmental meetings as an educational tool. Problems and possible solutions are discussed with departments weekly • Reports were confidential, unless there was a flagrant breach of policy or harm to a patient • Point-based disciplinary system for nurses replaced with a peer review process • System changes were implemented as a result of the reports. Ad-hoc workgroups were formed to troubleshoot solutions to the problems

Evidence table 16: Stump LS, 2000

Bibliographic reference	Stump LS. (2000) Re-engineering the medication error-reporting process: removing the blame and improving the system. American Journal of Health-System Pharmacy 57: Suppl-7
Study type	Observational study
Study quality	Very low
Number of patients	Not stated
Patient characteristics	Hospitalised patients
Intervention	Medication error reporting system – standardised, nonpunitive medication-use variance process
Comparison	Medication error reporting system – historical reporting process
Length of follow up	6 months
Location	Yale-New Haven hospital, US
Outcomes measures and effect size	The number of events (medication errors) reported in the medication-use variance reporting process increased more than fivefold over 6 months (range 4 to 49 reports per quarter prior to implementation; range 90 to 276 reports per quarter following implementation) – see published paper for graphical representation of data
Source of funding	Author received funding from Pfizer, including an honorarium for preparing the manuscript
Comments	**Characteristics of historical reporting system:** • Culture was punitive with corrective action focused on individual employee counselling, remedial training, and disciplinary action • Multi-tiered administrative reporting process delayed receipt of report in department of pharmacy until 2–3 months after incident • Fragmented reporting processes made quantifying errors and trends difficult; summary reports by pharmacy and quality improvement departments often had discrepancies • Data on 'near misses' or potential errors were limited to the dispensing process and reviewed only by the department of pharmacy • Handwritten, free-text reports were difficult to read and interpret, and lacked key data elements • Reporting rate was consistently lower than external benchmarks and moving in a downward trend. • Data on medication errors were generated only through internal, voluntary reports • Data were reviewed by individuals away from the frontline of medication use. Reporting was overseen by the hospital's

	medical-legal department **Characteristics of new reporting system:** • Culture is nonpunitive with improvement efforts focused on the medication-use system, competency assessment, and reporting incentives • Using centralised reporting to the department of pharmacy, reports are received within 48 hours of event occurrence • A unified database for all medication errors has enabled identification of several quality improvement targets • 'Near misses' in every stage of the medication-use process are captured and analysed in conjunction with events that reach the patient; these data have uncovered previously unidentified areas for improvement • Structured, 'check-box' reports that minimises free text and prompts the user for key data elements, including root cause and patient outcome • Event capture increased fivefold over historical data and was moving in an upward trend • Internal as well as external sources are used as triggers for systems improvement • Staff at the grassroots level are involved in reviewing data and planning improvements • Database maintained by a clinical co-ordinator
	The authors concluded that the redesign of our medication error reporting process served as the impetus for a change in the organisational culture surrounding medication errors. The choice of reporting format, be it electronic, voice, or paper, is best determined by individual institutions on the basis of their resources, staff preferences, and work habits. An organisational culture characterized by anonymity, rewards and recognition for staff members making reports, grassroots involvement in the review and interpretation of data, and use of external sources of error data is critical for establishing a process truly capable of creating safety.
Definitions: Medication use variance, any unplanned event that deviates from the intended course of prescribing, dispensing, administering, or monitoring medications. These are preventable events that may cause or lead to inappropriate medication	

Evidence table 17: Tam KW et al, 2008

Bibliographic reference	Tam KW, Kwok KH, Fan YM, et al. (2008) Detection and prevention of medication misadventures in general practice. Int J Qual Health Care 20: 192-99
Study type	Observational study
Study quality	Low
Number of patients	73,117 medication orders from 27,339 prescription sheets
Patient characteristics	Primary care patients
Intervention	3 methods for identifying medication misadventures: • Voluntary incident report • Chart review • Patient survey
Comparison	Comparison of the 3 methods stated above
Length of follow up	2 months
Location	4 primary care clinics in Hong Kong
Outcomes measures	Of all the medication orders issued, voluntary reporting identified 250

and effect size	medication errors (0.34% medication orders; 95% CI 0.30-0.38%) Chart review of 2056 medical records (5466 medication orders) identified 4 medication errors (0.07% medication orders; 95% CI 0-0.14%) Of 600 patients surveyed by telephone (1438 medication items prescribed), 6 medication errors (0.42% medication orders; 95% CI 0.09–0.75%) were identified
Source of funding	Not stated
Comments	**Interventions** **Voluntary incident report:** 2 types of forms were developed – 1 for medication errors, 1 for ADEs. To avoid duplicated reporting of the same event using both report forms, a medication error that was also an ADE was reported using the 'ADE report form'. Therefore, medication error that had no potential for patient injury was reported using the 'Medication error report form', while medication error that had already caused or had the potential to cause patient injury was reported using 'ADE report form'. The 'medication error report form' was completed for every medication error identified **Chart review:** A chart-review panel comprising of 8 doctors, 2 from each clinic, was responsible for charting the drug events from case notes and prescription sheets **Patient survey:** 8 nurses conducted telephone interviews to collect the drug events from 600 patients, who were identified by random selection from all the prescription sheets filed in the study period. The nurses followed an identical set of structured questions and standardised the way they asked the questions
	The authors recommended a complementary approach by use of an effective incident reporting system and regular chart reviews for detection and monitoring of medication misadventures in general practice, as there was minimal overlap between the 3 methods
Abbreviations: CI, confidence interval; ADE, adverse drug event Definitions: Medication misadventures consist of the sum of medication errors and adverse drug events. medication errors are specific types of errors in that they are preventable events that can occur at any stage in the medication use process that lead to patient harm or inappropriate medication use	

<Insert Note here>

Evidence table 18: Weissman JS et al, 2008

Bibliographic reference	Weissman JS, Schneider EC, Weingart SN, et al. (2008) Comparing patient-reported hospital adverse events with medical record review: do patients know something that hospitals do not? Annals of Internal Medicine 149 (2): 100-08
Study type	Observational study
Study quality	Low
Number of patients	n=998
Patient characteristics	Patients (aged 18 years or older) discharged from hospital
Intervention	Post-discharge patient interviews
Comparison	Medical record review
Length of follow up	At 6 months and 12 months after discharge
Location	71 US acute care hospitals

<table>
<tr><td>Outcomes measures and effect size</td><td>Medicines-related problems:
In the interview group, 229 patients (23%) reported 304 adverse events (1.3 events per patient with ≥1 event). Medical record reviewers found 105 patients (11%) with 128 events (1.2 events per patient with ≥1 event)
53 patients (5.3%) had at least 1 adverse event of any type that was confirmed by both the interview and medical record methods.
The preventability of adverse events identified are shown in the table below:
<table>
<tr><th>Adverse event preventability</th><th>Interview n (%)</th><th>Medical record n (%)</th><th>Interview + medical record n (%)</th></tr>
<tr><td>Definitely</td><td>2 (0.8)</td><td>2 (2.4)</td><td>3 (6.5)</td></tr>
<tr><td>Probably</td><td>73 (28.9)</td><td>29 (35.4)</td><td>13 (28.3)</td></tr>
<tr><td>Probably not</td><td>171 (67.6)</td><td>23 (28.0)</td><td>17 (37.0)</td></tr>
<tr><td>Definitely not</td><td>7 (2.8)</td><td>0 (0)</td><td>0 (0)</td></tr>
<tr><td>Unable to determine</td><td>NA</td><td>28 (34.1)</td><td>13 (28.3)</td></tr>
<tr><td>Serious and preventable*</td><td>12 (4.7)</td><td>11 (13.4)</td><td>9 (19.6)</td></tr>
</table>
* Includes adverse events classed as ‘serious’ or ‘life-threatening’ and ‘probably’ and ‘definitely’ preventable</td></tr>
<tr><td>Source of funding</td><td>Agency for Healthcare Research and Quality and Massachusetts Department of Public Health</td></tr>
<tr><td>Comments</td><td>Patients were only interviewed 6 to 12 months after discharge
The authors concluded that patients report many adverse events that are not documented in the medical record, some of which are serious and preventable</td></tr>
<tr><td colspan="2">Definitions: Adverse event, unintended harm to the patient by an act of commission or omission rather than by the underlying disease or condition of the patient
Abbreviations: NA, Not applicable</td></tr>
</table>

D.1.2 Medicines-related communication systems when patients move from one care setting to another

Evidence table 19: Balaban RB et al, 2008

Bibliographic reference	Balaban RB, Weissman JS, Samuel PA, et al. (2008) Redefining and redesigning hospital discharge to enhance patient care: a randomized controlled study. Journal of General Internal Medicine 23(8): 1228-33
Study type	RCT
Study quality	Low
Number of patients	n=122 randomised
Patient characteristics	Discharged from hospital
Intervention	A 4-step discharge-transfer intervention consisting of: • a comprehensive, ‘user-friendly’ patient discharge form provided to patients, in one of 3 languages • the electronic transfer of the patient discharge form to the RNs at the patient’s primary care site • telephone contact by a primary care RN to the patient • PCP review and modification of the discharge–transfer plan
Comparison	Discharge according to existing hospital practices, consisting of receiving handwritten discharge instructions (in English), communication

<table>
<tr><td></td><td>between the discharging physician and the primary care provider on an as needed basis, no communication between inpatient and outpatient RNs. Outcomes were also compared to historical controls</td></tr>
<tr><td>Length of follow up</td><td>31 days</td></tr>
<tr><td>Location</td><td>A small US community teaching hospital</td></tr>
<tr><td>Outcomes measures and effect size</td><td>Four undesirable outcomes were measured after hospital discharge; see table below for results
<table>
<tr><td rowspan="2">4 Types of undesirable outcome</td><td>Historical control (n=100)</td><td>Concurrent control (n=49)</td><td>Intervention (n=47)</td><td>P value: intervention versus historical contol</td><td>P value: intervention versus concurrent control</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>No follow-up within 21 days, n(%)</td><td>35 (35.0)</td><td>20 (40.8)</td><td>7 (14.9)</td><td>.01</td><td>.005</td></tr>
<tr><td>Readmission within 31 days, n(%)</td><td>14 (14.0)</td><td>4 (8.2)</td><td>4 (8.5)</td><td>.34</td><td>.96</td></tr>
<tr><td>ED visit within 31 days, n(%)</td><td>8 (8.0)</td><td>1 (2.0)</td><td>1 (2.1)</td><td>.16</td><td>.97</td></tr>
<tr><td>Incomplete outpatient workup, x/y (%)</td><td>13/42 (31.0)</td><td>5/16 (31.3)</td><td>3/26 (11.5)</td><td>.07</td><td>.11</td></tr>
<tr><td>Patients with one or more of the above outcomes, n(%)</td><td>55 (55.0)</td><td>27 (55.1)</td><td>12 (25.5)</td><td>.0008</td><td>.003</td></tr>
</table></td></tr>
<tr><td>Source of funding</td><td>CRICO / Risk management foundation</td></tr>
<tr><td>Comments</td><td>The Patient Discharge Form included the following:
1. Patient demographics
2. Discharge diagnosis
3. Names of hospital physicians (including residents, Hospitalists, and specialists)
4. Vaccinations given
5. New allergies
6. Dietary and activity instructions
7. Home services ordered
8. Scheduled appointments with PCP, specialists, and for diagnostic studies
9. Pending medical test results
10. Recommended outpatient workup(s)
11. Discharge medications list, which consisted of the following:
(a) Continued medications (with dose changes highlighted)
(b) New medications
(c) Discontinued medications
12. Optional nursing comments
13. Reminder to patients to bring the form to their next PCP appointment</td></tr>
<tr><td></td><td>25% of patients didn’t speak English</td></tr>
<tr><td></td><td>The authors concluded that the low-cost discharge–transfer intervention improved the rates of outpatient follow-up and of completed outpatient workups</td></tr>
<tr><td colspan="2">Abbreviations: PCP, Primary care provider; RN, Registered nurse</td></tr>
</table>

<Insert Note here>

Evidence table 20: Chen Y et al, 2010

Bibliographic reference	Chen Y, Brennan N, Magrabi F. (2010) Is email an effective method for hospital discharge communication? A randomized controlled trial to examine delivery of computer-generated discharge summaries by email, fax, post and patient hand delivery. International Journal of Medical Informatics 79(3): 167-72
Study type	RCT
Study quality	Low
Number of patients	n=168 randomised
Patient characteristics	Older people, discharged from hospital
Intervention	Electronic discharge summary sent by: • Email (n=40) • Fax (n=48) • Post (n=40) • Patient hand delivery (n=40)
Comparison	Comparison of 4 methods listed above
Length of follow up	10 weeks
Location	350-bed teaching hospital in New South Wales, Australia
Outcomes measures and effect size	The primary outcome was receipt of the discharge summary by the general practice by 7th day after discharge. The results are shown in the table below: Communication / Discharge summary received (%) Email (n=23) / 17 (73.9%) Fax (n=36) / 25 (69.4%) Post (n=32) / 14 (43.8%) Patient hand delivery (n=33) / 8 (24.2%) There was no significant difference between email and fax (P = 0.712). Delivery by email and fax was significantly more effective than post and patient hand delivery (P < 0.0002)
Source of funding	University of New South Wales, Australia
Comments	A pre-study audit was conducted to obtain baseline receipt rates of discharge summaries
	Database based electronic discharge summaries generated by a multidisciplinary team, for all patients discharged from ward. An electronic medication management system is also used to maintain medication charts for patients. The electronic discharge summary and computer-based medication charts are printed and sent to GPs by fax on the day of discharge
	The authors concluded that the method of discharge delivery is an important factor in determining the timely delivery of a hospital discharge summary

<Insert Note here>

Evidence table 21: Kunz R et al, 2007

Bibliographic reference	Kunz R, Wegscheider K, Guyatt G, et al. (2007) Impact of short evidence summaries in discharge letters on adherence of practitioners to discharge medication. A cluster-randomised controlled trial. Quality & Safety in Health Care 16(6): 456-61
Study type	RCT
Study quality	Low
Number of patients	Not applicable

Patient characteristics	Discharged from hospital
Intervention	1-sentence evidence summaries appended to consultants' letters to primary care practitioners
Comparison	Usual consultants' letters
Length of follow up	Not stated
Location	District hospital and referral practices
Outcomes measures and effect size	Appending an evidence summary to discharge letters resulted in a decrease in non-adherence to discharge medication from 29.6% to 18.5% (difference adjusted for underlying medical condition 12.5%; P = 0.039)
	The rate of discontinuation of discharge medication was 18.5% in the intervention group and 29.4% in the control group
	Among the 5 possible reasons for discontinuing discharge medication, the evidence summaries seemed to have the largest impact on budget-related reasons for discontinuation (2.6% in the intervention versus 10.7% in the control group; P = 0.052).
	72% of clinicians were enthusiastic about continuing to receive evidence summaries with discharge letters in routine care
Source of funding	Techniker Krankenkasse, Hamburg, Germany
Comments	178 practices received one or more discharge letters with evidence summaries. 66 practices in the intervention group provided feedback on 172 letters, and 56 practices in the control group provided feedback on 96 letters
	The authors identified medical conditions that were frequently encountered in hospital care, required long-term drug treatment, and for which high-quality RCTs, or meta-analysis of such trials, have unequivocally established benefits greater than risks, costs and inconvenience. A single sentence evidence summary was generated for each condition–medication pair. 135 evidence summaries were developed for 15 predefined medical conditions
	As exposure to an evidence summary for a patient in the intervention group may influence management of a similar patient in the control group, the authors cluster-randomised practices and conducted an analysis appropriate to the study design
	The authors concluded that patient-specific evidence summaries increased primary care practitioners' adherence to evidence-based consultant recommendations for long-term drug treatment across a broad spectrum of chronic medical conditions.

<Insert Note here>

Evidence table 22: Lalonde L et al, 2008

Bibliographic reference	Lalonde L, Lampron AM, Vanier MC, et al. (2008) Effectiveness of a medication discharge plan for transitions of care from hospital to outpatient settings. American Journal of Health-System Pharmacy 65(15): 1451-57
Study type	RCT
Study quality	Low
Number of patients	n=83
Patient characteristics	Patients (≥ 18 years) discharged from a geriatric, family-medicine, or psychiatric ward; discharged with at least two pharmacotherapeutic changes; and have had a medication history taken by a clinical pharmacist during hospitalisation
Intervention	Medication discharge plan (MDP) sent to community pharmacies and treating physicians

Comparison	Usual care – an MDP was not sent
Length of follow up	Not stated
Location	1 large community hospital in Canada
Outcomes measures and effect size	See table below for results

Variable	Mean ± S.D. No. Discrepancies[a]			
	MDP vs. Community Pharmacy Records		MDP vs. Patient Self-Report	
	MDP Group (n = 41)	Usual Care Group (n = 41)	MDP Group (n = 39)	Usual Care Group (n = 38)
Overall discordance	13.2 ± 16.6	15.3 ± 18.2	10.3 ± 12.1	12.1 ± 15.3
Discrepancy in medication status as defined in discharge plan				
Medication represcribed at discharge without changes	2.1 ± 4.6	1.2 ± 3.8	2.8 ± 5.0	4.1 ± 8.4
Medication reported in MDP only	0.7 ± 2.5	0.4 ± 2.2	1.1 ± 3.5	1.9 ± 6.0
Different medication dosage reported	1.4 ± 4.1	0.8 ± 3.1	1.7 ± 3.3	2.2 ± 5.5
Medication represcribed at discharge with changes	3.0 ± 6.9	2.2 ± 5.6	3.1 ± 6.4	1.0 ± 2.8
Medication reported in MDP only	0	0	1.1 ± 3.1	0[b]
Different medication dosage reported	3.0 ± 6.9	2.2 ± 5.6	2.0 ± 5.2	1.0 ± 2.8
Medication added during hospitalization	1.4 ± 2.8	2.5 ± 7.0	2.5 ± 4.5	4.7 ± 7.2
Medication reported in MDP only	0.4 ± 1.7	1.4 ± 6.5	1.2 ± 3.2	3.2 ± 6.8
Different medication dosage reported	1.0 ± 2.4	1.1 ± 3.1	1.3 ± 3.6	1.5 ± 3.2
Medication stopped during hospitalization	1.7 ± 4.9	3.7 ± 7.6	0.2 ± 1.1	1.5 ± 4.7
Medication not reported in MDP	5.0 ± 8.7	5.7 ± 9.6	1.7 ± 3.8	0.8 ± 2.7

[a] *Unless otherwise stated, P value was not significant for any comparisons*
[b] *P = 0.03*

Source of funding	Not stated
Comments	The MDP included: • Patient information (name, address, telephone numbers) • Contact information (names, telephone numbers) for the hospital physician and pharmacist • Patient's clinical information (weight, height, allergies, intolerances) • Medication information (drug name, dose, route, frequency, duration) • All medications reported at admission, along with their current status at discharge (represcribed without changes, represcribed with changes, discontinued) and new medicines added during hospitalisation • Details of the pharmacist's recommendations
	The usual care group received similar pharmaceutical care during their hospital admission and at discharge. An MDP was completed for each patient, but a copy was not given to patients and was not sent to their treating physician and community pharmacy. Patients received a conventional hospital discharge prescription and, if relevant, a medication administration schedule with or without medication information leaflets
	The authors concluded that the rate of medication discrepancies was not decreased in patients whose MDP was provided to their community pharmacy and physician at the time of hospital discharge, compared with the rate in patients who received usual care.

<Insert Note here>

Evidence table 23: Maslove DM et al, 2009

Bibliographic reference	Maslove DM, Leiter RE, Griesman J, et al. (2012) Electronic versus dictated hospital discharge summaries: a randomized controlled trial. J Gen Intern Med 24(9): 995-1001
Study type	RCT
Study quality	Low
Number of patients	n=209 randomised
Patient characteristics	Discharged from hospital (general internal medicine service)
Intervention	Electronic discharge summary
Comparison	Dictated discharge summary
Length of follow up	30 days
Location	a 513-bed tertiary care teaching hospital affiliated with the University of Toronto, Canada

Outcomes measures and effect size

The primary endpoint was overall discharge summary quality, as assessed by PCPs using a 100-point visual analogue scale, ranging from 0 (worst) to 100 (best). Other endpoints included housestaff satisfaction (using a 100-point scale), adverse outcomes after discharge (combined endpoint of emergency department visits, readmission, and death), and patient understanding of discharge details as measured by the Care Transition Model (CTM-3) score (ranging from 0 to 100). See tables below:

	EDS (n=46)	Dictation (n=48)	Difference of means (95%CI)	P-value for difference of means
	Mean (SD)	Mead (SD)		
Quality	86.4 (15.0)	84.3 (17.6)	2.1 (-4.6 to 8.8)	0.53
Completeness	88.2 (12.4)	83.5 (19.1)	4.7 (-2.0 to 11.4)	0.16
Organisation	88.3 (938)	85.5 (19.1)	2.8 (-3.0 to 8.6)	0.34
Timeliness	88.4 (15.8)	82.9 (21.2)	5.6 (-2.3 to 13.4)	0.16

Note: Analysis of medians indicated skewness of data. A non-parametric Mann-Whitney test was done, which also showed no statistically significant difference between the 2 groups, for any of the above measures (P values 0.13 to 0.99)

	EDS (n=105)	Dictation (n=104)	P
Adverse outcome [a] (%)	22 (21)	21 (20)	0.89
Outpatient follow-up requested (% of total)	68 (65)	61 (59)	0.36
Follow-up completed (% of requested)			
No	27 (40)	23 (38)	0.42
Yes	27 (40)	31 (51)	
Out of study range	12 (18)	5 (8)	
Data not available	2 (3)	2 (3)	
CTM-3 score, mean (SD)	80.3 (19.6)[b]	81.3 (20.1)[c]	0.81

[a] *Adverse outcome, emergency department visit, re-admission, or death at 30 days*
[b] *n = 50*
[c] *n = 54*

Source of funding

University Of Toronto Chair of Medicine Quality Partners Program and a student grant

Comments

Interventions

Dictated discharge summary:

Housestaff generated dictated discharge summaries by reciting their report into the hospital's telephone-based dictation system. The housestaff had discretion over the information included and how this information was organised. Once dictated, the summaries were sent to an external company to be transcribed, then returned to the hospital,

	uploaded to the hospital information system, and sent out to the PCPs. Dictated summaries did not require attending physician authentication before being posted to the HIS **Electronic discharge summary:** The customised electronic discharge summary (EDS) program contains fields that have been shown to improve the quality of a discharge summary. Fields are grouped into 3 separate sections: 1) preadmission information, 2) hospital course, and 3) discharge and follow-up plans. After the summaries were finalized by the housestaff, they were electronically signed and authenticated by the attending physician, uploaded to the HIS, and sent out to the PCPs. The forms generated included a structured discharge summary report, as well as a computer-generated prescription, and patient letter
	The authors concluded that an EDS program can be used by housestaff to more easily create hospital discharge summaries, compared to dictation and there was no difference in PCP satisfaction.
Definitions: High-quality summary, one that efficiently communicates information necessary for continued patient care; Quality, efficiently communicates information necessary for continued patient care; Completeness, all necessary information is included; Organisation, information is presented in a logical and clear fashion; Timeliness, time from patient discharge to summary receipt Abbreviations: EDS, electronic discharge summary; ED, emergency department; PCP, primary care physician; CTM-3 score, Care Transition Model score (range 0–100)	

<*Insert Note here*>

Evidence table 24: Nazareth I et al, 2001

Bibliographic reference	Nazareth I, Burton A, Shulman S, et al. (2001) A pharmacy discharge plan for hospitalized elderly patients—a randomized controlled trial. Age Ageing 30: 33-40
Study type	RCT
Study quality	Low
Number of patients	n=362 randomised
Patient characteristics	Discharged from hospital, aged 75 years and older on 4 or more medicines
Intervention	Pharmacy discharge plan
Comparison	Usual care
Length of follow up	6 months
Location	3 acute general hospitals and 1 long-stay hospital
Outcomes measures and effect size	There were no significant differences between the groups in the proportion of patients readmitted to hospital between baseline and 3 months, or 3 months and 6 months. There were no significant differences in any of the secondary outcomes (including number of deaths, attendance at hospital outpatient clinics and general practice, proportion of days in hospital over the follow-up period, patients' general well-being, satisfaction with the service and knowledge of and adherence to prescribed medication
Source of funding	NHS research and development programme on the primary/secondary care interface
Comments	**Interventions** **Pharmacy discharge plan:** The hospital pharmacist developed discharge plans which gave details of medication and support required by the patient. A copy was given to the patient and to all relevant professionals and carers. This was followed by a domiciliary assessment by a community pharmacist

	Usual care: Standard procedures that included a discharge letter to the GP listing current medications
	The authors concluded that they found no evidence to suggest that the co-ordinated hospital and community pharmacy care discharge plans in older people in the study influence outcomes

<Insert Note here>

Evidence table 25: Rytter et al, 2001

Bibliographic reference	Rytter L, Jakobsen HN, Rønholt F, et al. (2010) Comprehensive discharge follow-up in patients' homes by GPs and district nurses of elderly patients. A randomized controlled trial. Scand J Prim Health Care 28:146-53
Study type	RCT
Study quality	Low
Number of patients	n=333 randomised
Patient characteristics	Discharged from hospital (aged ≥ 78 years)
Intervention	Structured home visit by the GP and the district nurse one week after discharge, followed by two contacts after 3 and 8 weeks
Comparison	Usual care
Length of follow up	6 months
Location	1 Danish hospital
Outcomes measures and effect size	**Primary outcomes** **Readmission:** 26 weeks after discharge, 86 (52%) patients in the control group and 67 (40%) in the intervention group had been readmitted (P < 0.03); relative risk reduction (RRR) 23%. A Cox regression analysis of the number of days to first readmission showed a hazard ratio of 0.69 (95% CI: 0.50 to 0.95. p < 0.02) **Control of medication:** In the intervention group, the proportions of patients who used prescribed medication of which the GP was unaware (48% vs. 34%, P < 0.02) and who did not take the medication prescribed by the GP (39% vs. 28%, P < 0.05) were smaller than in the control group **Secondary outcomes** Patients in the intervention group felt that their GPs were better informed about their hospitalization (very well-informed 42% vs. 16%, P < 0.01). No significant differences were found in functional ability, self-rated health, or patient satisfaction with the whole admission to hospital or with the services given by the GPs and municipalities in general. 15 patients in the intervention group and 20 in the control group died within 26 weeks after discharge (hazard ratio 0.72, 95% CI 0.37 to 1.41)
Source of funding	Danish Centre for Health Technology Assessment, the National Board of Health, the Health Insurance Foundation, the General Practitioners' Foundation for Development of General Practice (PLU), the Copenhagen County Health Department, Copenhagen County Quality Committee for General Practice, Copenhagen County Committee on Disease Prevention, and Copenhagen County Health Insurance.
Comments	**Intervention:** Week 1: Structured home visit by GP and district nurse: • checking the discharge letter for specific recommended paraclinical or clinical follow–up • Check need for adjustment of medication • Check if social and personal support was arranged

	• Check of the family's medical cabinet Week 3: Appointment with the GP either as usual consultation or home visit. Depending on needs: • Follow-up on hospital treatment, medication and needs for remedial and care measures. • The district nurses joined depending on need Week 8: Appointment with the GP either as usual consultation or home visit, as per week 3 visit
	The authors concluded that the intervention shows a possible framework securing the follow-up of older people after discharge by reducing the readmission risk and improving medication control

Evidence table 26: Schnipper JL et al, 2006

Bibliographic reference	Schnipper JL, Kirwin JL, Cotugno MC, et al. (2006) Role of pharmacist counseling in preventing adverse drug events after hospitalization. Arch Intern Med 166: 565-71
Study type	RCT
Study quality	Moderate
Number of patients	n=178 randomised
Patient characteristics	Discharged from hospital
Intervention	Pharmacist counselling at discharge and a follow-up telephone call 3 to 5 days later
Comparison	Usual care
Length of follow up	30 days
Location	1 large US teaching hospital
Outcomes measures and effect size	The primary outcome was the presence of a preventable ADE in patients 30 days after hospital discharge. Secondary outcomes were all ADEs (preventable or not), patient satisfaction, health care utilisation, medication adherence, and medication discrepancies. See table below for results.

Outcome	Pharmacist counselling (n=92)	Usual Care (n=84)	P value
Preventable ADE	1/79 (1%)	8/73 (11%)	0.01
All ADE	14/79 (18)	12/73 (16)	> 0.99
ED visit or readmission	28/92 (30)	25/84 (30)	> 0.99
ED visit or readmission – medicines-related	4/92 (4)	7/84 (8)	0.36
ED visit or readmission – preventable medicines-related	1/92 (1)	7/84 (8)	0.03
Patient satisfaction	60/71 (85)	57/65 (88)	0.63
Median adherence score on previous day (IQR)	88.9 (0.71-1.00)	87.5 (0.73-1.00)	0.91

Source of funding	Brigham and Women's Hospital, Boston, US and an unrestricted grant from the Merck Co. Foundation
Comments	**Interventions** **Pharmacist counselling:** Patients in the intervention group received pharmacist counselling at discharge and a follow-up telephone call 3 to 5 days later. Interventions focused on clarifying medication regimens; reviewing indications, directions, and potential side effects of medications; screening for barriers to adherence and early side effects; and providing patient

	counselling and/or physician feedback when appropriate **Usual care:** Routine review of medication orders by a ward-based pharmacist and medication counselling by a nurse at discharge. Nursing discharge counselling typically focused on medication directions and may have included a discussion of indications or potential side effects, especially for new medications. These sessions sometimes included informal medication reconciliation, such as comparing discharge medications with those currently prescribed in the hospital
	The authors concluded that pharmacist counselling and follow-up was associated with lower rates of preventable ADEs after discharge, likely through reduction in medication discrepancies. Future studies should focus on optimising these interventions, identifying patients most likely to benefit from pharmacist involvement, and studying and improving cost-effectiveness
Abbreviations: ADE, adverse drug event; ED, Emergency department; IQR, Interquartile range	

<Insert Note here>

Evidence table 27: Shah M et al, 2013

Bibliographic reference	Shah M, Norwood CA, Farias S, et al. (2013) Diabetes transitional care from inpatient to outpatient setting: pharmacist discharge counselling. Journal of Pharmacy Practice 26(2): 120-24
Study type	RCT
Study quality	Low
Number of patients	n=130 randomised
Patient characteristics	Patients with diabetes for at least 1 year (HbA1c ≥8%; ≥18 years) who were discharged from hospital
Intervention	Pharmacist counselling (range 30 to 45 minutes) prior to usual care and discharge
Comparison	Usual care – diabetes education pamphlet, routine diabetes education from nurse (range 5 to 30 minutes).
Length of follow up	150 days
Location	1 US hospital
Outcomes measures and effect size	The primary outcome was overall diabetes medication adherence rate (covering more than 150 days after discharge). The results are shown in the table below:

Adherence (mean %) ± SD	Intervention (n=64)	Control (n=63)	P value
Overall adherence[a]	55.2 ± 42.0	34.8 ± 37.9	0.004
30 days after discharge[a]	58.6 ± 48.4	44.1 ± 48.8	0.12
60 days after discharge[a]	52.7 ± 48.3	34.1 ± 45.9	0.016
90 days after discharge[a]	62.0 ± 48.2	36.4 ± 46.2	0.001
120 days after discharge[a]	47.2 ± 49.9	24.4 ± 41.6	0.006

[a] Mann-Whitney test (nonparametric)

	The intervention also significantly improved HbA1c at follow-up and rate of follow-up outpatient visits
Source of funding	None
Comments	1 pharmacist was dedicated to discharge counselling in the study. Emphasis was on diabetes medicines, adverse effects, clinical benefits

	and medicines adherence, including the 7 AADE self-care behaviours, specifically focusing on taking medicines and monitoring. Usual care education consisted of survival skills regarding hypo- and hyperglycaemia, sick days, medicines adherence, use of glucometers and insulin injections, when needed
	Baseline demographics of both groups were similar. Patients in the intervention group had a shorter duration of diabetes. All patients were scheduled for a follow-up visit
	The authors concluded that pharmacist counselling at discharge can significantly improve medicines adherence
Abbreviations: HbA1c, Glycosylated haemoglobin; AADE, American Association of Diabetes Educators; SD, Standard deviation	

<Insert Note here>

Evidence table 28: Shaw H et al (2000)

Bibliographic reference	Shaw H, Mackie CA, Sharkie I. (2000) Evaluation of effect of pharmacy discharge planning on medication problems experienced by discharged acute admission mental health patients. Int J Pharm Pract 8: 144–53
Study type	RCT
Study quality	Low
Number of patients	n=97
Patient characteristics	Discharged from hospital, following acute admission to psychiatric ward
Intervention	Pharmacy discharge planning intervention, consisting of: • baseline pharmaceutical needs assessment • information about medicines • pharmacy discharge plan communicated to the community pharmacy
Comparison	Usual care (no additional pharmaceutical care)
Length of follow up	12 weeks
Location	3 acute admission psychiatric wards in a UK hospital
Outcomes measures and effect size	1 week post-discharge, both groups showed significant improvement in knowledge about medication from baseline, this improvement was maintained at 12 weeks. No significant difference was found between knowledge scores for the 2 groups on any occasion. There was no significant difference in admissions between both groups Fewer medication problems were reported in the intervention group, but the authors did not determine significance due to small numbers
Source of funding	Primary care development initiative
Comments	Domiciliary visits were carried out at 1, 4 and 12 weeks post-discharge to assess medicines knowledge and the number and types of medication problems experienced. Community pharmacists were questioned, where relevant after each domiciliary visit
	Authors concluded that further work is needed to evaluate whether the effectiveness of pharmacy discharge planning may be improved by providing information to GPs and community psychiatric patients, in addition to community pharmacists, as in this study
Text	

<Insert Note here>

Evidence table 29: Vuong T et al, 2008

Bibliographic reference	Vuong T, Marriott JL, Kong DCM, et al. (2008) Implementation of a community liaison pharmacy service: a randomised controlled trial. Int J Pharm Pract 16: 127-35
Study type	RCT

Study quality	Low
Number of patients	n=316 randomised
Patient characteristics	Discharged from hospital, >55 years, returning to independent living
Intervention	Standard care plus a home visit from a community liaison pharmacist within 5 days of discharge
Comparison	Standard care - discharge counselling, provision of compliance aid, communication with primary care providers if necessary
Length of follow up	8 to 12 weeks

D.1.3 Medicines reconciliation

Evidence table 30: Bolas H et al, 2004

<table>
<tr><td>Bibliographic reference</td><td>Evaluation of a hospital-based community liaison pharmacy service in Northern Ireland</td></tr>
<tr><td>Study type</td><td>RCT</td></tr>
<tr><td>Study quality</td><td>Low</td></tr>
<tr><td>Number of patients</td><td>n=162</td></tr>
<tr><td>Patient characteristics</td><td>Aged 55 years or over, receiving more than 3 drugs taken regularly (not on a ‘when required’ basis).</td></tr>
<tr><td>Intervention</td><td>Enhanced service involving community pharmacy liaison pharmacist involving:
full medication history
daily contact with the patient to explain any treatment changes
preparation of discharge letter signed by junior doctor
preparation of pharmaceutical discharge letter faxed to GP and community pharmacy with discharge prescription
preparation of a personalised medicines record sheet and discharge counselling
provision of a medicines helpline
assessment and management of patients own drugs</td></tr>
<tr><td>Comparison</td><td>Standard clinical pharmacy service, which at the time of the study did not include discharge counselling (specifics not reported in the paper)</td></tr>
<tr><td>Length of follow up</td><td>3 months</td></tr>
<tr><td>Location</td><td>Northern Ireland</td></tr>
<tr><td>Outcomes measures and effect size</td><td>Mismatch between discharge prescription and home medication
Table showing mean error rates between discharge prescription and home medication (N=171)
<table>
<tr><td></td><td>Intervention</td><td>Control</td><td>P</td></tr>
<tr><td>Name of medicine</td><td>1.5%</td><td>7%</td><td><0.005</td></tr>
<tr><td>Dose of medicine</td><td>10%</td><td>17%</td><td><0.07</td></tr>
<tr><td>Dosage frequency</td><td>11%</td><td>18%</td><td><0.004</td></tr>
</table>
There was a significant improvement in the correlation between discharge prescription medication and home medication 10-14 days post discharge in the intervention group with name of medicine and dosage</td></tr>
</table>

	frequency but not for dose of medicine.
Source of funding	DHSSPS Primary Care Development Fund
Comments	• This study had other outcome measures such as patient knowledge of drug therapy, emergency readmission rates, utilisation of patients own drugs and GP and community pharmacist satisfaction survey which have not been included in this evidence table as the intervention had several other components to it which would have affected these outcome measures. • The medicines reconciliation component of the intervention was assessed by using the reported outcome measure above only.

Evidence table 31: Kripalani S et al, 2012

Bibliographic reference	Effect of a pharmacist intervention on clinically important medication errors after hospital discharge: a randomised controlled trial
Study type	RCT
Study quality	Moderate
Number of patients	n=862
Patient characteristics	Adults hospitalised for acute coronary syndrome or acute decompensated heart failure
Intervention	The intervention consisted of 4 components – pharmacist-assisted medication reconciliation (at hospital admission and discharge), tailored inpatient counselling by a pharmacist, provision of low-literacy adherence aids, and individualized telephone follow-up after discharge PILL-CVD – pharmacist intervention for low literacy in cardiovascular disease
Comparison	Usual care, physicians and nurses performed medication reconciliation and provided discharge counselling
Length of follow up	30 days
Location	USA
Outcomes measures and effect size	**Number of clinically important medication errors per patient during the first 30 days after hospital discharge** • Clinically important medication errors Incident risk ratio (IRR) Adjusted – 0.92 (0.77-1.09, 95% CI), Unadjusted – 0.92 (0.77-1.10) Mean number of clinically important medication errors was similar in the intervention (0.87/patient) and usual care (0.95/patient). Treatment effect favoured intervention group but this was not statistically significant.
	Preventable or ameliorable adverse drug events (ADEs) during the first 30 days after hospital discharge • ADEs Incident risk ratio (IRR) Adjusted – 1.09 (0.86-1.39, 95% CI), Unadjusted – 1.09 (0.86-1.39) The number of ADEs per patient was similar in the intervention (0.43) and usual care (0.40) groups, as was the number of serious or life-threatening ADEs. The unadjusted and fully adjusted analyses showed no significant treatment effect on ADEs.
	Potential adverse drug events during the first 30 days after hospital discharge Incident risk ratio (IRR) Adjusted – 0.79 (0.61-1.01, 95% CI), Unadjusted – 0.80 (0.61-1.04) Potential ADEs occurred less often among intervention patients (0.44/patient) than usual care patients (0.55/patient). The treatment

	effect favoured the intervention in both unadjusted and adjusted analyses but was not statistically significant.
Source of funding	Sanofi Aventis, National Heart, Lung, and Blood Institute
Comments	• At one of the institutes usual care had additional features such as reminders to complete preadmission medication list and integration with order entry. • Sensitivity and sub group analysis showed that intervention tended to have a greater but non-significant effect among patients with inadequate health literacy (adjusted IRR for clinically important medication errors =0.68; 95% CI, 0.39 to 1.19). Patients with 10 or more pre-admission medications tended to benefit (but not significant) from the intervention (adjusted IRR for clinically important medication errors =0.80; 95% CI, 0.61 to 1.05).

Evidence table 32: Nickerson A et al, 2005

Bibliographic reference	Drug-therapy problems, inconsistencies and omissions identified during a medication reconciliation and seamless care service.
Study type	RCT
Study quality	Low
Number of patients	n=253
Patient characteristics	Adults mean age 61 years (control group) and 67 years (intervention group) prescribed at least one prescription medication at discharge.
Intervention	Clinical pharmacist carried out medication reconciliation process by reviewing discharge prescriptions and compared these to the medication administration records and the patient's medical chart to identify any discrepancies on the discharge orders. (The pharmacist also reviewed the drug regime at discharge, identified drug problems with drug therapy and communicated these to the patient's community pharmacy, hospital staff and GP, counselled the patient and provided a compliance chart).
Comparison	Usual care that involved a nurse on the unit to perform the discharge counselling and manually transcribe the discharge notes from patients medical chart
Length of follow up	Carried out over 9 months with 6 months follow up
Location	Canada
Outcomes measures and effect size	**Drug therapy inconsistencies and omissions (DTIO)** • Retrospective medical chart reviews revealed that 67/119 (56.3%) of the control patients were discharged from the hospital with an inconsistency or omission. The intervention resolved all inconsistencies or omissions (n=28, see note below), 0/28. • In the intervention group 53/134 (39.6%) of patients had a DTIO at the time of discharge, where 99 DTIO's were identified and resolved and had an intervention ranking of 'significant or very significant'. • Average of 0.74 DTIOs per intervention patient (SD =1.18)
	Drug therapy problems for seamless monitoring (DTPsm) (information for patients community pharmacist, GP) • 481 DTPsm identified and communicated in total • 129/134 patients had a DTPsm identified • Average number of patients with DTPsm was 3.59 (SD = 2.25) • 83.8% of the DTPsm identified were deemed as 'somewhat significant or significant' with 56.6% being significant

	• Average intervention raking score per pharmacist intervention (see comments below) was 4.16 (SD =0.38)
Source of funding	Atlantic Blur Cross Care, Canadian Society of Hospital pharmacist, Eli Lilly, Friends of the Moncton hospital, Hoffman LaRoche, Medbuy Corporation, New Brunswick Pharmacists Association, Shoppers Drug Mart, South-East Regional Health Authority
Comments	• Intervention group had statistically significant greater number of home medication changes, and their mean age, number of medications upon admission and the number of co-morbidities were marginally significantly greater. • Control group (n=119) had a retrospective chart analysis to identify drug therapy inconsistencies and omissions at the time of discharge. • Intervention group (n=28) also had retrospective chart revalidation of the clinical pharmacists interventions, however due to it being a time intensive process, every 6th chart was reviewed and if many problems were identified then all the remaining charts would be reviewed, this was not the case so only 28 charts ended up going through the revalidation checks in the intervention group as only 1 chart was found to still contain unresolved DTIOs. • Study results limited by the way intervention and control group results were compared with each other (C=119 vs I=28)
Intervention ranking system has six categories to rank the potential impact of the pharmacists intervention and ranges from 1 (adverse significance) to 6 (extremely significant)	

Evidence table 33: Schnipper JL et al, 2009

Bibliographic reference	Effect of an electronic medication reconciliation application and process redesign on potential adverse drug events
Study type	Cluster randomised controlled trial
Study quality	Low
Number of patients	n=322
Patient characteristics	All patients –no inclusion criteria specified in study.
Intervention	Computerised medication reconciliation tool and process redesign involving physicians, nurses and pharmacists (admission and discharge).
Comparison	Usual care
Length of follow up	May to June 2006 (2 months)
Location	USA
Outcomes measures and effect size	**Unintentional discrepancies with potential adverse drug events (PADEs) per patient** • Among 160 control patients, there were 230 PADEs (1.44 per patient), while among 162 intervention patients there were 170 PADEs (1.05 per patient) ARR 0.72; 95% CI, 0.52-0.99. • A significant benefit was found at hospital 1 (ARR, 0.60; 95% CI, 0.38-0.97) but not at hospital 2 (ARR, 0.87; 95% CI, 0.57-1.32) (P=0.32 for test of effect modification) • Ninety-eight PADEs were considered serious, i.e. to have potential to cause serious harm such as rehospitalisation or persistent alteration in health function, including 43 PADEs in the intervention arm (0.27 per patient) and 55 PADEs in those assigned to usual care (0.34 per patient). • The intervention significantly reduced PADEs at discharge but not at admission: ○ PADEs at admission: 44 PADEs in the intervention arm (0.27 per patient) and 49 PADEs in those assigned to usual care (0.31 per

	patient) Unadjusted RR 0.89; 95% CI, 0.59-1.33 Adjusted & clustered RR 0.87; 95% CI, 0.51-1.52 ○ PADEs at discharge: 126 PADEs in the intervention arm (0.78 per patient) and 181 PADEs in those assigned to usual care (1.13 per patient) Unadjusted RR 0.69; 95% CI, 0.55-0.86 Adjusted & clustered RR 0.67; 95% CI, 0.49-0.98
	Healthcare utilisation (see comments below) • No significant differences were found in health care utilisation. The rate of hospital readmission or emergency department visit within 30 days was 20% in the intervention arm and 24% in the usual care arm (clustered odds ratio, 0.76; 95% CI, 0.43-1.35).
Source of funding	Harvard Risk Management Foundation, Brigham and Women's Hospital, Massachusetts General Hospital and Partners Healthcare.
Comments	• Subgroup analysis found that the effect of the intervention was greater in the 167 patients with a PADE risk score of 4 or higher (adjusted and clustered RR 0.62; 95% CI, 0.41-0.93) than in the 155 patients with a risk score of 3 or lower (adjusted and clustered RR 1.09; 95% CI, 0.49-2.44) (P value for interaction, 0.02). The intervention was more successful in patients at high risk for medication discrepancies, based on a risk score derived from the control group • The study was not powered to detect a difference in healthcare utilisation • Study measured potential ADEs not actual ADEs • Full use of the computerised medication reconciliation tool was not achieved: 46% of patients had a completed preadmission medication list builder completed within 24hours of admission (75%) were complete by discharge – this limited the ability of the intervention benefiting the patients.
Abbreviations: ARR, adjusted relative risk; CI, confidence interval; RR, risk ratio.	

D.1.4 Medication review

Evidence table 34: Allard J et al, 2001

Bibliographic reference	Efficacy of a clinical medication review on the number of potentially inappropriate prescriptions prescribed for community-dwelling elderly people
Study type	RCT
Study quality	Low
Number of patients	n=266
Patient characteristics	Aged over 75 years of age, living in the community, at risk of losing their autonomy and taking 3 or more medications per day.
Intervention	Medication review by physicians, pharmacist and nurse.
Comparison	Usual care
Length of follow up	1 year
Location	Canada
Outcomes measures and effect size	**Number of potentially inappropriate prescriptions (PIP)** Mean number of PIPs per patient declined to 0.24 in the intervention group and 0.15 in the control group (p<0.001). The decline in the PIPs was higher in the intervention group that also had case conferences in which the mean number of PIPs per patient declined by 0.31whihc represents a decrease of 36% compared to the control group, 19%.

	There was no statistical difference between the intervention and control group for this outcome.
	Number of patients with at least one PIP There was a significant decrease seen in the intervention group (p=0.049) for the number of patients with at least one PIP compared to control.
	Global assessment of any change in the medications pre-intervention and post-intervention measurements in the groups. There was an improvement in the drug profile of 20% of subjects, deterioration in 5%, and that it remained stable in 70%. There was no significant difference between the intervention and control group.
Source of funding	Unclear
Comments	• PIPs were identified from the list of PIPs developed by the Quebec committee on drug use in the elderly. This list has never been validated with empirical data. • Study not powered adequately due to loss of subjects during the study • Small sample size

Evidence table 35: Armour C et al, 2007

Bibliographic reference	Pharmacy asthma care program (PACP) improves outcomes for patients in the community
Study type	Multi-site randomised intervention versus control repeated measures design
Study quality	Low
Number of patients	n=396
Patient characteristics	Aged 18–75 years, previous diagnosis of asthma and fulfilment of one or more of the following sub-criteria from the revised Jones' Morbidity Index: . Use of a reliever medication .3 times a week over the previous 4 weeks. . Waking at night or morning with cough/chest tightness on at least one occasion over the previous 4 weeks. . Time off work/study because of asthma over the previous 4 weeks. Symptoms of asthma (cough, breathlessness, wheeze, etc) at least once a week over the previous 4 weeks. . No visit to a doctor for asthma within the last 6 months.
Intervention	Intervention pharmacies providing Pharmacy Asthma Care Program (PACP) involving an ongoing cycle of assessment, goal setting, monitoring and review.
Comparison	Control pharmacies gave their usual care
Length of follow up	6 months
Location	Australia
Outcomes measures and effect size	**Change in overall asthma severity/control** The proportion of patients with severe asthma declined significantly in the intervention group but not in the control group (odds ratio 2.68, 95% CI 1.64 to 4.37; p,0.001). A multilevel logistic regression model was used to adjust for the difference in severity at baseline and to account for any effect of cluster (ie, pharmacy), and found that patients in the intervention group were almost three times more likely to change from the ''severe'' category to the ''not severe'' category (''moderate'' or ''mild'') than patients in the control group (odds ratio (OR) 2.68, 95% CI 1.64 to 4.37; p,0.001). The intra-pharmacy correlation coefficient (i.e. cluster effect)

	was very small (–0.006). When a more conservative intention-to-treat approach was used, the results were similar (adjusted OR 2.42, 95% CI 1.51 to 3.88; p,0.001).
	Clinical outcomes as reported in the study • There were no significant changes in spirometric parameters over the course of the study in either percentage predicted FEV_1 (P value on difference of repeated measures p=0.14) or FEV_1/FVC (P value on difference of repeated measures p=0.71). • When compared with the control group, the PACP intervention resulted in an increase in the proportion of patients adherent to preventer medications (OR 1.89, 95% CI 1.08 to 3.30), an improvement in the risk of non-adherence to medications (indicated by a lower Brief Medication Questionnaire regimen score) (p=0.04) and a decrease in the mean daily dose of the reliever medication salbutamol (p=0.03). • The intervention also resulted in an increase in the proportion of patients using a combination of reliever and preventer medications with or without a long-acting b_2 agonist (OR 3.80, 95% CI 1.40 to 10.32) as opposed to a reliever only. • The proportion of intervention patients with correct inhaler technique increased significantly during the study (p,0.001), as did the proportion of patients with an asthma action plan (p,0.001). Inhaler technique and possession of an action plan were not measured in the control group. • Significant beneficial effects of the PACP intervention were seen in the Asthma Quality of Life score (p=0.05), Consumer Asthma Knowledge scores (p,0.01) and Perceived Control of Asthma score (p,0.01).
Source of funding	Australian Department of Health and Ageing
Comments	• The PACP included targeted counselling and education on the condition, medication and lifestyle issues (such as trigger factors); review of inhaler technique; adherence assessment; detection of drug-related problems; goal setting and review; and referral to a GP as appropriate (eg, for a change in medication or dose). • Intervention pharmacists were given an asthma education manual and were trained on risk assessment, pathophysiology of asthma, asthma medications, the NAC six-step asthma management plan, patient education, goal setting, adherence assessment, spirometry (by qualified respiratory scientists) and the PACP protocol during a 2-day workshop delivered by the research team. • There was a difference in asthma severity/control at baseline between the intervention and control group of patients. • Diagnosis of asthma and the main outcome measure of asthma severity/control was based on self-reported data.
Abbreviations: CI, confidence interval; NAC, National Asthma Council.	

Evidence table 36 Barker A et al, 2012

Bibliographic reference	Pharmacist directed home medication reviews in patients with chronic heart failure: a randomised clinical trial
Study type	RCT
Study quality	Low
Number of patients	n=120
Patient characteristics	Mean age of 72 years who had a hospital length of stay of at least 48hours on 4 or more medications and met the Framingham criteria.
Intervention	Pharmacist directed post-discharge home medication review

<table>
<tr><td>Comparison</td><td>Standard/usual care (generic pharmacist discussions with no direct pharmacy advice unless requested)</td></tr>
<tr><td>Length of follow up</td><td>6 months</td></tr>
<tr><td>Location</td><td>Australia</td></tr>
<tr><td>Outcomes measures and effect size</td><td>Death
No difference in death between intervention and usual care (1.41 (0.50-3.97) p=0.514).

No of days of all-cause and CHF hospitalisations in 6 month follow-up
<table>
<tr><th></th><th>Intervention N=61</th><th>Usual care N=53</th><th>IRR (95% CI)</th><th>P</th></tr>
<tr><td>Hospital readmissions, n</td><td>53</td><td>39</td><td>1.18 (0.78-1.79)</td><td>0.417</td></tr>
<tr><td>Heart failure, n</td><td>22</td><td>11</td><td>1.74 (0.85-3.60)</td><td>0.131</td></tr>
<tr><td>Other conditions, n</td><td>31</td><td>28</td><td>0.97 (0.58-1.91)</td><td>0.898</td></tr>
<tr><td>Hospital inpatient stay (days)</td><td>331</td><td>231</td><td>1.25 (1.06-1.48)</td><td>0.009</td></tr>
<tr><td>Heart failure (days)</td><td>204</td><td>76</td><td>2.34 (1.80-3.05)</td><td>0.000</td></tr>
<tr><td>Other conditions (days)</td><td>127</td><td>155</td><td>0.72 (0.57-0.90)</td><td>0.005</td></tr>
</table>
No significant difference between the intervention and the group that received usual care for the number of readmissions.

Significant increase in all-cause and heart failure related hospital inpatient days in the intervention group compared to the group that received usual care

Health related quality of life, AQoL
No significant difference in the AQoL utility domains (illness, independent living, social relationships, physical senses, physical well-being) between the intervention and usual care at baseline, 1 month follow-up and 6 months follow-up

Functional health and well-being using SF-36v2
• Baseline: no significant difference between the intervention and usual care on all 8 domains
• 1 month follow-up: intervention group had significant improvements on physical functioning compared to the group that had usual care. No other significant differences in other domains between the intervention and usual care.
• 6 months follow-up: intervention group had significant improvements on physical functioning and mental health compared to the group that had usual care. No other significant differences in other domains between the intervention and usual care.</td></tr>
<tr><td>Source of funding</td><td>Victorian Department of Human Services</td></tr>
</table>

Comments	• Intervention group more symptomatic with their heart failure than the group that received usual care • Higher frequencies of co-morbidities in intervention group • Small sample size • Less than 50% could speak English (interpretation issues for those who could not speak English) • Reviewed medicines for a specific condition

Abbreviations: SD, standard deviation; LVEF, left ventricular ejection fraction; NYHA , New York Heart Association; COPD , chronic obstructive pulmonary disease; AF, atrial fibrillation; PVD, peripheral vascular disease; USA, unstable angina; HT, hypertension; AMI, acute myocardial infarction; IRR, incident rate ratio; CI, confidence interval; CHF, congestive heart failure; AQol, assessment of quality of life; SF-36v2, standard medical outcomes study short form -36.

Evidence table 37: Bond CM et al, 2007

Bibliographic reference	A randomised controlled trial of the effects of note-based medication review by community pharmacists on prescribing of cardiovascular drugs in general practice
Study type	RCT
Study quality	Low
Number of patients	n=2014
Patient characteristics	Aged 65 years old or under receiving repeat medications indicative of target cardiovascular conditions (angina and hypertension).
Intervention	Pharmacists conducted a single review of the patient medical records, and recommended to the GP any changes for action using a referral form.
Comparison	No intervention, usual care.
Length of follow up	12 months
Location	Scotland
Outcomes measures and effect size	**Prescribing appropriateness** Results not clear in the study, the authors in the discussion report that prescribing indicators were generally high before the intervention indicating that current practice was already in line with guidelines.

Planned and unplanned contacts

Table showing angina subjects, 1 or more visit to a CVD-related outpatient department

Total number in groups	Pre-intervention		Post-intervention		Difference (95% CI) between proportions in control & intervention groups, in change between pre- & post-intervention
	Control N, (%)	Intervention N, (%)	Control N, (%)	Intervention N, (%)	
Control 325 Intervention 313	118 (36.3)	127 (40.6)	83 (25.5)	105 (33.5)	-0.037 (-0.075 to 0)

A greater proportion of the control group made fewer visits to an

outpatient department for CVD-related reasons after the intervention.

Table showing angina subjects, 1 or more CVD-related visit to GP surgery

Total number in groups	Pre-intervention Control N, (%)	Pre-intervention Intervention N, (%)	Post-intervention Control N, (%)	Post-intervention Intervention N, (%)	Difference (95% CI) between proportions in control & intervention groups, in change between pre- & post-intervention
Control 325 Intervention 313	273 (84.0)	258 (82.4	267(82.2)	258 (82.4)	-0.018 (-0.035 to -0.006)

A greater proportion of the control group made fewer visits to the GP surgery for CVD-related reasons after the intervention.

Table showing angina subjects, 1 or more CVD-related home visit

Total number in groups	Pre-intervention Control N, (%)	Pre-intervention Intervention N, (%)	Post-intervention Control N, (%)	Post-intervention Intervention N, (%)	Difference (95% CI) between proportions in control & intervention groups, in change between pre- & post-intervention
Control 325 Intervention 313	46 (14.2)	44 (14.1)	41 (12.6)	30 (9.6)	-0.029 (-0.007 to -0.054)

A greater proportion of the intervention group received fewer home visits for CVD-related reasons after the intervention.

Quality of life, QoL

There were no differences between the groups for any of the QoL measures used (Euroquol EQ-50, conditions specific questions either based on the Rose questionnaire for angina or questions for hypertension based on the Psychological General Well-being Index).

Compliance

A greater proportion of the intervention group were ordering anti-platelet drugs after the intervention (difference = 7.6%, 95% CI 1-7-13.8%).

Source of funding

Not specified

Comments

- Prescribing was assessed in the study by appropriateness of medication based on a range of criteria widely used in the UK for example use of anti-platelets post-myocardial infarction.
- Recommendations made by the pharmacist to the GP were not followed up and so no record of recommendations or if the GP accepted or rejected intervention.
- Due to late recruitment, full 12 month data not available for 2 practices, where this affected the results, data from the practices were excluded
- Target recruitment numbers for the angina patients were not achieved, thus reducing the power of the stud.

	• Three of the 23 pharmacists recruited to carry out the intervention had slightly modified individualised training to carry out the intervention. • Randomisation by patient within the practice may have resulted in contamination of the control group for example due to an increased awareness resulting from participating in the study as well as concurrent educational initiatives or other pharmacy input. • Medicines review did not involve face-to-face contact.
Abbreviations: CI, confidence intervals; CVD, cardiovascular disease; CHF, chronic heart failure.	

Evidence table 38: Bouvy ML et al, 2003

Bibliographic reference	Effect of a pharmacist-led intervention on diruretic compliance in heart failure patients: a randomised controlled study
Study type	RCT
Study quality	Low
Number of patients	n=152
Patient characteristics	Mean age ±SD in the study were: • intervention 69.1±10.2, • control 70±11.2. Only patients treated with loop diuretics were eligible for inclusion into the study.
Intervention	Pharmacist-led structured interview of the patient, a computerised medication history was used to discuss drug use, reasons for non-compliance such as possible adverse drug reaction and difficulties to integrate medication use in daily life – to reinforce medication compliance. Patients were contacted by the pharmacist on a monthly basis for 6 months.
Comparison	Usual care (no structured interview or monthly follow-up)
Length of follow up	6 months
Location	Netherlands
Outcomes measures and effect size	**Compliance** The intervention group was more compliant than the group that received usual care with their loop diuretics.
	Morbidity and mortality No significant difference between intervention group and the group that received usual care with death (RR p=0.6 [03-1.4]) or hospitalisation (I=32, C=42, p=0.4) or for heart failure (I=16, C=15, p=0.4). There were less total number of hospitalisations in the intervention group
	Disease specific QoL **Table showing QoL in patients with available questionnaires***

	Pharmacy-led intervention			Usual care			
	Baseline N=58	6 months N=40	Change[1] N=40	Baseline n=56	6 months N=30	Change[1] N=30	P value
COOP/WONCA	20.6±4.8	20.4±5.5	0.5±3.9	22.1±5.1	19.6±5.4	-2.5±6.4	0.03
MHFQ	40.1±21.6	33.8±22.3	-2.3± 14.1	49.9±23.4	35.9±21.4	-11±22.8	0.07
Physical domain	18.5±8.6	16.1±9.6	-0.6±5.7	22.4±9.7	16.9±9.6	-4.6± 10.4	0.07
Emotional domain	8.2±6.1	6.8±6.6	-1.1±3.8	9.3±7.2	7.2±6.5	-1.6±5.0	0.6

	*Lower scores on the questionnaires indicate better quality of life;mean and standard deviation of scores are given [1] change was only calculated for patients with questionnaires available at both baseline and 6 months. Disease specific quality of life improved in both the intervention and usual care groups. Improvement in the usual care group tended to be higher, although this difference was not statistically significant. Generic quality of life using COOP/WONCA, improved in the usual care group and worsened slightly in the intervention group.
Source of funding	Part funded by research grant from an independent non-profit foundation for the efficient use of medicines: Doelmatige Geneesmiddelenvoorziening Midden Nederland (DGMN)
Comments	• Compliance to the loop diuretics was measured by using a medicines container with a microchip that recorded the time and date of opening, MEMS. The intervention group and the control group (usual care) used the MEMS. • Non-compliance was expressed as the number of days without any loop diuretic when the prescription was at least once daily. When patients were told to temporarily use their diuretics intermittently, this was not considered as non-compliance. • A large proportion of patients (68%) also visited a specialised heart failure clinic to improve compliance with medication and diet. • Pharmacists in study could have had patients in both the intervention and usual care group. The authors are of the opinion that cross contamination will be limited because only 27% of participating pharmacists were dispensing for both intervention and usual care groups, residual contamination will only have diluted the effect of the intervention. • The use of MEMS itself in the usual care group may be seen as an intervention and might also have contributed to a higher compliance.

Abbreviations: NYHA, New York Heart Association; MEMS, medication event monitoring system; COOP/WONCA, Dartmouth Primary Care Cooperative Information Project/World Organisation of National Colleges, Academics and Academic Associations of General Practice/Family Physicians; MHFQ, Minnesota Heart Failure Questionnaire.

Evidence table 39: Bryant LJM, 2011

Bibliographic reference	The General Practitioner-Pharmacist Collaboration (GPPC) study: a randomised controlled trial of clinical medication reviews in community pharmacy
Study type	RCT
Study quality	Low
Number of patients	n=498
Patient characteristics	Patients were aged 65 years or older and on 5 or more prescribed medicines.
Intervention	Comprehensive pharmaceutical care (CPC) plan medication review addressed patient concerns and expectations, adherence issues, provision of lifestyle and pharmacological advice, and included a clinical assessment of medicines with recommendations, if required to the GP in a pharmaceutical care plan.
Comparison	Usual care with no intervention, however, after 6 months the control group received the CPC consultation and were followed for a further 6 months[1].
Length of follow up	12 months

Location	New Zealand
Outcomes measures and effect size	**MAI[2]** At baseline: no significant difference between the MAI score for the intervention group and the control group. At 6 months: both mean MAI scores had improved, but only the intervention group had improved significantly. The difference in the 6-month scores between the intervention and control groups was also significant. At 12 months: The MAI continued to improve in the intervention group by month 12, but this was not significant between months 6 and 12. For the control group after the CPC medication review, the MAI significantly improved. **Number of inappropriate medicines** From baseline to month 6 in the intervention group there was a significant reduction in the mean number of inappropriate medicines per patient. A reduction was also seen at 12 months. For the control group after the CPC intervention at month 6, there was a significant reduction in the mean number of inappropriate medicines per patient. **QoL** There was no significant difference for any of the SF-36 domains between baseline and 6 months for the intervention group. When the results were adjusted for clustering effect there were significant differences between the intervention and control group, favouring the control group for emotional (P=0.024) and social functioning (P=0.019).
Source of funding	Health Funding Authority of New Zealand (HFA) reimbursed GP time and incidental study costs Pharmaceutical Society of New Zealand funded printing costs of study forms and pamphlets
Comments	• Study also reported the following secondary outcomes: o change in the number of medicines used o number of changes to medicines therapy (for example stopped, started, switched, dose change) o number of recommendations made and implemented • The intervention group had a mean of 3.1 changes per patient and the control group had a mean of 1.8 changes per patient. Significantly more medicines were started in the control group than the intervention group. • Only 39% of the 44 pharmacists who agreed to participate in the study provided adequate data, which was a limitation of the study and indicated potential barriers to the generalizability of the study. • Authors also notes the use of the MAI as a surrogate endpoint as a limitation of the study • Use of SF-36 for measuring QoL for medicines-related issues may not be suitable as an effect may not been seen straight away with a change in medicine

[1] For a longitudinal comparison using the original control group compared with itself after a 6-month observation period, and a 6-month extension study for the original intervention group to investigate the sustainability of any intervention effect.
[2] MAI was used as a surrogate endpoint regarding the suitability of medicines.
[3] Note the intervention group received the CPC clinical medication review immediately. The control group received the CPC clinical medication review at 6 months.

Abbreviations; MAI, medication appropriateness index; QoL, quality of life; SF-36, standard medical

outcomes study short form -36.

Evidence table 40: Furniss L et al, 2000

<table>
<tr><td>Bibliographic reference</td><td>Effects of a pharmacist's medication review in nursing homes. Randomised controlled trial</td></tr>
<tr><td>Study type</td><td>RCT</td></tr>
<tr><td>Study quality</td><td>Low</td></tr>
<tr><td>Number of patients</td><td>n=330</td></tr>
<tr><td>Patient characteristics</td><td>Mean age of the nursing home residents included in the study were 78 years in the control group and 83 years in the intervention group.</td></tr>
<tr><td>Intervention</td><td>Medication review by pharmacist in the nursing home, GP surgery or under exceptional circumstances over the telephone.</td></tr>
<tr><td>Comparison</td><td>No medication review, usual care.</td></tr>
<tr><td>Length of follow up</td><td>8 months</td></tr>
<tr><td>Location</td><td>England</td></tr>
<tr><td>Outcomes measures and effect size</td><td>Mortality
Over the intervention phase, there were 14 deaths in the control homes compared with just 4 deaths in the intervention group homes. This difference was statistically significant (Mann-Whitney U-test: P=0.028)
Mean numbers of prescribed drugs
<table>
<tr><td></td><td>Time 0</td><td>Time 1 (4 months)</td><td>Time 2 (8 months)</td></tr>
<tr><td>Control</td><td>4.9</td><td>4.5</td><td>4.4</td></tr>
<tr><td>Intervention</td><td>5.1</td><td>5.1</td><td>4.2</td></tr>
<tr><td>Difference (95% CI)</td><td>-0.02 (-1.2 to1.2)</td><td>-0.3 (-0.06 to -0.04)[1]
P=0.03</td><td>0.5 (-0.04 to 1.0)[1]
P=0.07</td></tr>
<tr><td colspan="4">[1]Covariate adjusted for difference at baseline (Time 0)</td></tr>
</table>
Residents in both groups had a decrease in the mean number of drugs prescribed during the intervention phase. After adjustment for baseline differences, the reduction in the homes that had medication reviews was greater than the control group, but this difference was not statistically significant (P=0.070).
Health and social care utilisation
There was no formal statistical comparison between control and intervention group due to the small number of nursing homes included in the study (n=14).
Health and social care related quality of life using MMSE, GDS, BASDEC, CRBRS
The MMSE scores and the numbers of residents with scores below 23 did not change significantly over the study period, however there was a decline in the total MMSE scores for the intervention group.

No statistically significant changes were observed in the depression scores (GDS) during the study.

Means CRBRS scores increased in the intervention group relative to the control group and the difference between the groups became significant at 8 months. However the author noted that these changes could not be attributed to the intervention as the increase in impairment occurred before this.</td></tr>
<tr><td>Source of funding</td><td>North West NHS Executive</td></tr>
</table>

Comments	• Resident comorbidities not specified between the 2 groups
Abbreviations: SD, standard deviation; MMSE, Mini-Mental State Examination; GDS, Geriatric Depression Scale; BASDEC, Brief Assessment Schedule Depression Cards; CRBRSS, Crichton-Royal Behaviour rating scale; CI, confidence interval.	

Evidence table 41: Hay EM et al, 2006

Bibliographic reference	Effectiveness of community physiotherapy and enhanced pharmacy review for knee pain in people aged over 55 presenting to primary care: pragmatic randomised control trial
Study type	RCT
Study quality	Moderate
Number of patients	n=325
Patient characteristics	All adults aged 55 years and over who consulted their general practitioner with pain, stiffness, or both in one or both knees and who were able to give written, informed consent were invited to participate.
Intervention	Enhanced pharmacy review (pharmacological management in accordance with an algorithm to optimise medication) (also community physiotherapy-advice about activity and pacing and an individualised exercise programme was another intervention in the trial).
Comparison	Usual care
Length of follow up	12 months
Location	England
Outcomes measures and effect size	**Change in Western Ontario and McMaster Universities osteoarthritis index (WOMAC).** • At 3 months there was significant improvements in the WOMAC pain score in the pharmacy group when compared to the control group (p=0.006). • There was no statistically significant differences in mean WOMAC change scores in pain and function between the control group and pharmacy intervention at 6 and 12 months.
	Participants' global assessment of change compared with baseline (five point ordinal scale) More of the pharmacy group compared with the control group were classified as responders according to the OMERACT-OARSI criteria at each of the three follow-up points, but the difference was statistically significant only at 3 months (global p=0.0002, OMERACT-OARSI response p=0.04)
	Severity of pain over the previous seven days (0-10 numerical rating scale) At 3 months there was significant change in pain severity in the pharmacy group compared to control (p=0.04).
	Severity rating of patient nominated main functional problem over the previous three days (0-10 numerical rating scale) There was no significant difference between pharmacy group and the control group in the severity rating of the main problem at 3, 6 or 12 months.
	Participants' self-efficacy (arthritis self-efficacy scale) At 12 months there was significant change in arthritis self-efficacy pain scale in the pharmacy group compared to control (p=0.03).

	Psychological distress (hospital anxiety and depression scale) There was no significant difference between pharmacy group and the control group in the hospital anxiety and depression scale scores at 3, 6 or 12 months.
	Treatment usefulness and satisfaction • ~40% of the pharmacy group found the intervention useful for reducing pain at 3, 6 and 12 months • At 3 months the pharmacy group experienced a significant difference in the intervention being useful for helping to return to usual activity. • At 3 and 12 months the pharmacy group found the intervention useful for practical advice (p=0.002, p=0.002, respectively) • At 3 and 12 months the pharmacy group were satisfied with the intervention (p=0.006, p=0.01, respectively
Source of funding	Arthritis Research Campaign, North Staffordshire Primary Care Research Consortium, and the Department of Health National Co-ordinating Centre for Research Capacity Development. NEF is funded by a primary care career scientist award from the Department of Health and NHS R&D.
Comments	• One consistent finding was that the prescribing of NSAIDs was reduced in pharmacy group compared with control at 6 months (16% lower) with no increase in reporting of pain and high levels of patient satisfaction.
Abbreviations: OMERACT-OARSI , Outcome Measures in Rheumatology-Osteoarthritis Research Society International (initiative for defining clinically significant response); NSAIDS, non-steroidal anti-inflammatory drugs.	

Evidence table 42: Holland R et al, 2005

Bibliographic reference	Does home based medication review keep older people out of hospital? The HOMER randomised controlled trial
Study type	RCT
Study quality	Low
Number of patients	n=872
Patient characteristics	Aged 80 or over, prescribed 2 or more medicines on discharge.
Intervention	Home based medication reviews carried out by pharmacists
Comparison	Usual care
Length of follow up	6 months
Location	Discharge from acute or community hospitals in England.
Outcomes measures and effect size	**Total number of emergency admissions to hospital over 6 months** **Table showing number of emergency hospital readmissions during 6 month trial follow up** Group: Total admissions Intervention: 234 Control: 178 The Poisson model indicated 30% greater rate of readmission in the intervention group (rate ratio = 1.30, 95% confidence interval 1.07 to 1.58; P=0.009).
	Mortality

Fewer deaths occurred in the intervention group (49 vs 63). The hazard ratio for the intervention group compared with the control group was 0.75 (0.52 to 1.10; P=0.14).

Admission into care homes

Table showing number of admissions to care homes by group during 6 month trial follow up

	No (%) of events		±Difference in proportions, with 95% CI and P values
Admissions	Intervention N= 429*	Control N=426¥	
Total no admitted to residential home	21 (7.0)	17 (6.0)	1.0 (-3.1 to 5.5) P=0.61
Total no admitted to nursing home	16 (5.3)	15 (5.3)	0.001 (-3.8 to 3.8) P=0.97

*Data available for 300 intervention patients
¥ data available for 285 control patients
± intervention minus control

Fewer control patients than intervention patients were admitted to care homes, but these differences were not statistically significant.

QoL

Table showing mean EQ-50 scores and visual analogue health scale scores for groups at baseline, 3 months and 6 months follow up.

	Intervention group n=429		Control group n=426		±Difference in change over 6 months, with 95% CI and P values
Measure	Score (SD)	No of respondents	Score (SD)	No of respondents	
EQ-50					
Baseline	0.59 (0.29)	422	0.63 (0.28)	417	
3 months	0.47 (0.32)	320	0.48 (0.32)	325	
6 months	0.46 (0.33)	311	0.50 (0.31)	288	
Change over 6 months	-0.131 (0.33)	308	-0.137 (0.34)	284	0.006 (-0.048 to 0.059) P=0.84
Visual analogue health scale					
Baseline	62.2 (18.3)	404	62.3 (18.5)	406	
3 months	54.3 (19.5)	322	55.6 (20.1)	315	
6 months	54.9 (19.8)	303	58.8 (19.4)	275	
Change over 6 months	-7.36 (24.4)	284	-3.24 (23.0)	266	-4.12 (-8.09 to -0.15) P=0.042

± intervention minus control

In both groups scores decreased over the 6 month follow up period, but the changes were not significantly different between the groups. Scores on the visual analogue health scale were in favour of the control group which was statistically significant.

Source of funding	NHS Eastern Region R&D, Academic Pharmacy Practice Unit of

	University of East Anglia, Norfolk Health Authority, Norfolk Social services and Suffolk social services.
Comments	• Participants were told after randomisation which groups they were in. It was possible that a small number of participants in both groups may have had their medication reviewed during follow-up period by their GP or community pharmacist. • Follow up only 6 months
Abbreviations: SD, standard deviation; QoL, quality of life; CI, confidence interval.	

Evidence table 43: Holland R et al, 2007

Bibliographic reference	Effectiveness of visits from community pharmacists for patients with heart failure: heartMed randomised controlled trial
Study type	RCT
Study quality	High
Number of patients	n=293
Patient characteristics	Aged over 18 years, admitted as an emergency in which heart failure was an important ongoing clinical condition, and prescribed 2 or more medicines on discharge.
Intervention	Two home visits by one of 17 community pharmacists within two and eight weeks of discharge. Pharmacists reviewed drugs and gave symptom self-management and lifestyle advice.
Comparison	Usual care
Length of follow up	6 months
Location	England
Outcomes measures and effect size	**Total hospital readmissions at 6 months** A total of 112 emergency readmissions occurred in the control group and 134 in the intervention group). The Poisson model indicated a non-significant 15% increase in the intervention group's rate of readmission (rate ratio=1.15, 95% confidence interval 0.89 to 1.48; P=0.28). Including social class and use of a drug adherence aid in the model, as these differed between groups at baseline, decreased the rate ratio slightly (rate ratio=1.08, 0.83 to 1.40; P=0.59).
	Mortality Fewer deaths occurred in the control group than in the intervention group (24 vs 30). The hazard ratio comparing intervention and control groups was 1.18 (95% confidence interval 0.69 to 2.03; P=0.54).
	QoL No significant differences between the 2 groups in the EQ-5D scores, VAS health scale scores and the Minnesota living with heart failure questionnaires scores.
	Drug adherence and behaviour change Final adherence scores were marginally higher (better) in the intervention group (adjusted mean difference=0.12 units, −0.48 to 0.73 units; P=0.68). Heart failure behaviour scores improved in both groups, although the final scores were non-significantly lower (better) in the intervention group (adjusted mean difference=1.7 units, −4.9 to 1.5 units, P=0.29)
Source of funding	British Heart Foundation. Excess treatment costs were funded by Great Yarmouth and Southern Norfolk Primary Care Trusts. This trial received support for the educational training events from Pfizer UK.
Comments	• The two groups were similar at baseline, except that fewer intervention participants were from non-manual social classes (44% vs 55%) and

	intervention participants more often used some form of drug adherence aid (27% vs 16%). • Sample size calculations based on a normal approximation to the Poisson distribution indicated that the authors needed 306 patients to confer 80% power to show admissions reduction at the 5% significance level (two sided). Primary outcome data were available for 291 (99%) patients. • The authors did an unplanned post-hoc analysis on primary care activity (that is, all home visits, attendances at general practices, and phone calls). and found that the intervention led to a 17% increase in primary care activity (rate ratio=1.17, 95% CI 1.06 to 1.29; P=0.002).
Abbreviations: QoL, Quality of life; VAS, visual analogue scale; CI, confidence interval.	

Evidence table 44: Jamieson LH et al, 2010

Bibliographic reference	A randomised comparison of practice pharmacist-managed hypertension providing Level 3 Medication Review versus usual care in general practice
Study type	RCT, open cross-over trial
Study quality	Low
Number of patients	n=33
Patient characteristics	Patients had a diagnosis of hypertension, their blood pressure during the previous 2 months had been greater than 140/85mmHg and if they were receiving antihypertensive.
Intervention	Practice based pharmacist providing level 3 medication review to hypertensive patients
Comparison	Usual care – routine management by GP
Length of follow up	12 months (14 months study with 2 months recruitment)
Location	England
Outcomes measures and effect size	**Clinical outcomes, change in blood pressure** Medication review had a statistically significant beneficial effect on blood pressure (systolic: mean decrease of 12.4mmHg (95%CI:6.4, 18.5), p<0.001; diastolic: mean decrease of 10.7mmHg (95% CI:6.6, 14.8), p<0.001).
Source of funding	No funding received
Comments	• Two measurements were made at each consultation (mean of 2 measurements used) • Study population had mild hypertension • Other outcomes reported in the study included recommendations to prescribe low dose aspirin, 7 lipid lowering interventions, 2 NSAIDS stopped, an increase and decrease of thyroxine doses in 2 patients, an oral hypoglycaemic change and blood glucose level of 4 patients found to be high and referred to the GP of which 2 were subsequently diagnosed with type 2 diabetes.
Abbreviations: SD, standard deviation; CI, confidence intervals; NSAIDs, non-steroidal anti-inflammatory drugs.	

<Insert Note here>

Evidence table 45: Krska J et al, 2001

Bibliographic reference	Pharmacist-led medication review in patients over 65: a randomized, controlled trial in primary care
Study type	RCT
Study quality	Low

Number of patients	n=332
Patient characteristics	Aged at least 65 years with at least 2 chronic conditions.
Intervention	Pharmacist-led medication review
Comparison	Usual care
Length of follow up	3 months
Location	Scotland
Outcomes measures and effect size	**Pharmaceutical care issues (PCI)** **Table showing pharmaceutical care issues identified in 322 patients over 65 who were taking 4 or more medicines and their resolution 3 months after medication review**

	No. of pharmaceutical care issues				
	Intervention N=168		**Control N=164**		
Issue	Total (%)[a]	Resolved (%)[b]	Total (%)[a]	Resolved (%)[b]	P value
Potential/suspected ADR	300 (24.9)	253 (84.3)	327 (23.7)	189 (57.8)	<0.0001
Monitoring issues	185 (15.3)	175 (94.6)	199 (14.4)	156 (78.4)	<0.0001
Potential ineffective therapy	140 (11.6)	80 (57.1)	169 (12.3)	41 (24.3)	<0.0001
Education required	135 (11.2)	109 (80.7)	163 (1.8)	30 (18.4)	<0.0001
Inappropriate dosage regime	69 (5.7)	54 (78.3)	95 (6.5)	17 (17.9)	<0.0001
Potential/actual compliance	74 (6.2)	51 (68.9)	69 (5.0)	21 (30.4)	<0.0001
Untreated indication	66 (5.5)	44 (66.7)	69 (5.0)	19 (27.5)	<0.0001
Drug with no indication	59 (4.9)	32 (54.2)	80 (5.8)	15 (18.8)	<0.0001
Repeat px no longer required	55 (4.6)	53 (96.4	66 (4.7)	4 (5.9)	<0.0001
Inappropriate duration of therapy	43 (3.6)	31 (72.1)	64 (4.6)	25 (29.1)	<0.0001
Discrepancy between doses prescribed and used	28 (2.3)	27 (96.4)	33 (2.4)	1 (3.0)	<0.0001
Potential drug-disease interaction	18 (1.5)	13 (72.2)	17 (1.2)	8 (47.1)	0.1302
Others[c]	34 (2.8)	28 (82.3)	27 (2.0)	16 (59.2)	<0.05
Total	1206 (100)	950 (78.8)	1380 (100)	542 (39.3)	

[a] of all in group

[b] excludes issues partially or spontaneously resolved; % is total number of pharmaceutical care issues

[c] including out-of-date medicines use, duplication of therapy, cost issues and potential drug-drug interactions

Significantly more PCIs of virtually all types were resolved at 3-month follow up in the intervention group than in the control group. There were no differences between groups in either the number of PCIs which resolved spontaneously or in the number of new issues identified at

	follow.
	Health related QoL SF-36 questionnaire used to assess this outcome. There were no significant differences in any of the scores at baseline between the groups. None of the domains showed any significant changes in either group at follow up.
	Use of health and social services The numbers were too small for statistics to be meaningful. There was no differences in hospital clinic attendance, use of social services or contacts with district nurses and health visitors before and after medicine review.
Source of funding	Grampian Healthcare NHS trust
Comments	• The size of the study was not sufficient enough to demonstrate any clear effect of medication review on hospital admissions or the use of other health and social care services. • There were differences between the groups in both the number of PCIs and recent hospital admissions. These may have been related, since the higher number of recent hospital admissions in intervention group patients could have contributed to resolution of issues prior to the medication review.
Abbreviations: SD, standard deviation; CI, confidence intervals; ADR, adverse drug reaction; px, prescription; QoL, quality of life; SF-36, standard medical outcomes study short form -36.	

Evidence table 46: Lenaghan E et al, 2007

Bibliographic reference	Home-based medication review in a high risk elderly population in primary care--the POLYMED randomised controlled trial
Study type	RCT
Study quality	Low
Number of patients	n=136
Patient characteristics	Aged 80 years or over living in their own homes with polypharmacy.
Intervention	Home-based medication review by a pharmacist
Comparison	Standard care
Length of follow up	6 months
Location	England
Outcomes measures and effect size	**Total number of non-elective hospital admissions at 6 months** In total there were 21 unplanned admissions in the control group and 20 unplanned admissions in the intervention group. Statistical calculation revealed that there was a non-significant reduction in admission of 8% (relative risk = 0.92, 95% CI 0.50-1.70, P = 0.80)
	Deaths Data was available for 134 participants. No significant difference between the 2 groups (1.3% difference in proportions, CI -12.1 to 14.7%, P= 0.81)
	Admission to care homes There were fewer care home admissions in the intervention group compared to the control group (1 versus 3), but again, this result was non-significant (−3.0% difference in proportions, CI −11.0 to 5.0%, *P* = 0.30).
	QoL In both groups, the EQ-5d utility score decreased over 6 months follow-up. There was a small difference in the change in utility scores over 6 months in favour of the control group, but this was not statistically significant.

	Number of drug items prescribed The mean number of items prescribed to participants in the control group increased from 9.85 to 10.33 items over 6 months. In the intervention group, there was a reduction in the mean number of items from 9.01 to 8.68. The mean difference in the change in the number of items prescribed over 6 months was −0.87 items per patient per 6 months in favour of the intervention group, which was statistically significant (95% CI −1.66 to −0.08, *P* = 0.03).
Source of funding	NHS Executive Eastern Region research funding
Comments	• Data on hospital admissions were obtained from Hospital Episode Statistics (HES) • Participants completed an EQ-5d questionnaire by telephone at recruitment and at 6 months • Sample size calculation suggested that at a significance level and 80% power, approximately 164 subjects should be recruited in total.
Abbreviations: QoL, quality of life; CI, confidence interval.	

Evidence table 47: Mannheimer B, 2006

Bibliographic reference	Drug-related problems and pharmacotherapeutic advisory intervention at a medicine clinic.
Study type	RCT
Study quality	Low
Number of patients	N= 300
Patient characteristics	Mean age of 70 years taking at least 2 or more medicines.
Intervention	Nurse visited the patient for an interview on one occasion and completed the medical history with emphasis on medication and completed a questionnaire estimating symptoms together with the patient. Drug interactions were identified by a computer program designed to signal drug-drug interaction when the nurse entered the drugs into the computer. The nurse then met with a clinical pharmacologist to review the medication. (hospital-based medication review)
Comparison	Usual care
Length of follow up	6 months
Location	Sweden
Outcomes measures and effect size	**Frequency of drug related problems (DRPs) in the intervention group** • 33 clinically significant DRPs were found by the institutional caregivers from admission to the time of inclusion into the study. • Total of 299 DRPs among 71% (106/150) of the patients were found that had not been previously identified during normal care. • 35% (106/299) of the DRPs in the 39% of the patients (58/150) were judged to be important that written advice was given to the physician in charge. 63% of the time, the advice given was accepted by the physician in charge. Most common advice was ‘provide information’ (36/106), ‘withdraw drug’ (33/106), ‘reduce dose’ (20/106) and ‘change drug’ (13/106). **Rehospitalisation** The number of patients who were re-admitted to hospital one or more times was 40% (60/150) in the intervention group compared to 35% (53/150) in the control group (risk ratio: 1.11, 95% CI 0.87-1.41, p=0.40). **Deaths**

	The proportion of death in the intervention group was 19% (29/150) compare to 15% (22/150) in the control group (risk ratio:1.19, 95%CI :0.85-1.67, p=0.28)
Source of funding	Stockholm Soder hospital, Drugs and Therapeutics committee, South Catchment Area of Stockholm, and the Federation of County Councils, Stockholm County Council R&D department
Comments	• Important drug-related problems (DRPs) that had already been identified by the institutional caregivers from admission to time of inclusion, such a s bleeding associated with warfarin, were documented. • Calculations of significance not clear in paper
Abbreviations: CI, confidence interval.	

Evidence table 48: Mehuys E et al, 2008

Bibliographic reference	Effectiveness of pharmacist intervention for asthma control improvement.
Study type	RCT
Study quality	Moderate
Number of patients	n=201
Patient characteristics	Aged between 18–50 years being treated for asthma for longer than 12 months. Managing asthma with controller medication.
Intervention	Pharmacist-led medication and asthma review
Comparison	Usual care
Length of follow up	6 months
Location	Belgium
Outcomes measures and effect size	**Level of asthma control** Mean ACT scores did not change from baseline for both study groups . However, a pre-defined subgroup analysis of patients having insufficiently controlled asthma at baseline showed that the intervention had significantly increased the ACT score after 6 months compared with usual care (mean ACT change from baseline in the intervention group was +2.3 and +0.3 in the control group; mean difference (95%CI), 2.0 (0.1–3.9); p=0.038)
	Patient's peak expiratory flow (PEF) There was no significant differences within-subject or between-group for the PEF morning (p=0.703) and PEF evening values (p=0.430).
	Rescue medication use The need for rescue medication was reduced in both groups from baseline, with a significantly higher reduction in the intervention arm (-0.56 and -0.57 inhalations per day after 3- and 6-month follow-up, respectively) versus the control arm (-0.03 and -0.43 inhalations per day after 3- and 6-month follow-up, respectively; p=0.012).
	Night-time awakenings due to asthma Patients in the intervention group experienced less night-time awakenings due to asthma than patients in the control group (p=0.044). For this outcome measure, there was a significant interaction between study group and time (p=0.033). Post hoc analysis showed that the intervention group had significantly fewer nightly awakenings than the usual care group at 6-month follow-up (p=0.004), while there was no difference at 3-month follow-up (p=0.529).

	Inhalation technique • At baseline, the mean percentage of handling steps performed correctly was ~75% in both groups. At the end of follow-up, this percentage was significantly higher in the intervention arm (p=0.004). • The percentage of patients performing each of the inhalation manoeuvres correctly increased by 40% in the pharmacist care group and by 20% in the usual care group. The intervention was also able to correct all major inhalation technique errors, as 9.7% of the patients were assigned a sum score of zero before the intervention, a percentage reduced to 0.0% at the end of the intervention period. For patients receiving usual care, these percentages were 6.6% (at the start of the study) and 4.8% (at the end of the study).
	Adherence to controller medication Adherence to controller medication, was higher in the intervention group compared with the control group (mean adherence rate 90.3 versus 74.6%; p=0.016). However, there was no significant between-group difference in medication adherence as assessed by self-reporting (p=0.108).
	Severe exacerbations No differences between the control and intervention groups in the occurrence of severe exacerbations (Odds ratio [95%CI] p=0.158).
	Quality of life There was no significant difference in Asthma Quality of Life Questionnaire (AQLQ) score between both control and intervention group either at baseline or at the end of the follow-up period (p=0.128).
	Knowledge on asthma No beneficial effects of the intervention were seen in the asthma knowledge scores (p=0.133).
	Smoking behaviour • At the start of the study, 20 (21.3%) patients in the control group and 25 (23.4%) patients in the intervention group reported to be current smokers. • Of the smoking patients in the control group, 2 had quit smoking, 12 were still smoking and 6 were lost to follow-up after 6 months. • Of the smokers in the intervention group, 4 had quit smoking, 12 were still smoking and 9 were lost to follow-up after 6 months. No significant between-group differences were observed (p=0.501).
Source of funding	Unclear
Comments	• ACT (Dutch version) is a clinically validated measure for asthma control, consisting of five questions, each having five possible response modalities (classified by decreasing level of asthma control, scored from 5 to 1) • The effect of the intervention was probably underestimated, as newly diagnosed, steroid-naıve asthma patients were not included, but only patients who had already been taking chronic asthma medication for ≥1 yr. • Patients in the study may not be fully representative of the overall general population of asthma patients, since they participated voluntarily in the study.
Abbreviations: ACT , Asthma control test; CI, confidence interval.	

Evidence table 49: Planas LG et al, 2009

Bibliographic reference	Evaluation of a hypertension medication therapy management program in patients with diabetes.
Study type	RCT
Study quality	Low
Number of patients	n=52
Patient characteristics	Ages 18 years and over on antihypertensive therapy with blood pressure greater than 130/80mmHg.
Intervention	Pharmacist-led medication therapy management programme
Comparison	Usual care
Length of follow up	9 months
Location	USA
Outcomes measures and effect size	**Blood pressure** • Mean control group SBP level increased 2.75mmHg between baseline and 9 month visits. The mean intervention group SBP level decreased 17.32mmHg. This difference in SBP change between the control and intervention groups (20.05mmHg [95% CI 7.45-32.66]) was statistically significant (p=0.003). • The percentage of control group participants at blood pressure goal decreased from 20.0% to 6.67%, whereas the percentage of intervention group participants at goal increased from 16.0% to 48.0%. A statistically significant association was observed between being in the intervention group and being at goal blood pressure ($\chi 2$ = 7.301, p = 0.007). The odds of an intervention group participant achieving goal blood pressure were 12.92 times (95% CI 1.47–113.77) greater than that for a control group participant (p = 0.021).
	Antihypertensive medication adherence The mean adherence rate in the control group was 79.5% before the study and 78.8% during the study period. The mean adherence rate for the intervention group was 80.5% before the study and increased to 87.5% during the study period. Although the mean adherence rate in the intervention group increased 7% while remaining fairly constant in the control group, the difference was not statistically significant at the alpha 0.05 level (p= 0.0712).
Source of funding	American Pharmacists Association Foundation, the American Society of Health-System Pharmacists Foundation and USA drug stores.
Comments	• Small sample size and power • Limited generalizability to all managed care participants with hypertension and diabetes due to selection bias. • Asthma patients only

Evidence table 50: Schmader KE et al, 2004

Bibliographic reference	Effects of geriatric evaluation and management on adverse drug reactions and suboptimal prescribing in the frail elderly.
Study type	RCT
Study quality	Moderate
Number of patients	n=834
Patient characteristics	Aged 65 years or over hospitalised on a surgical or medical ward, had an expected length of stay of ≥3 days, and met criteria for frailty.

Intervention	The geriatric evaluation and management unit consists of core team with geriatrician, nurse, social worker and a pharmacist who reviewed the medication and made recommendations with regards to therapy in both outpatient clinic and inpatient ward setting.
Comparison	Usual care
Length of follow up	12 months
Location	USA
Outcomes measures and effect size	**Adverse drug reactions** • All drug reactions (minor and serious) were more frequently detected in the geriatric evaluation and management unit during the inpatient period (p=0.0001). • There were no significant effects on geriatric evaluation and management of any adverse drug reaction during the outpatient period. • The risk of serious adverse drug reactions after discharge was reduced by 35% in the geriatric evaluation and management clinic relative to usual outpatient care (p<0.05).
	Suboptimal prescribing • The geriatric evaluation and management unit was associated with significant reductions (P<0.05) in the number of unnecessary medicines, medication appropriateness index score, inappropriate drugs and number of conditions with omitted drugs during the inpatient period. • In the outpatient follow-up period there were no significant differences between the geriatric evaluation and management and usual inpatient care in the number of unnecessary medicines, medication appropriateness index score, inappropriate medicines and number of conditions with omitted medicines. • The number of inappropriate medicines increased slightly in the geriatric evaluation and management unit relative to usual care during the outpatient follow-up period (P<0.01). • There were no significant effects of geriatric evaluation and management on any of the suboptimal prescribing measures during the outpatient period, except for a reduction in the number of conditions with omitted medicines (p<0.001).
Source of funding	Grants from; Veterans Affairs Cooperative Study Program, national institute of Aging, National Institute of Allergies and Infectious diseases.
Comments	• Retrospective methods were used to help identify adverse drug reactions, which could have led to underestimation of the true rate of adverse drug reactions. • Study involved mostly men admitted to Veterans Affair hospital and so the study results may not be generalisable to women and other healthcare setting

Evidence table 51: Sellors J et al, 2003

Bibliographic reference	Community pharmacy based provision of pharmaceutical care to older patients.
Study type	Paired cluster RCT
Study quality	Moderate
Number of patients	n=889
Patient characteristics	Aged 65 years or over, taking 5 or more medicines.
Intervention	Structured medication assessment by the pharmacist

<table>
<tr><td>Comparison</td><td>Usual care</td></tr>
<tr><td>Length of follow up</td><td>5 months</td></tr>
<tr><td>Location</td><td>USA</td></tr>
<tr><td>Outcomes measures and effect size</td><td>Reduction in the daily units of medication taken (as a surrogate for optimized drug therapy)
After 5 months, the mean number of daily prescription and over-the-counter medication units was similar in the intervention and control groups (12.4 vs. 12.2, p = 0.50), as was the number of medications taken per day (8.0 vs. 7.9, p = 0.87).

Use of health services
Table showing mean healthcare use for the patient participant over the 5-month trial
<table>
<tr><td></td><td colspan="2">Mean no. of visits (and SE)*</td><td>P value</td></tr>
<tr><td>Healthcare resource</td><td>Intervention group</td><td>Control group</td><td></td></tr>
<tr><td>Physician visits</td><td>5.16 (0.27)</td><td>4.97 (0.29)</td><td>0.65</td></tr>
<tr><td>Clinic visits</td><td>0.29 (0.15)</td><td>0.31 (0.60)</td><td>0.40</td></tr>
<tr><td>Laboratory tests/imaging procedures</td><td>8.70 (0.58)</td><td>8.55 (0.09)</td><td>0.60</td></tr>
<tr><td>Surgical procedures</td><td>0.46 (0.20)</td><td>0.68 (0.34)</td><td>0.32</td></tr>
<tr><td>Emergency/urgent care visits and ambulance use</td><td>0.20 (0.03)</td><td>0.23 (0.03)</td><td>0.28</td></tr>
<tr><td>All admissions to hospital</td><td>0.14 (0.02)</td><td>0.11 (0.02)</td><td>0.77</td></tr>
<tr><td>Drug-related hospital stays</td><td>0.04 (0.01)</td><td>0.04 (0.01)</td><td>0.08</td></tr>
<tr><td>Other healthcare services/visits to health professionals</td><td>7.77 (1.15)</td><td>7.83 (1.29)</td><td>0.47</td></tr>
<tr><td>Time spent with pharmacists, min</td><td>72.82 (2.86)</td><td>0.00 (0.00)</td><td>-</td></tr>
<tr><td colspan="4">*unless stated otherwise</td></tr>
</table>
No significant difference between the 2 groups on the use of healthcare resources.

QoL
A decline in the mean scores for health-related quality of life was observed for the seniors in both groups for all of the subscales of the SF-36 quality-of-life survey from baseline to study exit, except for physical functioning in the control group, with no significant differences between the groups</td></tr>
<tr><td>Source of funding</td><td>Health Transition Fund, Health Canada, and in support from the Department of Family Medicine, McMaster University, and the Centre for Evaluation of Medicines, St. Joseph’s Healthcare, Hamilton, Ontario.</td></tr>
<tr><td>Comments</td><td>• A unit was defined as 1 tablet, 1 teaspoon, 1 drop (eye), 1 application of cream or ointment, or 1 dose of insulin.
• Information was gathered on the use of health services during the study period from the patients’ medical charts and from diaries completed by the patients for health services that would not normally be in the medical charts.
• The 2 patient groups had similar demographic and medical characteristics and daily medication use</td></tr>
</table>

	• Drug-related problems was not an outcome defined in the study but was reported. The most common drug-related problem identified was the presence of a condition or risk that was not being treated with a required drug. The average length of meeting with a physician, per patient, was 16.4 (SD 8.1) minutes. Physicians reported that they had learned something new as a result of 53.2% (176/331) of the pharmacist consultations. • Follow-up time was too brief to capture the impacts of improved drug therapy.
Abbreviations: QoL, quality of life; SD, standard deviation.	

Evidence table 52: Sjoberg C et al, 2013

Bibliographic reference	Effects of medication reviews performed by a physician on treatment with fracture-preventing and fall-risk-increasing drugs in older adults with hip fracture-a randomized controlled study
Study type	RCT
Study quality	Low
Number of patients	n=199
Patient characteristics	Aged 65 and over at the time of the fracture..
Intervention	Medication reviews, based on assessments of risks of falls and fractures, regarding fracture-preventing and fall-risk-increasing medicines, performed by a physician, conveyed orally and in written form to hospital physicians during the hospital stay, and to GPs after discharge.
Comparison	Usual care
Length of follow up	12 months
Location	Sweden.
Outcomes measures and effect size	**Changes in treatment with fracture-preventing and fall-risk-increasing medicines 12 months after discharge** • Fracture-preventing medicines At admission, 26% intervention and 29% control participants were being treated with fracture-preventing medicines. After 12 months there was a significant increase (p=0.01) of the use of fracture-preventing dmedicines in the intervention group to 77% and control group 58%. • Fall-risk-increasing medicines The mean±SD number of falls-risk-increasing medicines at admission was 3.1±2.2 in the intervention group and 3.1±1.9 in the control group (p=0.97). After 12 months, the corresponding figures 2.9±2.1 and 3.1±2.2 (p=0.62). No significant differences were seen in major groups of medicines (psychotropics, cardiovascular medicines, opioids, and other falls-risk-increasing medicines).
	Falls No significant differences were found between the groups with regard to falls (p=0.13 for individuals, p=0.18 for occasions
	Fractures No significant differences were found between the groups with regard to fractures (p=0.64 for individuals, p=0.71 for occasions)
	Deaths No significant differences were found between the groups with regard to deaths (p=0.19)

Source of funding	Swedish National Board of Health and Welfare
Comments	• Falls-risk-increasing medicines were identified according the indicators for appropriate treatment in the elderly provided by the Swedish National Board of Health and Welfare • Intervention identified under- and overtreatment with fracture-preventing medicines. • The study did not have the power to detect the differences from the small results relating to the fracture-risk-increasing medicines • Drug use by the participants may have been under- or overestimated as interviews were not conducted with the participant on medicines use. • Results only extractable to older population on fracture-preventing medicines.
Abbreviations: SD, standard deviation.	

Evidence table 53: Spinewine A et al, 2007

Bibliographic reference	Effect of a collaborative approach on the quality of prescribing for geriatric inpatients: a randomised controlled trial.
Study type	RCT
Study quality	High
Number of patients	n=203
Patient characteristics	The authors report no defined inclusion criteria apart from being aged 70 and over.
Intervention	Pharmaceutical care provided from admission to discharge by a specialist clinical pharmacist who had direct contact with the Geriatric Evaluation and Management (GEM) team and patients. (pharmaceutical care and GEM care)
Comparison	Usual care (GEM care)
Length of follow up	1 year
Location	Belgium
Outcomes measures and effect size	**Appropriateness of prescribing (on admission and discharge)** • Medication Appropriateness Index , MAI 60% of prescriptions for all patients included in the study (n=186) had at least one inappropriate rating at baseline Intervention patients were significantly more likely to have an improvement in their summated MAI score than were control patients (odds ratio (OR) = 9.1, 95% CI = 4.2-21.6). Intervention patients had highly significant improvements in MAI scores, as well as important improvements in the individual MAI criterion. • Medicines to avoid in older people (Beers criteria) Both control and intervention groups had similar improvement from admission to discharge (OR = 0.6, 95% CI = 0.3-1.1). For benzodiazepines-fall criteria, there was a higher absolute decrease in prescribing for intervention patients (difference between the groups not significant). This was secondary to an increase in new users in the control group (3.4% intervention patients, 12.7% of control patients, p=0.10), whereas discontinuation was similar in both groups (15.5% vs 15.9%). • ACOVE Criteria for underuse **Table showing improvements in seven underuse assessing care of vulnerable elders (ACOVE) criteria from admission to discharge.**

Underuse ACOVE criteria condition (no. of patients in the 3 groups with the condition of interest)			Improvement from admission to discharge* (%)		
	Drug	Patients with inappropriate rating on admission (%)	Historical control	Control	Intervention
Osteoporosis /fracture (84)	Biphosphonate, Calcium, vit D	90 (72.0)	32.0	48.7	86.0
Atrial Fibrillation (84)	Anticoagulant /aspirin	33 (39.2)	9.0	20.5	62.7
Ischemic heart disease (80)	Aspirin	34 (42.5)	40.0	39.6	77.7
Diabetes mellitus (57)	Aspirin	23 (40.4)	16.4	50.0	77.7
Heart failure (26)	ACEI	11 (42.3)	50.0	-200.0	66.7
Heart failure (26)	beta-blocker	18 (69.2)	-33.3	0.0	57.5
Myocardial infarction (26)	Beta-blocker	16 (61.5)	0.0	-14.1	100.0
*[(number of patients with inappropriate rating on admission) - (number of patients with inappropriate rating at discharge)] / number of patients with inappropriate rating on admission. Zero indicates no improvement; 100% indicates maximum improvement; negative values indicate deteriorate from admission to discharge.					

When controlling for the baseline level of underuse, intervention patients were six times as likely as control patients to have at least one improvement (OR = 6.1, 95%=CI 2.2-17.0)

Unnecessary medicines use (patients who received an inappropriate rating for indication, efficacy, or therapeutic duplication with MAI)

At least one unnecessary medicine was prescribed to 84.4% of control and intervention patients in admission. At discharge, unnecessary medicine use was still detected in 77.8% of control patients, in contrast to 37.5% of intervention patients.

Death rate

12 months after discharge, the rate of death was lower in the intervention group than in the control group (22.5% of intervention vs 30.1% of control, p=0.30). Difference not statistically significant.

Emergency visits

12 months after discharge, the rate of emergency visits was lower in the intervention group than in the control group (7.9% of intervention vs 12.0% of control, p=0.45). Difference not statistically significant.

Readmissions

The readmission rates were similar, 32.6% for intervention vs 33.7% for control, p=1.0). Difference not statistically significant.

Patient satisfaction with information received

One month after discharge, satisfaction with information received on medicines was higher in the intervention group (80.0% of intervention vs 60.9% of control were satisfied, p=0.10). Difference not statistically significant.

Source of funding	National Institutes of Health, Grants
Comments	• Pharmaceutical care involves the process through which a pharmacist cooperates with a patient and other professionals in designing, implementing, and monitoring a therapeutic plan that will produce specific therapeutic outcomes for the patient. • The study was not powered to detect the persistence of improvements after discharge, however, a trend toward higher maintenance rates was detected in the intervention group for 2 criteria: Beers drugs (improvement maintained in 94% of intervention vs 86% of control cases) and benzodiazepines in patients with previous fall (86% vs 56%, respectively). The differences were not significant.
Abbreviations: MAI, medication appropriateness index; CI, confidence intervals; ACOVE. assessing care of vulnerable elders criteria.	

Evidence table 54: Sturgess IK et al, 2003

Bibliographic reference	Community pharmacy based provision of pharmaceutical care to older patients.
Study type	RCT
Study quality	Low
Number of patients	n=191
Patient characteristics	Community dwelling elderly patients: • ≥65 years • Taking 4 or more medications • Regular visitors to the participating pharmacy • Orientated to self, time and place were eligible for recruitment.
Intervention	Pharmacy intervention involved education on medical condition, compliance strategies, drug rationalisation, and appropriate monitoring
Comparison	Normal pharmacy services
Length of follow up	18 months
Location	Northern Ireland
and Outcomes measures and effect size	**Health-related QoL** The intervention group results demonstrated a decline in patients QoL over the 18 months, whereas the control patients appeared to be significantly improved in some of the SF-36 dimenesions (Mann-Whitney; p<0.05).
	Number of hospitalisations During the study a lower proportion of intervention patients reported one or more hospitalisations compared to control patients (30.9% and 36.7% respectively), however, the difference was not significant (chi squared; p>0.05). Overall fewer intervention patients were hospitalised during the study than in the 18 months before the study compared to control patients. These differences were not statistically significant (p>0.05; chi squared).
	Sign and symptom control In response to a question relating to control of medical conditions, a significant proportion of intervention patients agreed that they controlled their medical condition better during the study than before participation in the study (6 month 87.8%, 12 months 85.1%, 18 months 83.1%)
	Patient knowledge of medicines During the study there was little change in the summary measure scores (AUC) in both intervention and control groups compared to those scores

obtained at baseline (+3.82±9.82, +4.65±11.62 respectively; independent t-test; p>0.05).

Number of changes in medicines

Table showing number of changes in medicines

	Baseline		6 months		12 months		18 months	
	I	C	I	C	I	C	I	C
No. of changes in medication mean±SD	0.74± 1.10	0.53± 1.05	-1.07[a] ±1.47	0.59± 1.18	1.21[a]± 1.45	0.17± 0.50	0.88[a]± 1.18	0.12± 0.42

[a] significant difference between control and intervention patients (Mann-Whitney test; p<0.05)
I – intervention, C - control

There were significantly more changes to medications in the intervention group at 6, 12 and 18 months. Longitudinal analysis indicated that intervention patients were taking significantly more prescribed medicines at 6, 12 and 18 months compared to baseline (Wilcoxon test; p,0.05), whilst that of the control group remained constant.

Problems with medicines

Table showing number of medicines related problems reported by patients

	Baseline		6 months		12 months		18 months	
	I	C	I	C	I	C	I	C
No. of problems with medicines mean±SD	1.12± 1.43	1.05± 1.38	0.82 ±1.24	1.13± 1.40	0.60± 1.13	0.83± 1.40	0.90[a]± 1.27	2.09± 2.38

[a] significant difference between control and intervention patients (Mann-Whitney test; p<0.05)
I – intervention, C – control

There were no significant differences (p>0.05) between control and intervention patients during the first 12 months of the study. In the last 6 months of the study, the intervention patients reported significantly fewer problems with their medicines compared to control patients.

Compliance

Table showing self-reported compliance and refill compliance rate

	Baseline		6 months		12 months		18 months	
	I	C	I	C	I	C	I	C
Self-reported compliance % of patient complaint	37.6	32.0	34.5	29.4	40.4	24.4	47.3	14.7
Refill compliance rate % of patient compliant	30.2	29.7	46.2	19.1	40.4	25.0	40.0	40.6

I – intervention, C – control

Significantly higher proportion of intervention patients were compliant with their medicines at 12 and 18 months (chi-squared; p<0.05) compared to the control patients (from the self-reported questionnaire).

The authors also reported that an analysis of change in compliance (change in compliance compared to that reported at baseline) had been carried out that significantly showed a higher proportion of intervention patients changed from non-compliant to compliant compared to control.

Refill compliance rate was calculated from patients medical records and showed that significantly higher proportion of intervention patients were

compliant with their medicines at 6 months compared to the control group (chi-squared; p = 0.02). Analysis of change shows no significant difference.

Number of contacts with healthcare professionals

Intervention patients reported higher numbers of contacts with their GP during the first (0-6) and second (7-12) six month periods than control patients (Independent t-test; p<0.05)

Intervention patients reported more contact with a specialist during the second (7-12) and third (13-18) six-monthly periods compared to control patients (Independent t-test;p<0.05)

Patient satisfaction

- Approx. 80% reported that they thought the intervention was better than the service received prior to the intervention (6 months 81.5%, 12 months 80% and 18 months 84.7%)
- 68.1% of intervention patients said that they now readily approach their pharmacist with questions about their medicines.
- 88% and 73.5% of intervention patients agreed that they were satisfied with the advice received about medicines and medical conditions respectively.
- 64.7% of the intervention patients agreed that they had a better relationship with their pharmacist as a result of the study.

Types of patient problems identified during the study

Table showing types of problems identified

Problem identified	No. of problems	% of problems
Need for additional therapy	23	11.3
Unnecessary drug	3	1.5
Wrong/inappropriate drug	9	4.4
Wrong/inappropriate dose	9	4.4
Adverse drug reaction	23	11.3
Poor compliance	115	56.4
Drugs out of date	3	1.5
Lifestyle issues	6	2.9
Other	13	6.4

Source of funding	Unclear
Comments	• Potential impact of the intervention may have been negated as patients recruited into the study were often those who already have existing relationships with the pharmacist.

Abbreviations: QoL, quality of life; SF-36, short study form-36.

Evidence table 55: Sorensen L et al, 2004

Bibliographic reference	Medication reviews in the community: results of a randomized, controlled effectiveness trial.
Study type	RCT
Study quality	Very low
Number of patients	n=400 (302 completed the trial)

Patient characteristics	Patients were eligible to participate in the trial if they satisfied one or more of the following 10 inclusion criteria: • on five or more regular medications • taking 12 or more doses of medication per day; • suffer from three or more medical conditions; • suspected by GPs to be non-adherent with their treatment regimen; • on medicines(s) with a narrow therapeutic index or requiring therapeutic monitoring; • had significant changes made to their medicines regimen in the previous 3 months; • had signs or symptoms suggestive of possible medicines-induced problems; • had an inadequate response to treatment; • admitted to hospital in the preceding 4 weeks • at risk in managing their own medications due to language difficulties, • dexterity problems or impaired sight.
Intervention	The multidisciplinary service model consisted of GP education, patient home visits, pharmacist medication reviews, primary healthcare team conferences, GP implementation of action plans in consultation with patients, and follow-up surgery visits for monitoring.
Comparison	No pharmacist based medication review, usual care
Length of follow up	6 months
Location	Australia
Outcomes measures and effect size	**QoL (SF-36)** The SF-36 was measured at baseline and at the end of the trial, and there were no differences in the scores between the intervention and control patients for the PCS and the MCS at baseline.
	Severity of illness Although the larger reduction of DUSOI-A for intervention patients was not statistically significant, the trend suggests that the intervention may have had a positive effect on severity of illness.
	Reporting of medicines-related problems After adjusting for baseline differences, intervention patients were less likely (although not statistically significant) to report medicines-related ADEs than controls at the end of the trial.
	Hospital admissions and unplanned and planned contacts There were no differences between intervention and control patients in baseline and endpoint measures for number of hospital admissions, number of non-admission hospital services and number of GP visits. No apparent differences were found in the cumulative number of bed-days between the intervention and control.groups.
	Satisfaction The view of the majority (92%) of intervention GPs was that the model had improved the care of the participating patients; 94% of participating pharmacists found the model useful. From the patient viewpoint, most reported benefiting from participation in the trial – only three (2.9%) of the intervention patients (5.8% of the control patients) felt they had not benefited from participation in the trial.
Source of funding	Commonwealth government of Australia
Comments	• Accredited pharmacist used to carry out medication reviews.

	Accredited pharmacists specialize in medication management (and carry out equivalent functions to clinical pharmacists in many settings) and are defined as such through accreditation by the Australian Association of Consultant Pharmacy (AACP) by a process involving short courses or previous documented training in clinical pharmacy, followed by an open-book case-based examination. • DUSOI-A – used to measure patients health, 10cm visual analogue scale 0 = low severity of illness and 100 = high severity of illness. • Short follow-up of 6 months due to time constraints • Intervention GPs may have selected patients they expected to benefit from the medication review, while control GPs may have selected patients less ill. • Collecting complete datasets from both the intervention and control groups was a limitation of this study. Consistent with a lesser evaluation burden for the control group, more control patients than intervention patients completed the trial and more complete datasets from patients and GPs were available for control group patients.
Abbreviations: MCS, mental component score; PCS, physical component score; CI, confidence interval; DUSOI-A, Dukes Severity of Illness Visual Analogue scale; QoL, quality of life.	

Evidence table 56: Taylor et al, 2003

Bibliographic reference	Improving primary care in rural Alabama with a pharmacy initiative.
Study type	RCT
Study quality	Low
Number of patients	n=69
Patient characteristics	Adult patients (18 years or older) who received care at the participating clinics and were identified as being at high risk for medicines-related adverse events were enrolled. High risk was defined as presence of three or more of the following risk factors: • five or more medicines in the drug regimen, • Twleve or more doses per day, • four or more medicine changes in the previous year, • three or more concurrent diseases, • a history of non-compliance to medicines and • the presence of medicines requiring therapeutic monitoring.
Intervention	Standard medical care plus pharmaceutical care that included medication review. A patient typically met with a pharmacist for 20 minutes before seeing a physician. The intervention was based on the principles of pharmaceutical care, a uniform process for preventing or identifying and resolving problems related to drug therapy.
Comparison	Standard medical care
Length of follow up	12 months
Location	USA
Outcomes measures and effect size	**Clinical outcomes as reported in the study** **Blood pressure**: At 12 months, intervention-group patients were significantly more likely than control patients to have targeted blood pressures. Furthermore, there was a significant increase from baseline in the percentage of patients at goal in the intervention group. **Diabetes mellitus:** The percentage of patients achieving the therapeutic goal increased from 23.1% to 100.0% in the intervention group during the 12-month period but decreased in the control group. The percentage

of patients meeting the goal at 12 months was significantly higher in the intervention group than in the control group.

Dyslipidemia: The intervention group had an improvement in LDL cholesterol at 12 months, while the percentage of patients in the control group meeting LDL cholesterol goals actually declined.

Anticoagulation: At 12 months, all patients in the intervention group had INRs within the targeted range, but only 25% of control patients did.

QoL

No significant differences in health-related quality-of life scores were observed between the groups at baseline or at 12 months. The intervention group's score improved in each category, but not significantly.

Patient satisfaction

Table showing patient satisfaction with pharmaceutical care

	Intervention (n=33)	Control (n=36)	p
Mean ± S.D. of no. of patients With pharmacy-related satisfaction (%)	81.9±4.8	89±6.2	0.000

Authors noted no differences between the 2 groups with patient-related satisfaction to pharmaceutical care.

Compliance

Table showing compliance data

	Intervention (n=33)	Control (n=36)	p
Mean ± S.D. patients who were compliant (%[a])	100	88.9±6.3	0.115
Mean ± S.D. medication knowledge score (%)	92.6±3.4	42.9±12.8	0.000

[a] Percentage of patients with compliance scores of 80–100%.

The percentage of patients with medication compliance scores of 80–100% increased by 15% in the intervention group. Compliance in the control group did not change from baseline. However, compliance scores did not differ significantly between the groups at baseline or at 12 months. The most frequently cited reasons for non-compliance were forgetting to take medications (*n* = 10), medication costs (*n* = 10), having too many medicines to take (*n* = 9), difficulty reading or understanding directions of medicines (*n* = 4), and considering taking medicines too much trouble (*n* = 4).

Mean medicines knowledge scores in the intervention group were 36% higher at 12 months. In contrast, the control group had a knowledge score reduction of 15% ($p < 0.0001$).

	Hospitalisations and emergency department visits The number of hospitalisations and ED visits decreased in the intervention group while remaining constant in the control group compared with the year preceding enrolment. Eleven hospitalisations were reported for the control group in the year prior to the study, compared with 24 in the intervention group. During the study year, the control group had 11 hospitalisations, and the intervention group had 2 (p = 0.003). The number of ED visits remained constant in the control group at 6 and decreased in the intervention group from 18 in the year before the study to 4 during the study (*p* = 0.044).
	Prescribing appropriateness and medicines misadventures The percentage of inappropriate prescriptions decreased in all 10 MAI domains in the intervention group and increased in 5 domains in the control group. The domains in which prescribing was most frequently inappropriate were dosage, correctness of directions, practicality of directions, and expense. Of the seven patients reporting medicines misadventures, four were in the intervention group and three were in the control group (p=0.731). A variety of minor ADRs were reported, including anxiety, confusion, cough, wheezing, swelling, and rash. No severe medicines misadventures were reported.
Source of funding	Unclear
Comments	• The hospitalisation and ED result should be interpreted cautiously, since the investigators did not identify whether hospitalisations and ED visits were due to a complication or to poor control of disease. • The study could not control for possible cofounders. For example, blood pressure readings were not taken by the same person with the same sphygmomanometer throughout the study. In addition, it was not documented whether abnormal values for blood pressure, glucose, lipids, or INR corresponded to a confounding circumstance, such as an infection. • Small sample size and short follow-up
Abbreviations: LDL, low density lipids; INR, international normalised ratio; ADRs, adverse drug reactions.	

Evidence table 57: Community pharmacy medicines management project evaluation team. 2007

Bibliographic reference	The MEDMAN study: a randomised controlled trial of community pharmacy-led medicines management for patients with coronary heart disease.
Study type	RCT
Study quality	Moderate
Number of patients	n=1493
Patient characteristics	Aged over 17 years with CHD (previous myocardial infarction, angina, coronary artery bypass graft and/or angioplasty)..
Intervention	Pharmacist consultations included assessments of the following: therapy, compliance to medicines, lifestyle (e.g. smoking cessation, exercise and diet) and social support (e.g. difficulties in collecting prescriptions and opening bottles) for CHD patients.
Comparison	Usual care in general practice

Length of follow up	12 months
Location	England
Outcomes measures and effect size	**Proportion of patients receiving secondary prevention treatment for CHD in accordance with the NSF (2000)** • No statistically significant change in NSF recommended treatment for the secondary prevention of CHD, or future risk of cardiovascular death in the 2 groups. • There were no significant differences in lifestyle factors between the groups at baseline or at follow- up. A higher percentage of data regarding lifestyle was available at follow-up in both groups (because of better supply of information at follow-up by patients) compared with baseline. The global score for appropriateness of treatment was not significantly different between groups.
	Health status There were no significant differences between groups in individual SF-36 domains or in overall EQ-5D score between the 2 groups.
	5-year risk of cardiovascular death The 5-year risk of cardiovascular death score at baseline could be calculated for 964 (66.5%) patients. Apparent benefits in the intervention group at follow-up did not reach statistical significance.
	Patient satisfaction In the intervention group, statistically significant improvements ($p < 0.01$) were found in the single computed satisfaction score for patients' most recent pharmacy visit for prescription medicines compared with control patients.
	Compliance At baseline, the median score for compliance for the intervention and control groups was high at 59 (IQR 56–60) and was little changed at follow-up (p=0.99).
Source of funding	Department of Health for England and Wales
Comments	• 5-year risk of cardiovascular death based on an existing score modified to allow for the absence of data on history of stroke and creatinine concentration. • This community pharmacist-led intervention did not significantly improve NSF-defined management of CHD. • Patients appeared to have a high compliance with medication taking, reducing the potential for improvements in care • Limited to CHD patients • Study was underpowered
Abbreviations: CHD, coronary heart disease; IQR, interquartile range.	

Evidence table 58: Villeneuve J et al, 2010

Bibliographic reference	A cluster randomised controlled trial to evaluate an ambulatory primary care management program for patients with dyslipidaemia: the TEAM study.
Study type	Cluster RCT
Study quality	Low
Number of patients	n=205
Patient characteristics	Aged at least 18 years and a candidate (on the basis of laboratory

	results within the previous three months) for initiation of 3-hydroxy-3-methyl-glutaryl-coenzyme A reductase inhibitor (statin) monotherapy or already receiving statin monotherapy with inadequate control, where inadequate control was defined[8] as LDL cholesterolm2.5 mmol/L or higher and ratio of total cholesterol to high density lipoprotein (HDL) cholesterol 4.0 or higher for high risk patients (10-year risk for coronary artery disease ε 20%) or LDL cholesterol 3.5 mmol/L or higher and ratio of total cholesterol to HDL cholesterol 5.0 or higher for moderate risk patients (10-year risk for coronary artery disease 11%– 19%).
Intervention	Under the collaborative care model, pharmacists counselled patients about their medications, requested laboratory tests, monitored the effectiveness and safety of medications and patients' adherence to therapy, and adjusted medication dosages.
Comparison	Usual care
Length of follow up	12 months
Location	Canada
Outcomes measures and effect size	**Change in LDL cholesterol level** • At baseline, patients in the collaborative care group had higher LDL cholesterol (3.5 vs. 3.2 mmol/L, p= 0.05) and total cholesterol (5.7 vs. 5.4 mmol/L, p= 0.01). • At 12 months, patients in the collaborative care group had an additional reduction of 0.2 mmol/L in LDL cholesterol (95% CI –0.3 to –0.1) relative to patients in the usual care group. However, the adjusted difference was not statistically significant (–0.05 mmol/L, 95% CI –0.3 to 0.2).
	Proportion of patients achieving their target lipid levels At 12 months, 87 (81%) of the patients in the collaborative care group and 86 (74%) of those in the usual care group had reached their target lipid levels (crude RR 1.10, 95% CI 0.95 to 1.26), as defined by the 2003 Canadian guidelines. After adjustment for baseline LDL cholesterol, patients in the collaborative care group were significantly more likely to reach their targets (RR 1.16, 95% CI 1.01 to 1.34).
	Changes in other risk factors for cardiovascular disease after 12 months of follow-up. At 12 months, the changes in other risk factors for cardiovascular disease did not differ between the two groups.
	Use of lipid therapy Patients in the collaborative care group were less likely to have a prescription for a high-potency statin at baseline (RR 0.28, 95% CI 0.16 to 0.50) and were more likely to remain on a low potency statin at 12 months (RR 1.61, 95% CI 1.23 to 2.12)
	Health resource use The mean number of visits to a physician did not differ between groups. Patients receiving collaborative care had fewer laboratory tests requested by physicians. On average, patients receiving collaborative care had 3.1 pharmacist visits, equivalent to 64 (SD 18) minutes of consultation, over a mean of 6.6 months (SD 0.3). Pharmacists requested a mean of 2.1 (SD 1.1) lipid panels and 2.0 (SD 1.1) liver-enzyme tests for these patients.
Source of funding	Canadian Institutes of Health Research and unrestricted research grants from AstraZeneca Canada Inc., Merck Frosst Canada Ltd. and Pfizer Canada Inc.
Comments	• The lack of clinical effect may have been due to the recruitment of patients with modestly elevated LDL cholesterol.
Abbreviations: LDL, low density lipids; CI, confidence interval; RR, relative risk; SD, standard	

deviation.

Evidence table 59: Vinks T H et al, 2009

Bibliographic reference	Pharmacist-based medication review reduces potential drug-related problems in the elderly: the SMOG controlled trial.
Study type	RCT
Study quality	Low
Number of patients	n=196
Patient characteristics	Aged 65 years or over and using 6 or more medications.
Intervention	Medication review by the pharmacist
Comparison	Usual care
Length of follow up	4 months
Location	Netherlands
Outcomes measures and effect size	**Change in the number of potential drug related problems (DRPs)** There was a significant reduction in the mean number of potential DRPs between the intervention and control groups from baseline to endpoint (mean difference -16.3%; 95% CI -24.3 to – 8.3). The reduction in potential DRPs in the patient group with CDS score 8-9 was most pronounced (mean difference -23.7%; 95%CI -38.3 to -9.1).
	Change in the number of medicines No significant reduction in the number of medicines was seen in any patient group.
Source of funding	Partly financed by educational grant from the Dutch Albert Bakker Foundation.
Comments	• Drug related problems were identified and validated by reference to national prescribing guidelines such as the Practice Standards of Dutch GPs as well as therapeutic handbooks. • The enrolled participants health status was measured using the chronic disease score (CDS) to assess the complexity of the medicine regimen as well as the number of different chronic disease the patient has. After the study had been completed, patients in the intervention and control groups were split into 3 categories based on their CDS scores (CDS 0-7, CDs 8-9 and CDS ≥10, the higher the score, the more complex the regimen). • Types of identified DRP were not included in reported outcomes, but included in the results of the paper and discussed as the study was not initially powered to analyse this data by DRP classification which was only possible after post-hoc splitting of the CDS groups. The authors had found that more prescriber- and patient-related DRP interventions had been accepted and implemented than had drug-related DRP interventions (the difference was only slight).

Abbreviations: CI, confidence intervals.

Evidence table 60: Zermansky AG et al, 2001

Bibliographic reference	Randomised controlled trial of clinical medication review by a pharmacist of elderly patients receiving repeat prescriptions in general practice
Study type	RCT
Study quality	Moderate
Number of patients	n=1188
Patient characteristics	Aged 65 years or over who were receiving at least one repeat prescription and living in the community.

Intervention	Pharmacist-led medication review
Comparison	Normal care from GP and primary healthcare staff
Length of follow up	12 months
Location	England
Outcomes measures and effect size	**No. of changes to repeat prescriptions over 1 year** The mean number of changes per patient was 2.2 in the intervention group and 1.9 in the control group (difference = 0.31, 95% confidence interval 0.06 to 0.57; p= 0.02). Table above shows the numbers of patients who had at least one change to their treatment during the study. More patients in the control group than the intervention group started taking a new medicine. There was no clear difference in the number of other changes.
	Use of health services There was no evidence of any adverse health outcome in the intervention group as measured by need for consultation with a general practitioner or hospital treatment.
Source of funding	The Health Foundation
Comments	• The number of deaths was 15 (2.5%) in the intervention group and 25 (4.3%) in the control group (odds ratio = 0.56, 0.29 to 1.1). The study did not specify deaths as a secondary outcome, as the study was not powered to detect a difference in mortality. • The small scale of this trial, involving only four practices in one city and just one pharmacist, limits the generalisability of the results.

Evidence table 61: Zermansky AG et al, 2006

Bibliographic reference	Clinical medication review by a pharmacist of elderly people living in care homes--randomised controlled trial
Study type	RCT
Study quality	Moderate
Number of patients	n=661
Patient characteristics	Residents in care homes aged 65 years or over taking one or more repeat medicines.
Intervention	Clinical medication review conducted by a pharmacist
Comparison	Usual care (no CMR)
Length of follow up	6 months
Location	England
Outcomes measures and effect size	**Number of changes in medicines per participant** **Table showing no of changes in medication**

	Intervention (n=331)	Control (n=330)	Difference (RR 95% CI)	P-value
No. of drug changes*, mean in 6 months (SD)	3.1 (2.7)	2.4 (2.6)	1.34 (1.21 to 1.48)	<0.0001
***adjusted for care home type random effect				

	The number of changes to medicines in the intervention group was significantly greater than that in the control group. Changes included stopping medicines (13.4%), altering medicines (4%), starting medicines (10.2%) and monitoring (21.6%).
	Outcomes as reported in the study **Table showing clinical outcomes**

	Baseline data		Outcomes			
	Intervention (n=331)	Control (n=330)	Intervention	Control	Difference (RR 95% CI)	P-value
Barthel [mean (SD)] Change in mean	10.0 (6.3)	10.1 (6.1)	9.8 (6.1) -0.3	9.3 (6.2) -0.8	0.46 (-0.02 to 0.94)[a]	0.06
SMMSE [mean(SD)] Change in mean	13.8 (10.0)	13.1 (10.0)	13.9 (10.0) +0.1	13.8 (10.6) +0.7	-0.24 (-1.18 to 0.70)[a]	0.62
GP consultations[b], mean (SD)	3.2 (2.8)	3.2 (2.8)	2.9 (2.8)	2.8 (2.8)	1.03 (0.93 to 1.15)	0.50
Falls[b] mean per patient in 6 months (SD)	1.0 (1.7)	0.9 (1.7)	0.8 (1.7)	1.3 (3.1)	0.59 (0.49 to 0.70)	<0.0001
Patients falling[b] in 6 months (%)	145 (43.8)	128 (38.8)	84 (25.7)	107 (32.1)	0.73 (0.50 to 1.06)[c]	0.09
Hospitalisations [b] in 6 months/patient (SD)	0.23 (0.52)	0.23 (0.57)	0.20 (0.48)	0.26 (0.61)	0.75 (0.52 to 1.07)	0.11
Patients hospitalised [b] in 6 months, no. (%)	61 (18.3)	62 (18.7)	47 (14.2)	52 (15.8)	0.89 (0.56 to 1.41)[c]	0.62
Deaths, no. (%)	-	-	51 (15.3)	48 (14.5)	0.89 (0.56 to 1.41)[c]	0.81

[a] mean difference (95% CI)

[b] adjusted for care home type random effect

[c] difference odds ratio (95% CI)

Falls: There was a large and significant reduction in the fall number of falls in the intervention group.

Mortality: There was no statistically significant difference in mortality between the 2 groups.

Hospital admissions: The lower rate of hospitalisation in the intervention patients did not reach statistical significance.

No. of GP consultations: There was no significant difference in GP consultation rate between the 2 groups

Barthel Index: There was no statistically significant difference in the Barthel score between the 2 groups.

SMMSE: There was no statistically significant difference in the SMMSE score between the 2 groups.

Source of funding	The Health Foundation
Comments	• The following medication outcomes were also reported as secondary outcomes: no. of repeat medicines per participant; cost of 28 days of repeat medicines per participant at end date; recorded medication

	reviews in the study period. There was no significant difference in the number of medicines or cost per patient. • Barthel Activities of Daily Living Index to assess physical functioning. • Number of subjects recruited was less than the original target • Short duration of the project with one medication review per patient.
Abbreviations: CMR, clinical medication review; SMMSE, Standardised Mini-Mental State; SD, standard deviation; RR, relative risk.	

D.1.5 Self-management plans

Evidence table 62: Agrawal S K et al, 2005

Bibliographic reference	Efficacy of an individualized written home-management plan in the control of moderate persistent asthma: a randomized, controlled trial
Study type	RCT
Study quality	Low
Number of patients	n=68
Patient characteristics	Children aged 5-12 years old with physician diagnosed moderate persistent Asthma classified as per National Heart Lung and Blood institute (NHLBI) guidelines. All children were on a treatment protocol receiving a moderate dose of inhaled corticosteroids with the option of using inhaled beta-2 agonist when required.
Intervention	Individualised action plans (home-management plan) consisted of written guidelines for the home management of asthma based on the assessment of asthma severity or peak expiratory flow rate depicted in a colour-coded chart. At the time of enrolment all included patients and parents were provided with education consisting of basic information about asthma and its causes, aggravating factors, purpose and effects of asthma therapy, and the principles of home monitoring and self-management of asthma. Training on peak expiratory flow rate and maintaining an asthma symptom diary was provided.
Comparison	No home-management plan (usual care)
Length of follow up	1 year
Location	India
Outcomes measures and effect size	Table below summarises the outcomes Data is presented as mean (standard deviation) per subject

Outcomes	Intervention (n=32)	Control (n=28)	p
Acute asthma event	0.50 (0.71)	1.0 (0.61)	0.02
School days missed	1.5 (1.4)	2.54 (1.79)	0.015
Nocturnal awakening	1.75 (1.30)	3.25 (1.20)	0.001
Symptom score	21.9 (14.4)	33.7 (10.9)	0.0006

Source of funding	Unclear
Comments	-

Evidence table 63: Christenson TD et al, 2006

Bibliographic reference	Self-management versus conventional management of oral anticoagulant therapy: A randomized controlled trial.
Study type	RCT
Study quality	Low
Number of patients	n=100
Patient characteristics	Enrolled patients met the following criteria: • on oral anticoagulation for at least 8 months • age 18 years and over • able to self-manage
Intervention	Patients used a coagulometer once a week to test their INR which was then recorded onto a sheet and dosage of warfarin or phenprocoumon adjusted as trained (not clear in the study if a protocol was used).
Comparison	Usual care by physician or hospital anticoagulation clinics
Length of follow up	6 months
Location	Denmark
Outcomes measures and effect size	**Variance of INR (median, 95% CI) using intention to treat analysis** Self-management: 0.16 (-17.9 to 57.8) Usual care: 0.24 (0.15 to 0.41) P=0.09 **Variance of INR (median, 95% CI) using per-protocol analysis** Self-management: 0.16 (0.10 to 0.20) Usual care: 0.24 (0.15 to 0.41) P= 0.003 **Time within therapeutic INR range, (median. 95% CI)** Self-management: 78.7 % (69.2% to 81%) Usual care: 68.9% (59.3% to 78.2%) P= 0.14
Source of funding	The Danish Heart Foundation and other Danish Funds.
Comments	• The self-management group reported their INR values and coumarin doses to the training centre every 3rd month
Abbreviations: INR, international normalised ratio	

Evidence table 64: Cromcheecke ME et al, 2000

Bibliographic reference	Oral anticoagulation self-management and management by a specialist anticoagulation clinic: A randomised cross-over comparison
Study type	Randomised cross-over comparison study
Study quality	Moderate
Number of patients	n=50
Patient characteristics	The study enrolled consecutive outpatients, mean age 42 years, who were receiving long-term anticoagulation (phenprocoumon or acenocumarol).
Intervention	The intervention group used home self-testing using Coaguchek® to self-monitor prothrombin time and self-dosing testing performed once a week (self-management).
Comparison	The conventional management was done by the anticoagulation clinic (usual care). After three months patients crossed over the alternative management strategy.
Length of follow up	Duration of the study 3 months.

Location	Departments of cardiology and internal medicine of the Academic Medical Centre (Amsterdam)
Outcomes measures and effect size	**Number of INR measurements within 0.5 INR units from target INR** In the self-management group, patients were within a range of ±0.5 from the therapeutic target for 55% of the treatment period. In the anticoagulation clinic management group, patients were within a range of ±0.5 from the therapeutic target for 49% of the treatment period, p=0.06.
	Number of patients within target INR range for more than 75% of the time Self-management group: 13 (27%) Usual care: 6 (12%) Odds ratio 2.5 (1.0–6.7)
	Better control of anticoagulation (period of time in therapeutic target range) The odds ratio for better control of anticoagulation during self-management compared with anticoagulation clinic management was 4.6 (95% CI 2.1–10.2)
	Adverse events Bleeding: No major bleeding was seen in either groups, however, 3 minor bleeds were observed in the anticoagulation clinic managed group compared with 1 minor bleed in the self-managed group. Thrombosis: One episode of clinically suspected recurrent venous thrombosis episode was observed in the anticoagulation clinic managed group, no episodes were observed in the self-management group
	Patient-satisfaction There were significant differences in all 5 categories of the questionnaire in favour of the self-management group. Scores for general treatment satisfaction and self-efficacy were higher in the self-management group, whereas the score for daily anxieties, distress and strain were significantly lower.
Source of funding	Unclear
Comments	• A patient satisfaction assessment showed superiority of self-management of anticoagulation over conventional care.
Abbreviations: INR, international normalised ratio; CI, confidence intervals.	

Evidence table 65: Ducharme FM et al, 2011

Bibliographic reference	Written action plan (WAP-P) in paediatric emergency room improves asthma prescribing, adherence, and control
Study type	RCT
Study quality	Low
Number of patients	n=219
Patient characteristics	Children aged 1–17 years old, had a clinical diagnosis of asthma defined as two or more wheezing episodes, were treated with at least one albuterol nebulization, were discharged with albuterol and fluticasone delivered by metered-dose inhalers.
Intervention	The intervention consisted of the treating emergency department physician recording management instructions on a written action plan with prescription (WAP-P) or usual prescription. The dosage and duration of therapy, verbal instructions, and recommendations for medical follow-up or asthma education were left to the discretion of the emergency physicians, who received no specific guidance. Patients on daily fluticasone as per a prior action plan were

	recommended to continue usage. A written action plan was designed for asthma attacks coupled with a prescription (WAP-P), specifically to record discharge instructions after the acute-care visit. The written action plan included the following: • management of the acute exacerbation • initiation of both long-term controller medicines and non-pharmacologic management • key messages, such as asthma chronicity • validated paediatric self-assessment asthma control tool. The WAP-P was available in triplicate, it included the prescription, chart copy, and patient's take-home plan; allowed simultaneous writing of all documents; and encouraged the pharmacist in reinforcing the plan.
Comparison	Usual care with prescription
Length of follow up	28 days
Location	Canada
Outcomes measures and effect size	**Patient adherence to fluticasone over 28 days after discharge** <u>1-14 Days after randomisation</u> Unadjusted analysis: no significant group difference seen at day 14 Adjusted analysis: significantly favours WAP-P = 73% (n=104), UP = 68% (107) Mean group difference = 7% (95% CI, 1%, 15%) <u>15—28 Days after randomisation</u> Unadjusted analysis: significantly favours WAP-P, mean group difference 16.13% (95% CI, 2.09, 29.91) Adjusted analysis: significantly favours WAP-P, mean group difference 20.04% (95% CI, 6.05, 34.02) In multivariate or subgroup analyses, there was no apparent impact of prior ownership of an action plan, prior use of daily inhaled corticosteroids and age on adherence to fluticasone.
	Medical follow-up visits • within 28 days when recommended: RR 1.17 (0.76, 1.80) • within 90 days (post hoc analysis) when recommended : RR 1.30 (0.87, 1.95)
	Unscheduled acute care visits Patients with ≥ 1 acute care visits: RR 1.27 (0.52, 3.10)
	Rescue beta-2 agonists use over last 14 days Patients with albuterol use ≤2 doses/week (15-28 days): RR 0.92 (0.73, 1.15)
	Asthma control (Measured Asthma Quiz for Kidz, a validated questionnaire measuring the number of indicators of poor asthma control. A score of 0 is best, 6 is worst, and 2 is defined as the cut-off for poor control.) Patients with asthma quiz score <2: RR 1.36 (1.04, 1.86)
	QoL of the child and caregivers Caregiver: MD 0.19 (-0.20, 0.58) measured on the Juniper's 13-item Paediatric Asthma Caregiver's Quality of Life Questionnaire on a scale of 1 (worst) to 7 (best) Child: MD 0.26 (-0.15, 0.68), measured by the validated 23-item Paediatric Asthma Quality of Life Questionnaire on a scale of 1 (worst) to 7 (best)

Source of funding	Grant support from Merck and Co., USA, Nycomed, Canada, Merck Frosst, Canada GlaxoSmithKline, Canada, Canadian Institutes of Health Research, Canadian Foundation for innovation the Childhood Asthma Foundation, AllerGen NCE Inc. (Canada) and the Re´seau que´be´cois de l'enseignement sur l'asthme (MPOC).
Comments	-

Evidence table 66: Fitzmaurice DA et al, 2002

Bibliographic reference	A randomised controlled trial of patient self-management of oral anticoagulation treatment compared with primary care management
Study type	RCT
Study quality	Moderate
Number of patients	n=56
Patient characteristics	The study enrolled ambulatory patients (most receiving warfarin for atrial fibrillation). Mean age 63 years self-management mean age 69 years control group.
Intervention	The intervention group used self-testing and self-dosing using Coaguchek® device to self-monitor INR. Testing was performed every 2 weeks or after 1 week following dosage adjustment. Oral anticoagulant used: warfarin.
Comparison	Conventional management group received routine care in practice clinics
Length of follow up	6 months
Location	Six general practices in the west Midlands using the Birmingham model of anticoagulation management (United Kingdom)
Outcomes measures and effect size	**Percentage of time in INR range (95% CI)** Self-management group (n=23): 74 (67-81) Usual care (n=26): 77 (67-86) No significant difference (p values not given in study)
	Percentage of tests in INR range (95% CI) Self-management group (n=23): 66 (61-71) Usual care (n=26): 72 (65-80) No significant difference (p values not given in study)
	Haemorrhage (minor and serious adverse events) There were no serious adverse events in the self-management group, with one fatal retroperitoneal haemorrhage in the usual care group.
	Quality of life Five common themes emerged from the patient self-management interviews: knowledge and management of condition and self-empowerment, increased anxiety and obsession with health, self-efficacy, relationship with health professionals, and societal and economic cost. No significant difference in quality of life was found between the two groups.
Source of funding	Roche Diagnostics UK
Comments	• Self-management group attended two 1-2 hours workshops. Workshops were based within individual practices, were organised by research staff and attended by practice staff • A random sample of patients (eight self-management and eight usual care) were given a semi-structured interview covering relevant themes generated from a series of focus groups. Material was pooled to elicit questions relevant to patients' experience in the study. • Questions from a validated questionnaire regarding warfarin treatment

	were also used, in addition to the SEIQoL tool for quality of life estimation. • Self-management patients were provided with a clinical report form (CRF) to record INR results, warfarin dose, adverse events, advice received, and number of test strips used.
Abbreviations: INR, international normailsed ratio; SEIQo, schedule for the evaluation of individual quality of life.	

Evidence table 67: Fitzmaurice DA et al, 2005

Bibliographic reference	Self-management of oral anticoagulation: randomised trial
Study type	RCT
Study quality	Moderate
Number of patients	n=616
Patient characteristics	The study enrolled ambulatory patients, mean age 69 years, who were receiving long-term anticoagulation (warfarin).
Intervention	The patient self-monitoring (PSM) group used home self-testing using Coaguchek® managed anticoagulation for 12 months, testing INR very two weeks (one week after a dose change). Adjusted dosage by using a laminated dosing schedule. Intervention patients were reviewed at a practice based clinic every three months to assess progress and to do external quality assessment procedures.
Comparison	The control group used hospital or practice based anticoagulant clinics (routine care, RC)
Length of follow up	12 months
Location	The study was based in primary care centres within Midlands Research Consortium (United Kingdom)
Outcomes measures and effect size	**Percentage of time spent within the therapeutic range**

Percentage of time (95% confidence interval) within therapeutic range for international normalised ratio and number of patient years

	Pre-study	Study	Change	Patient years
PSM total (n=337)	68 (64.3 to 70.7)	70 (68.1 to 72.4)	2.50 (−0.64 to 5.65)	318
RC (n=280)	69 (65.2 to 72.1)	68 (65.2 to 70.6)	−0.69 (−4.35 to 2.96)	264

In the intention to treat analysis, there were no significant differences in mean percentage of time within therapeutic range for INR between pre-study and study periods in either the PSM arm (t_{320} = 1.57, p = 0.12) or the routine care arm (t_{255} = − 0.37, P = 0.71).

INR control based on mean percentage of time within the therapeutic range during the study did not differ significantly between the PSM and routine care groups (70% v 68%; t_{575} = 1.35, p = 0.18).

Major and minor haemorrhage

There were 582.1 patient years of follow-up for the intention to treat analysis.

PSM arm: overall incidence of serious adverse events was 2.8/100 patient years (nine events)

Routine care: overall incidence of serious adverse events was 2.7/100 patient years (seven events)

The overall rate of serious bleeding was 1.5/100 patient years (1.6

<table>
<tr><td></td><td>PSM vs 1.5 routine care)

Thromboembolism
The overall rate of serious thrombosis was 1.2/100 patient years (1.3 PSM vs 1.1 routine care)

Treatment-related quality of life, TRQoL and anxiety (outcome reported in another paper (see comments)
Table showing TRQoL and anxiety scores
<table>
<tr><th></th><th colspan="3">Mean change in scores end of study–baseline</th></tr>
<tr><th></th><th>Change in PSM (p-value)</th><th>Change in RC (p-value)</th><th>Comparison P-value for PSM vs RC</th></tr>
<tr><td>Self-efficacy (n= PSM 192, RC 154)</td><td>1.67 (<0.001)</td><td>0.43 (0.34)</td><td>0.01</td></tr>
<tr><td>Daily hassles (n= PSM 182, RC 142)</td><td>-1.12 (0.022)</td><td>-0.63 (0.19)</td><td>0.79</td></tr>
<tr><td>Strained social network (n=PSM 198, RC 159)</td><td>0.04 (0.93)</td><td>1.55 (0.001)</td><td>0.08</td></tr>
<tr><td>Psychological distress (n=PSM 197, RC 154)</td><td>0.34 (0.41)</td><td>1.36 (0.003)</td><td>0.14</td></tr>
<tr><td>Anxiety (n= PSM 199, RC 151)</td><td>0.80 (0.29)</td><td>0.61 (0.54)</td><td>0.88</td></tr>
<tr><td>Treatment satisfaction (n=PSM 202, RC 161)</td><td>0.08 (0.78)</td><td>-0.29 (0.38)</td><td>0.84</td></tr>
</table>

PSM demonstrated greater improvement in self-efficacy than RC across the study period.</td></tr>
<tr><td>Source of funding</td><td>UK Medical Research Council</td></tr>
<tr><td>Comments</td><td>• McCahon D et al, 'Does self-management of oral anticoagulation therapy improve quality of life and anxiety?'
• Trained anticoagulation nurses gave intervention patients training at the practice.
• Not clear in the study if INR and doses adjustments were recorded. In the UK, patients on oral anticoagulant therapy have an oral anticoagulant therapy booklet to record INR and doses.</td></tr>
<tr><td colspan="2">Abbreviations: INR, international normalised ration; PSM, patient self-management; RC, routine care.</td></tr>
</table>

Evidence table 68: Grunau BE et al, 2011

Bibliographic reference	Patient self-management of warfarin therapy: Pragmatic feasibility study in Canadian primary care
Study type	Open label randomised cross over trial
Study quality	Low
Number of patients	n=11
Patient characteristics	Patients enrolled met the following inclusion criteria: • age older than 18 years • warfarin therapy preceded the study for more than 3 months and expected to continue therapy during the study period • compliance to medicines • ability to use nomograms to adjust doses.
Intervention	The intervention group was instructed to monitor their serum

	international normalized ratio (INR) at community laboratories and to adjust their warfarin doses independently using provided nomograms. Education on warfarin dose adjustment was limited to a single 15-minute office visit.
Comparison	Usual care with anticoagulation clinics
Length of follow up	8 months (4 months cross over)
Location	Canada
Outcomes measures and effect size	**Proportion of INR values in the therapeutic range** There was a non-significant mean difference of 2.2% (95% confidence interval 19.1 to 23.6) favouring PSM (P = 0 .82), with values for PSM and usual care of 82.4% and 80.2%, respectively.
	The number of days in the therapeutic range Non-significant difference was also found comparing the number of days in therapeutic range per patient using PSM and usual care (P =0.76), with results of 82.2% and 79.7%, respectively.
	Secondary outcomes • Ten patients (91%) identified preference for PSM and were invited to continue with this strategy. One patient (9%) elected to continue with physician management (P =0.001). • There were no statistical differences in any of the categories of the quality-of-life survey when comparing PSM with usual care. • No additional office visits or phone support were required to assist patients in PSM. • There were no thromboembolic complications. • One episode of self-limited bleeding, defined as minor, occurred in 1 patient during the PSM phase.
Source of funding	Not clear
Comments	• A PSM binder given to each patient included a simple instruction page, a progress chart, and warfarin dose adjustment nomograms for 5 different doses.
Abbreviations: PSM, Patient self-management.	

Evidence table 69: Guerci B et al, 2003

Bibliographic reference	Self-monitoring of blood glucose significantly improves metabolic control in patients with type 2 diabetes mellitus: the auto-surveillance intervention active (ASIA) study
Study type	Open-label randomised prospective controlled trial
Study quality	Low
Number of patients	n=689
Patient characteristics	Patients were aged 40–75 years, with a diagnosis of type 2 diabetes more than 1 year ago and with standardised HbA_{1c} level ≥ 7.5mmol/L.
Intervention	In addition to the conventional laboratory workup, patients self-monitored their blood glucose using Ascencia Espirit discmeter device. These patients received specific initial training given by their general practitioner at the initial inclusion visit and were required to perform at least 6 capillary assays a week.
Comparison	Patients received a conventional laboratory work-up based solely on laboratory measurement of HbA_{1c} every 12 weeks, according to recommendations of the Agence Nationale d'Accréditation et d'Evaluation des Soins (ANAES).
Length of follow up	6 months

Location	France, primary care
Outcomes measures and effect size	**HbA1c level at endpoint** At endpoint, HbA_{1c} level was lower in the SMBG group, MD±SD (8.1 ± 1.6%) than in traditional assessment group (8.4 ± 1.4%)(P = 0.012). Significant improvement in the SMBG group. An improvement of HbA1c between baseline and endpoint was shown in 52.0% of patients (57.1% in the SMBG group and 46.8% in the conventional assessment group) and stability or worsening was found in 48% of patients (42.9% in the SMBG group and 53.2% in the conventional assessment group) (P = 0.007). At 3 months, 50.3% of patients in the SMBG group showed an improvement in HbA1c level vs 41.6% in the conventional assessment group (P = 0.026).
	Hypoglycaemic events 78 patients reported at least one episode of hypoglycaemia (symptomatic or asymptomatic) during the study; that was 53 (10.4%) patients in the SMBG group and 25 (5.2%) patients in traditional assessment group. These proportions statistically different (P = 0.003) due to the difference between groups solely for asymptomatic hypoglycaemia (P = 0.001)
	Changes in prescription of antidiabetic treatments and other treatments The percentage of patients taking an antidiabetic treatment increased during the study, whatever the treatment used, but no statistical difference between groups was found (figures not reported).
	Mean change in blood pressure, MD±SD SBP between the inclusion and endpoint was – 1.20 ± 11.4 mmHg in the SMBG group vs. – 2.72 ± 12.03 mmHg in the conventional group. Mean change in DBP between the inclusion and endpoint was – 0.62 ± 7.71mmHg in the SMBG group vs – 1.00 ± 7.89 mmHg in the conventional group. No difference was found between the groups.
Source of funding	Unclear
Comments	• Guidelines for self-adjustment of diet and low blood glucose values were given.
Abbreviations: SMBG, self-monitoring blood glucose; SBP, systolic blood pressure; DBP , diastolic blood pressure.	

Evidence table 70: McGeoch et al, 2006

Bibliographic reference	Self-management plans in the primary care of patients with chronic obstructive pulmonary disease (COPD)
Study type	Prospective, unblended randomised controlled trial
Study quality	Moderate
Number of patients	n=159
Patient characteristics	Included patients met the following criteria: • Had COPD according to the American Thoracic Society criteria (history of cough, sputum, shortness of breath with a background of tobacco smoking) • FEV_1/FVC <70% (spirometry with 12 months) • Symptoms at least weekly • History of one or more exacerbations in the previous 12 months requiring an increase in therapy
Intervention	The intervention group received usual care and education on the use of a self-management plan. The plan and structured education included methods of early recognition of exacerbations and a range of

	appropriate self-initiated interventions including antibiotics and short-oral course of corticosteroids. In addition, patients were instructed to make early contact with their general practice during exacerbations.
Comparison	Usual care with no access to self-management plans
Length of follow up	12 months
Location	New Zealand, primary care
Outcomes measures and effect size	**Health related QoL using St Georges Respiratory Questionnaire (SGRQ)** Table showing changes in outcomes measures from baseline for the intervention and control groups at 12 months

	Intervention, n=84	Control, n=70	P-value
SGRQ symptoms, mean (SE)	7.8 (2.2)	5.5 (2.7)	0.52
SGRQ activity mean (SE)	-1.1 (1.8)	0.92 (2.3)	0.47
SGRQ impacts mean (SE)	2.1 (1.6)	-1.2 (1.7)	0.17
SGRQ total mean (SE)	1.7 (1.6)	0.43 (1.6)	0.58

Scores for SGRQ ranged from 0-100, with higher scores indicating more limitations. Scores for HADS ranged from 0-21.

Positive sign indicates improvement, negative sign indicates deterioration.

No significant difference shown between both groups for health related QoL

Health utilisation

Table showing changes in outcome measures from baseline for the intervention and control groups at 12 months

	Intervention, n=84	Control, n=70	P-value
ED attendances	11%	15%	0.46
Hospital admissions	8%	9%	0.91
GP visits	42%	38%	0.67
Antibiotic courses	57%	52%	0.49
Steroid courses	7%	6%	1.00

No significant difference shown between both groups for healthcare utilisation

Hospital related anxiety and depression

	Intervention, n=84	Control, n=70	P-value
HADS anxiety mean (SE)	0.15 (0.7)	0.01 (0.3)	0.87
HADS depression mean (SE)	0.29 (0.29)	0.04 (0.32)	0.57

Positive sign indicates improvement, negative sign indicates deterioration.

No significant difference shown between both groups for HADS.

COPD self-management interview (COPD-SMI)

Table showing mean scores for intervention and control group

	Intervention, n=84	Control, n=70	P-value
SMI well knowledge	23.9	22.8	0.001
SMI well actions	22.5	22.0	0.187
SMI early exacerbation knowledge	20.6	18.8	0.001

	SMI early exacerbation actions	19.5	17.2	0.001
	SMI severe exacerbation knowledge	17.2	14.7	0.002
	SMI severe exacerbation actions	21.9	20.4	0.005
	Maximum score for each domain is 26. Higher scores for the intervention group compared with controls in all 3 situations indicate better self-management knowledge and capacity to act (actions) for all stages of COPD action plan at 12 months.			
Source of funding	Pegasus Health, The Canterbury Respiratory Research Trust, Asthma and Respiratory Foundation of New Zealand			
Comments	• The study was not powered to detect small differences in emergency department attendances, hospital admissions, GP visits, antibiotic courses and steroid courses.			
Abbreviations: FEV_1, forced expiratory volume in 1 second; FVC, forced vital capacity; QoL, quality of life; HADS, hospital anxiety and depression scale; ED, emergency department.				

Evidence table 71: McManus RJ et al, 2010

Bibliographic reference	Telemonitoring and self-management in the control of hypertension (TASMINH2): A randomised controlled trial
Study type	RCT
Study quality	Moderate
Number of patients	n=527
Patient characteristics	Included patients met the following criteria: • aged 35-85 years old • receiving treatment for hypertension with 2 or fewer antihypertensive medicines • baseline blood pressure more than 140/90mmHg • willing to monitor their own blood pressure and self-titrate medicines
Intervention	Patients were invited to 2 training sessions run by the research team and were trained to monitor their own blood pressure for the first week of each month with a validated automated sphygmomanometer transmitting readings to the research team. Two self-measurements were made each morning and a colour traffic light system was used by patients to code these readings as green (below target but above safety limit), amber (above target, but below safety limits) and red (outside of safety limits). A month was deemed to be “above target” if the readings on 4 or more days were above target. If patients had 2 consecutive months of readings above target, they were instructed to make medicine changes in accordance with their agreed titration schedule by requesting a new prescription without seeing their GP.
Comparison	Usual care
Length of follow up	12 months
Location	England
Outcomes measures	**Change in mean systolic blood pressure (SBP) between baseline and each follow-up point** (adjusted analysis for sex, general practice,

and effect size

baseline systolic blood pressure more than 150mmHg, and diabetes and chronic kidney disease status)

<u>At 6 months</u>

Intervention: SBP decrease by 12.9mmHg (95% CI 10.4 to 15.5)

Control: SBP decrease by 9.2mmHg (95% CI 6.7 to 11.8)

Difference between groups 3.7mmHg (95% CI 0.8 to 6.6), p=0.013

<u>At 12 months</u>

Intervention: SBP decrease by 17.6 mmHg (95% CI 14.9 to 20.3)

Control: SBP decrease by 12.2mmHg (95% CI 9.5 to 14.9)

Difference between groups 5.4mmHg (95% CI 2.4 to 8.5), p=0.0004

Mean number of antihypertensive medicines per patient (95% CI)

	Baseline	6 months	12 months	P value for overall trend comparison*
Intervention	1.5 (1.4-1.7)	1.9 (1.8-2.1)	2.1 (1.9-2.3)	<0.0001
Control	1.5 (1.4-1.7)	1.7 (1.5-1.8)	1.7 (1.5-1.8)	

*Comparison of trend over time between intervention and control adjusted for general practice, sex, baseline systolic blood pressure more than 150mmHg, and diabetes and chronic kidney disease status, P value for comparison at 6 and 12 months was <0.0001

Of the 210 (80%) patients who self-managed their hypertension for 12 months, 148 (70%) made at least one medicine change (median 1, IQR 0-2)

Patients in the intervention group were prescribed 0.32 (0.21-0.43) additional antihypertensive medicines compared with control at 6 months (p=0.001) and 0.46 (0.34-0.58) additional antihypertensive medicines at12 months (p=0.001)

Mean primary care consultations during the year

Intervention group: mean attendance 3.2 (95% CI 2.9-3.5)

Control group: 3.5 (95% CI 3.2-3.7)

X^2 = 3.0, p=0.08 for comparison

Frequent symptoms or side-effects

The most frequent symptoms or side-effects reported were pain, fatigue, swelling of legs, sleep difficulties, dry mouth, feeling flushed, cough, breathlessness and sore eyes. The intervention group was not associated with increased anxiety or frequency of most side effects. However, the frequency of leg swelling was significantly higher in the intervention group than in the control group (increase in prescriptions for calcium channel blockers in intervention group).

Quality of Life measured by EQ-5D (adjusted)

<u>At 6 months</u>

Effect size: 0.011 (-0.023 to 0.045)

<u>At 12 months</u>

Effect size: 0.027 (-0.004 to 0.065)

No significant difference between intervention and control group.

Patient experiences of self-monitoring blood pressure and self-titration of medicines (outcome reported in another paper (see comments)

- 26 patients in the intervention group were approached for interviewing on their experiences of self-management.
- Key themes emerged on understanding blood pressure and attitudes to medicines, self-titration of medicines, and continuing

	the intervention after the trial. - Patients were confident about self-monitoring. Some patients lacked the confidence to increase their medicine without consulting with their GP again. Patients were more comfortable with titrating their medicine if their blood pressure reading was substantially above target. Many planned to continue self-monitoring after the study finished and reported home readings to their GP, but a few patients wished to continue with self-management plan.
Source of funding	Department of Health Policy Research Programme, National Coordinating centre for Research Capacity Development, and Midlands Research Practices Consortium.
Comments	• All patients received information based on literature produced by the British Hypertension Society about non-pharmacological interventions to reduce blood pressure • All participating family doctors were given a copy of current NICE hypertension guidelines • Patients transmitted their readings to the research team by means of an automated modem device which was connected to the sphygmomanometer and plugged into a normal telephone socket like an answerphone. • Titration schedules consisting of two changes or increases of medicines were agreed between patients in the intervention group and their GP at a review visit after training and included the option of renal monitoring for angiotensin-converting enzyme inhibitors. • Intervention by the research team on the basis of telemonitored blood pressure results was limited to checking that patients had followed the safety advice for high or low readings by means of a telephone call. • A qualitative study by Jones MI et al embedded within this RCT aimed to explore the views and experiences of those who had undertaken blood pressure self-management.
Abbreviations: IQR, interquartile range; CI, confidence interval.	

Evidence table 72: Menendez-Jandula,B et al, 2005

Bibliographic reference	Comparing self-management of oral anticoagulant therapy with clinic management: a randomized trial
Study type	RCT
Study quality	Low
Number of patients	n=737
Patient characteristics	Ambulatory patients were enrolled that met the following criteria: • Age 18 years or older • Receiving long-term anticoagulant therapy for at least 3 months before entering the study
Intervention	Self-management group received instructions for using portable coagulometer weekly and self-adjusting treatment dose using a card system to select the right dose according to range the reading was in.
Comparison	Usual care in an anticoagulant clinic
Length of follow up	Median 11.8 months (range 0.3 to 16.9 months)
Location	Spain, secondary care
Outcomes measures	**Individual percentage of time of INR values within the target range**

and effect size	The mean percentage of INR determinations within the individual target range was higher in the patient self-management group than in the control group (58.6% vs 55.6%; difference 3.0 percentage points, 95% CI, 0.4 to 5.4 percentage points) – no significant difference
	Thromboembolic/haemorrhagic complications Major complication rate was 7.3% in the control group and 2.2% in the self-management group, risk difference, 5.1 percentage points, 95% CI, 1.7 to 8.5 percentage points.
Source of funding	In part by Roche Diagnostic
Comments	-
Abbreviations: INR, international normailsed ratio.	

Evidence table 73: Siebenhofer A et al, 2008

Bibliographic reference	Self-management of oral anticoagulation reduces major outcomes in the elderly. A randomized controlled trial
Study type	RCT
Study quality	Moderate
Number of patients	n=195
Patient characteristics	Patients included were aged 60 years and over, prescribed long-term anticoagulation either with phenprocoumon or acenocoumarol.
Intervention	Patients had initial training about oral anticoagulation and basic empowerment of managing oral anticoagulation on their own and recording in their diaries.
Comparison	Usual care
Length of follow up	Mean follow-up as reported in the study was 2.9±1.2 years in intervention group and 3.0±1.1 years in the control group.
Location	Austria
Outcomes measures and effect size	**Combined endpoint of all thromboembolic events requiring hospitalisations and all major bleeding complications (using intention to treat analysis)**

No of patients with event	Intervention (n=99)	Control (n=96)	Hazard Ratio (95% CI)	P-value
Thromboembolic or major bleeding event	12	22	0.50(0.25–1.00)	0.049
Thromboembolic event	6	13	0.46(0.19–1.16)	0.103
Major bleeding	7	10	0.70(0.27–1.82)	0.466
Death	15	11	1.41(0.65–3.30)	0.389
Aggregated death, thromboembolic or major bleeding event	22	28	0.74(0.42–1.29)	0.291
Hospitalisation	68	73	0.92(0.66–1.28)	0.607

Oral anticoagulation control

Variable	Intervention (n=95)	Control (n=94)	P-value
Time within target range, %	73.4 (64.7, 82.0)	65.5 (55.4, 77.2)	0.004

	INR's within target range, %	68.4 (61.5, 77.8)	59.1 (50.0, 70.6)	0.001
Source of funding	Roche Diagnostics			
Comments	• Patients in the intervention group had poorer quality of oral anticoagulation control at baseline compared to control group.			
Abbreviations: INR, international normalised ratio; CI, confidence intervals.				

Evidence table 74: Sunderji R et al, 2004

Bibliographic reference	A randomised trial of patient self-managed versus physician-managed oral anticoagulation
Study type	RCT – open label
Study quality	Moderate
Number of patients	n=140
Patient characteristics	Included patients met the following criteria: • age 18 years and older • on warfarin for at least one month before enrolment • require anticoagulation for at least one year to a target international normalised ration (INR) of 2.0 to 3.0 or 2.5 to 3.5.
Intervention	Intervention patients tested their INR using a point of care device and adjusted their warfarin doses using a nomogram (self-management).
Comparison	Usual care, physician managed.
Length of follow up	8 months
Location	Canada
Outcomes measures and effect size	**Primary outcomes** **Intention to treat analysis**

Variable	**Usual care, % (n=70)**	**Self-management, % (n=69)**	**P**
Mean proportion of INR (SEM)			
In range	58.7 (5.9)	64.8 (5.8)	0.23
Below range	29.0 (5.4)	18.0 (4.7)	0.06
Above range	12.3 (3.9)	17.2 (4.6)	0.21
Time in target range (SEM)			
In range	63.2 (5.8)	71.8 (5.5)	0.14
Below range	27.3 (5.4)	15.0 (4.3)	0.04
Above range	9.5 (3.5)	13.2 (4.1)	0.25

Secondary outcomes

Variable	**Usual care (n=70)**	**Self-management, (n=69)**	**P**
Adverse events			NS
Major bleeding (n)	1	0	
Thromboembolism (n)	2	0	
INR greater than 5.0 (n [%])	9 (0.8)	25 (1.3)	NS

Source of funding	Heart and Stroke foundation of British Colombia and the Yukon, the Vancouver General Hospital Interdisciplinary Research grant and

	International Technidyne Corporation, USA
Comments	• Patients managing their own warfarin made 40 of 1615 (2.5%) incorrect warfarin dosage adjustments decisions, all without adverse consequences. • All subjects who completed the self-management intervention stated that they were satisfied with using the coagulometer for testing and adjusting their warfarin doses and preferred to continue with managing their own therapy
Abbreviations: INR, international normalised ratio.	

Evidence table 75: Thoonen BPA et al, 2003

Bibliographic reference	Self-management of asthma control and quality of life: a randomised controlled trial
Study type	RCT
Study quality	Low
Number of patients	n=214
Patient characteristics	Included patients met the following criteria: • age 16 to 60 years • FEV_1 >40% of predicted value and >55% of predicted value 15 minutes after inhalation of 800 micrograms budesonide twice daily • FEV_1 reversibility (after bronchodilation with 800 micrograms salbutamol metered dose inhaler or 8 weeks treatment with 800 micrograms budesonide twice daily) of at least 10% of the predicted value or PC_{20} histamine of 8mg/ml.
Intervention	Self-management programme consisted of tailored education and instructions on how to use a personalised written self-management plan and self-treatment instructions. Patients recorded morning and evening peak flow values and the presence of asthma symptoms weekly.
Comparison	Usual care
Length of follow up	2 years
Location	Netherlands
Outcomes measures and effect size	**Asthma control** Mean % of successfully treated weeks per patient Self-management (81/105): 78% (95% CI 75.1 to 80.6) Usual care (74/103): 72% (95% CI 68.8 to 74.8) Changes in post-bronchodilator FEV_1 (800 micrograms salbutamol once daily through spacer) Self-management: estimated decline rate of 0.048l/year Usual care: estimated decline rate of 0.026l/year P=0.239 Changes in reversibility of FEV_1 as percentage of the predicted value No significant difference (figures not reported in study) Changes in concentration of histamine provoking a fall in FEV_1 of 20% or more. No significant difference (figures not reported in study)
	Asthma specific quality of life Based on repeated measurements analysis, the estimated increase in overall asthma quality of life score was 0.10 points per visit in the usual care group and 0.21 points per visit in the self-management group,

	P=0.055. There was a significant change between groups only in the emotions domain (0.02 points per visit in the usual care group, 0.20 points per visit in the self-management group, p=0.006).
	Lost activity days Mean number of limited activity days (adjusted to account for control group having 2 outliers) Self-management: 1.2 (95% CI 0.5 to 1.9) Usual care: 3.9 (95% CI 2.5 to 5.4)
	Mean budesonide usage Self-management: 1680 puffs per patient (95% CI 1538 to 1822) Usual care: 1897 puffs per patient (95% CI 1697 to 2115) Indicating a saving of 217 puffs per patient
	Number of median (IQR) dose equivalents of short acting bronchodilators Self-management: 97(168)micrograms/day Usual care: 69 (340)micrograms/day Mann-Whitney U test, p=0.711
	Number of short courses of oral prednisolone and antibiotics No significant difference in the number of antibiotics between the two groups. The self-management group had a significantly higher number of courses of oral prednisolone than the usual care group, Mann-Whitney U test, p=0.015.
	Number of GP diagnosed exacerbations No significant difference in the number of GP diagnosed exacerbations between the two groups.
Source of funding	Research grants from The Netherlands Organisation for Scientific Research (NOW) and AstraZeneca Pharmaceutica BV.
Comments	• Patients were treated according to the Dutch College of Family Physicians guidance on asthma, which are largely comparable to international guidelines but do not include self-management.
Abbreviations: $FEV_{1,}$ forced expiratory volume in 1 second; PC_{20} histamine, 20% fall in histamine concentration.	

D.1.6 Patient decision aids used in consultations about medicines

Evidence table 76: Branda ME et al, 2013

Bibliographic reference	Branda ME, LeBlanc A, Shah ND, et al. (2013) Shared decision making for patients with type 2 diabetes: a randomized trial in primary care. BMC Health Services Research 13: 301
Study type	RCT
Study quality	Moderate
Number of patients	n=103 randomised
Patient characteristics	Adults with type 2 diabetes for at least a year with a clinician-identified reason to consider changing their antihyperglycaemic or lipid-lowering regimens
Intervention	Statin or diabetes patient decision aid (n=53)

Comparison	Usual care (n=50)
Length of follow up	6 months
Location	10 US primary care practices
Outcomes measures and effect size	Patient knowledge – significantly improved knowledge at baseline (post intervention) in PDA group and risk with, and without medication Participation in decision-making – significantly more patients in the PDA group had a discussion about starting or changing a medication (77% vs. 45%, P<0.001) Decisional conflict – significant difference in some decisional conflict subscale scores, in favour of the PDA group. No total decisional conflict score given Patient satisfaction – no significant difference Medicines adherence – no significant difference Clinical outcomes (including HbA1c and lipid profile) – no significant difference Participation in decision-making – compared to usual care, patients receiving the DA were more likely to report discussing medications, and were more engaged by their clinicians in decision making (50. Vs. 28, difference 21.4 (95% CI 6.4, 36.3), P=0.01)
Source of funding	Not stated
Comments	Target sample size was not achieved (n=240)

<Insert Note here>

Evidence table 77: Deschamps MA et al, 2004

Bibliographic reference	Deschamps MA, Taylor JG, Neubauer SL, et al. (2004) Impact of pharmacist consultation versus a decision aid on decision making regarding hormone replacement therapy. International Journal of Pharmacy Practice 12(1): 21-28
Study type	RCT
Study quality	Moderate
Number of patients	n=128 randomised
Patient characteristics	Peri- and post-menopausal women (aged 48 to 52 years)
Intervention	HRT patient decision aid self-completed at home with follow-up consultation with physician (n=61)
Comparison	Pharmacist consultation, with follow-up consultation with physician (n=67)
Length of follow up	12 months
Location	Family medicine clinic in Canada
Outcomes measures and effect size	Decisional conflict – significant reduction in both groups from baseline. No significant difference between groups (data not provided) Satisfaction with preparation for decision-making was high in both groups – no significant difference between groups Participation in decision making – majority of patients in both groups made decision themselves, or shared with their clinician Decisions regarding HRT use – no significant difference Satisfaction with decisions at follow-up was high in both groups – no significant difference between groups Medicines adherence – no significant difference
Source of funding	Eli Lilly Canada Inc.
Comments	Both groups had follow-up consultation with physician after 2-4 weeks to discuss HRT. Physician clarified any questions regarding patients medical profile relevant to HRT and to discuss the patients current or future intentions regarding HRT

	Pharmacist consultation – 40-minute appointment within clinic. Pharmacist had access to medical records. At end of consultation, patient and pharmacist agreed provisional plan Both interventions improved decisional conflict
Abbreviations: HRT, Hormone replacement therapy	

<Insert Note here>

Evidence table 78: Hamann J et al, 2006

Bibliographic reference	Hamann J, Langer B, Winkler V, et al. (2006) Shared decision making for in-patients with schizophrenia. Acta Psychiatrica Scandinavica 114(4): 265-73
Study type	RCT
Study quality	Low
Number of patients	n=107 randomised
Patient characteristics	Acutely ill hospital in-patients with schizophrenia
Intervention	Schizophrenia treatment patient decision aid (booklet) (n=49)
Comparison	Usual care (n=58)
Length of follow up	18 months after discharge
Location	12 acute psychiatric wards in 2 German hospitals
Outcomes measures and effect size	Main patient-reported outcomes are shown in the table below

Outcome	Intervention	Control	P value
Patient perceived involvement* (n=75)	79.5 (SD 18.6)	69.7 (SD 20.0)	0.03
COMRADE before discharge* (n=82)	76.8 (SD 20.9)	73.5 (SD 19.3)	0.18
Patient knowledge before discharge (n=88)	15.0 (SD 4.4)	10.9 (SD 5.4)	0.01
Patient satisfaction before discharge† (n=83)	16.3 (SD 3.7)	16.4 (SD 3.2)	0.42

** Patient involvement in decision-making after the patient/physician planning meeting (see comments below), measured by COMRADE*
† Overall patient satisfaction was measured by ZUF8, an 8-item questionnaire

Source of funding	German Ministry of Health and Social Security
Comments	Patients met with their physician within 24 hours after working through the decision aid with their nurse. The aim of this planning meeting was to reach agreement between the patient and psychiatrist on further treatment according to preferences indicated by the patient in the PDA booklet

Note: This study is the same RCT as Hamann J et al, 2007. Different outcomes were reported in each published study (see evidence table above)

Abbreviations: COMRADE, Combined Outcome Measure for Risk Communication and Treatment Decision Making Effectiveness; SD, Standard deviation

Evidence table 79: Hamann J et al, 2007

Bibliographic reference	Hamann J, Cohen R, Leucht S, et al. (2007) Shared decision making and long-term outcome in schizophrenia treatment. Journal of Clinical Psychiatry 68(7): 992-97
Study type	RCT
Study quality	Low
Number of patients	n=107 randomised
Patient characteristics	Acutely ill hospital in-patients with schizophrenia

Intervention	Schizophrenia treatment patient decision aid (booklet) (n=49)
Comparison	Usual care (n=58)
Length of follow up	18 months after discharge
Location	12 acute psychiatric wards in 2 German hospitals
Outcomes measures and effect size	Hospital readmission within 6 months of discharge – no significant difference Hospital readmission within 18 months of discharge – no significant difference Medicines adherence – good compliance at 6 months – no significant difference Medicines adherence – good compliance at 18 months – no significant difference Poor compliance at 6 months was associated with a significant increase in readmission between 6 and 18 months (P = 0.04)
Source of funding	German Ministry of Health and Social Security
Comments	Patients met with their physician within 24 hours after working through the decision aid with their nurse. The aim of this planning meeting was to reach agreement between the patient and psychiatrist on further treatment according to preferences indicated by the patient in the PDA booklet
Note: The study is the same RCT as Hamann J et al, 2006. Different outcomes were reported in each published study (see evidence table above)	

<Insert Note here>

Evidence table 80: Kasper J et al, 2008

Bibliographic reference	Kasper J, Kopke S, Muhlhauser I, et al. Informed shared decision making about immunotherapy for patients with multiple sclerosis (ISDIMS): A randomized controlled trial. European Journal of Neurology 15(12):1345-52
Study type	RCT
Study quality	High
Number of patients	n=297 randomised
Patient characteristics	MS patients considering, or reconsidering choice of immunotherapy
Intervention	MS patient decision aid (patient information booklet about immunotherapy options and interactive worksheet) (n=150)
Comparison	Usual care (standard information) (n=147)
Length of follow up	6 months
Location	Community based setting in Germany
Outcomes measures and effect size	**Primary outcome:** Participation in decision making – the match between the patient's preferred and actual roles during consultation with the physician – no significant differences (P=0.709). Most patients in both groups preferred patient-controlled decision making **Secondary outcomes:** Treatment choice – no significant differences Decision-making process – the PDA group appraised immunotherapy more critically initially, but this was balanced out after the physician consultation Patient evaluation – the PDA group rated the value of the information received significantly higher than the control group (P<0.001) Patient evaluation of the decision – no significant differences after 6 months
Source of funding	German Ministry of Health and Social Services

Abbreviations: MS, Multiple sclerosis

<Insert Note here>

Evidence table 81: Kennedy AD et al, 2002

Bibliographic reference	Kennedy AD, Sculpher MJ, Coulter A, et al. (2002) Effects of decision aids for menorrhagia on treatment choices, health outcomes, and costs: a randomized controlled trial. JAMA 288(21): 2701-08
Study type	RCT
Study quality	High
Number of patients	n=894
Patient characteristics	Women with uncomplicated menorrhagia
Intervention	Menorrhagia patient decision aid (booklet and videotape) sent to patients plus a pre-consultation structured interview (n=253)
Comparison	• Usual care (no intervention) (n=244) • Menorrhagia patient decision aid (booklet and videotape) sent to patients (n=232)
Length of follow up	2 years
Location	6 hospitals in southwest England
Outcomes measures and effect size	Patient satisfaction – the interview group rated both the opportunities they had been given to take part in treatment decision making (adjusted OR, 1.49; 95%CI 1.11 to 2.01; P = 0.008) and the overall results of their treatments (adjusted OR, 1.44; 95%CI 1.03 to 2.01; P = 0.03) significantly higher than the control group. The differences between the information group and the controls were smaller and not significant. The differences between the intervention groups were not statistically significant Patient self-reported health status – no significant difference between all 3 groups Hysterectomy rates – significantly lower in the interview group, compared with other 2 groups. No other treatments showed any significant differences between groups
Source of funding	NHS Research and Development Health Technology Assessment Programme
Comments	Women in both intervention groups were sent an information pack (a booklet and complementary videotape) 6 weeks before their specialist consultation. Immediately before their consultation, women in the interview group underwent structured interview, to clarify and elicit their preferences

<Insert Note here>

Evidence table 82: Lalonde L et al, 2006

Bibliographic reference	Lalonde L, O'Connor AM, Duguay P, et al. (2006) Evaluation of a decision aid and a personal risk profile in community pharmacy for patients considering options to improve cardiovascular health: The OPTIONS pilot study. International Journal of Pharmacy Practice 14(1) 51-62
Study type	RCT
Study quality	Low
Number of patients	n=26 randomised
Patient characteristics	Patients aged 30-74 years who had started lipid-lowering or antihypertensive therapy in the previous 12 months
Intervention	Cardiovascular health patient decision aid (booklet and personal worksheet) plus pharmacist consultation (n=13)
Comparison	Cardiovascular health personal risk profile (PRP), plus pharmacist

	consultation (n=13)
Length of follow up	3 months
Location	10 community pharmacies in Canada
Outcomes measures and effect size	Patient knowledge – no differences pre- and post-intervention in either groups Risk perception – no differences pre- and post-intervention in either groups Decisional conflict – overall score significantly reduced in the PRP group after the intervention, but did not reduce significantly in the PDA group Patient satisfaction with decision process – no significant differences between groups Clinical outcomes – no significant differences between groups
Source of funding	Canadian Stroke Network

<Insert Note here>

Evidence table 83: Légaré F et al, 2003

Bibliographic reference	Légaré F, O'Connor AM, Graham ID, et al. (2003) The effect of decision aids on the agreement between women's and physicians' decisional conflict about hormone replacement therapy. Patient Education and Counseling 50(2): 211-21
Study type	RCT
Study quality	Low
Number of patients	n=184 randomised
Patient characteristics	Post-menopausal women (aged 45 to 69 years) considering HRT
Intervention	HRT patient decision aid (audio-tape, booklet and worksheet) with follow-up physician consultation
Comparison	Information pamphlet on risks and benefits of HRT with follow-up physician consultation
Length of follow up	Not stated
Location	Family medicine practices in Canada
Outcomes measures and effect size	Decisional conflict – no significant differences in patient decisional conflict scores. Agreement between patient and physician decisional conflict scores was higher in the PDA group
Source of funding	Canadian Arthritis Society and Medical Research Council of Canada
Comments	Physicians did not receive any formal training to provide counselling

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Evidence table 84: Leighl NB et al, 2011

Bibliographic reference	Leighl NB, Shepherd HL, Butow PN, et al. (2011) Supporting treatment decision making in advanced cancer: a randomized trial of a decision aid for patients with advanced colorectal cancer considering chemotherapy. Journal of Clinical Oncology 29(15): 2077-84
Study type	RCT
Study quality	Moderate
Number of patients	n=207 randomised
Patient characteristics	Patients with advanced colorectal cancer considering first-line chemotherapy
Intervention	Colorectal cancer patient decision aid (take home booklet with audio recording, reviewed by an oncologist)
Comparison	Usual care (standard medical oncology consultation)
Length of follow up	1 month
Location	4 teaching hospitals in Sydney, Australia and 1 major cancer centre in

	Toronto, Canada
Outcomes measures and effect size	**Primary outcomes:** Patient understanding/knowledge – significantly improved understanding with PDA (P<0.001) Satisfaction with decision making – no significant difference **Secondary outcomes:** Decisional conflict – no significant difference (median and range reported) Treatment decision made – no significant difference Anxiety – no significant difference Participation in decision making (patient achievement of decision involvement preferences) – no significant difference
Source of funding	Cancer Council New South Wales and American Society of Clinical Oncology
Comments	PDA based on Ottawa decision support framework

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Evidence table 85: Mann DM et al, 2010

Bibliographic reference	Mann DM, Ponieman D, Montori VM, et al. (2010) The Statin choice decision aid in primary care: a randomized trial. Patient Education and Counseling 80(1):138-40
Study type	RCT
Study quality	Low
Number of patients	n=150 randomised
Patient characteristics	Diabetes patients
Intervention	Statin patient decision aid (n=80)
Comparison	Usual care (printed materials from ADA) (n=70)
Length of follow up	6 months
Location	US primary care
Outcomes measures and effect size	Knowledge – no significant differences Decisional conflict – decisional conflict scale scores improved significantly with PDA (informed scale: 27.1 vs. 33.8, P=0.02; support scale: 25.2 vs. 29.6, P=0.05) Patient beliefs/risk perceptions – the control group significantly overestimated the risk of a heart attack over 10 years, with or without a statin, compared with the intervention group Medicines adherence – no significant differences
Source of funding	Not stated
Comments	Participants completed a questionnaire at baseline and at 3 and 6 months follow up Lower decisional conflict scores represents less decisional conflict
Abbreviations: ADA, American Diabetes Association	

<Insert Note here>

Evidence table 86: Mathers N et al, 2012

Bibliographic reference	Mathers N, Ng CJ, Campbell MJ, et al. (2012) Clinical effectiveness of a patient decision aid to improve decision quality and glycaemic control in people with diabetes making treatment choices: A cluster randomised controlled trial (PANDAs) in general practice. BMJ Open 2(6)
Study type	RCT
Study quality	High
Number of patients	n=175 randomised

Patient characteristics	Patients with type 2 diabetes
Intervention	Type 2 diabetes patient decision aid used in a single consultation
Comparison	Usual care (standard medical consultation)
Length of follow up	6 months
Location	49 UK general practices
Outcomes measures and effect size	**Primary outcomes** Decisional conflict – PDA group had significantly reduced decisional conflict scores (total score, and all subscores except the support subscore) Clinical outcome (glycaemic control: HbA1c) – no significant difference between groups **Secondary outcomes:** Patient knowledge – PDA group had significantly improved knowledge for one question (lowering blood sugar), no significant difference for other question (lowering risk of complications) Realistic expectations – PDA group had significantly more realistic expectations Preferred option – no significant difference Proportion undecided – no significant difference Participation in decision-making (see table below)

	How did you make your decision about your diabetes treatment (n=169)			
	Passive	**Collaborative**	**Autonomous**	**Total**
Control	16 (21%)	28 (36%)	33 (43%)	77 (100%)
Intervention	8 (9%)	25 (27%)	59 (64%)	92 (100%)

χ^2 =8.9, df=2, P=0.012

Source of funding	National Institute for Health Research
Comments	Included patients were taking at least 2 oral glucose lowering drugs (maximum tolerated dose), with HbA1c >7.4% (57 mmol/mol) or advised in preceding 6 months to add or consider changing to insulin therapy. PDA was used in a single consultation following brief training of clinicians. PDA developed in line with the International Patient Decision Aid Standards criteria

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Evidence table 87: Montori VM et al, 2011

Bibliographic reference	Montori VM, Shah ND, Pencille LJ, et al. (2011) Use of a decision aid to improve treatment decisions in osteoporosis: the osteoporosis choice randomized trial. American Journal of Medicine 124(6): 549-56
Study type	RCT
Study quality	High
Number of patients	n=100
Patient characteristics	Postmenopausal women aged at least 50 years (with bone mineral density T scores < –1.0) and not receiving a bisphosphonate
Intervention	Osteoporosis patient decision aid used in a consultation (pictographic format) (n=52)
Comparison	Usual care (standard brochure) (n=48)
Length of follow up	6 months
Location	10 US general medicine and primary care practices
Outcomes measures	Decisional conflict – no significant difference

and effect size	Patient satisfaction – no significant difference Patient knowledge – significantly improved in PDA group (PDA specific questions) Patient involvement – significantly improved in PDA group Medicines adherence – no significant difference
Source of funding	Mayo Clinic Foundation for Medical Education and Research, US

<Insert Note here>

Evidence table 88: Morgan MW et al, 2000

Bibliographic reference	Morgan MW, Deber RB, Llewellyn-Thomas HA, et al. (2000) Randomized, controlled trial of an interactive videodisc decision aid for patients with ischemic heart disease. Journal of General Internal Medicine 15(10): 685-93
Study type	RCT
Study quality	Moderate
Number of patients	n=240 randomised
Patient characteristics	Patients with ischaemic heart disease (IHD)
Intervention	CVD patient decision aid (video programme) (n=120)
Comparison	Usual care (n=120)
Length of follow up	6 months
Location	One hospital in Toronto, Canada
Outcomes measures and effect size	Patient satisfaction and knowledge (see table below):

Outcome	Control group n=97	SDP group n=90	Delta	95% CI around Delta	P value
Satisfaction*	70%	71%	1%	(–3%, 7%)	0.5
Knowledge*	62%	75%	13%	(+8%, 18%)	<0.001

SDP group = intervention group.
** Satisfaction was measured using the 12-item Decision-Making Process Questionnaire, and knowledge was measuring using a multiple item knowledge questionnaire*

Revascularisation – significantly lower in PDA group

General health scores and angina scores – no significant difference

Participation in decision-making – no significant difference in shared decision-making between groups

Source of funding	Ontario Ministry of Health and the Heart and Stroke Foundation of Ontario
Comments	Physicians and patients received a summary of the important points covered by the PDA. Patients randomised to the PDA also received a brochure with educational information about the treatment choices. These patients were given an appointment to view the PDA within 4 weeks after angiography. After viewing the CVD PDA, patients received a written summary of the main learning points, including the treatment options and the risks and benefits of those treatments. A physician copy of the written summary was also provided
Abbreviations: CVD, Cardiovascular disease	

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Evidence table 89: Mullan RJ et al, 2009

Bibliographic reference	Mullan RJ, Montori VM, Shah ND, et al. (2009) The diabetes mellitus medication choice decision aid: A randomized trial. Archives of Internal Medicine 169(17): 1560-68
Study type	RCT

Study quality	Moderate
Number of patients	n=87 randomised
Patient characteristics	Patients with type 2 diabetes (for at least 1 year)
Intervention	Type 2 diabetes medication choice patient decision aid (n=48)
Comparison	Usual care (general information pamphlet) (n=37)
Length of follow up	6 months
Location	11 primary care and family medicine sites
Outcomes measures and effect size	Decisional conflict and trust – no significant difference between groups Patient knowledge – significant increase in knowledge in PDA group for knowledge questions specific to PDA; no significant difference for questions non-specific to PDA Acceptability – no significant difference between groups, except for 'helpfulness of information' which was significantly increased in PDA group Participation in decision-making – the overall OPTION score (measure of patient involvement) was significantly higher in PDA group Self-reported health status – no significant difference HbA1c – no significant difference Medicines adherence – significantly improved in the usual care group
Source of funding	American Diabetes Association
Abbreviations: HbA1c, Glycosylated haemoglobin	

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Evidence table 90: Murray E et al, 2001[a]

Bibliographic reference	Murray E, Davis H, Tai SS, et al. (2001) Randomized controlled trial of an interactive multimedia decision aid on hormone replacement therapy in primary care. BMJ 323(7311): 490-93
Study type	RCT
Study quality	High
Number of patients	n=205 randomised
Patient characteristics	Women considering hormone replacement therapy (HRT)
Intervention	HRT patient decision aid (interactive multimedia programme with booklet and printed summary)
Comparison	Usual care
Length of follow up	9 months
Location	26 general practices in the UK
Outcomes measures and effect size	Acceptability – both patients and general practitioners found the decision aid acceptable Decisional conflict – mean scores for decisional conflict were significantly lower in the PDA group (2.5 vs 2.8; mean difference -0.3, 95%CI –0.5 to –0.2); this difference was maintained during follow up Participation in decision making – a higher proportion of GPs perceived that treatment decisions had been made 'mainly or only' by the patient in the PDA group, compared with the control group (55% vs 31%; 24%, 8% to 40%). No significant differences in patient perceptions Proportion undecided – a significantly lower proportion of women in the PDA group were undecided about treatment (14% v 26%; difference –12% (–23.3 to –0.4%) Anxiety – no significant differences Use of health resources – no significant differences General health status – no significant differences Utility – no significant differences

Source of funding	BUPA Foundation and the King's Fund

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Evidence table 91: Murray E et al, 2001[b]

Bibliographic reference	Murray E, Davis H, Tai SS, et al. (2001) Randomised controlled trial of an interactive multimedia decision aid on benign prostatic hypertrophy in primary care. BMJ 323(7311): 493-96
Study type	RCT
Study quality	High
Number of patients	n=112 randomised
Patient characteristics	Men with benign prostatic hypertrophy (BPH)
Intervention	BPH patient decision aid (interactive multimedia programme with booklet and printed summary)
Comparison	Usual care
Length of follow up	9 months
Location	33 general practices in the UK
Outcomes measures and effect size	Acceptability – both patients and GPs found the decision aid acceptable Participation in decision-making – a significantly higher proportion of patients (32% vs 4%; mean difference 28%, 95%CI 14% to 41%) and their GPs (46% vs 25%; mean difference 21%, 95%CI 3% to 40%) perceived that treatment decisions had been made mainly or only by patients in the PDA group, compared with the control group Decisional conflict scores – significantly lower decisional conflict scores in the PDA group at 3 months. This was maintained at 9 months Anxiety, utility, and general health status – no significant differences
Source of funding	NHS national research and development programme, the BUPA Foundation, and the Kings Fund

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Evidence table 92: Oakley S and Walley T, 2006

Bibliographic reference	Oakley S, Walley T. (2006) A pilot study assessing the effectiveness of a decision aid on patient adherence with oral bisphosphonate medication. Pharmaceutical Journal 276(7399): 536-38
Study type	RCT
Study quality	Low
Number of patients	n=33 randomised
Patient characteristics	Postmenopausal women prescribed a bisphosphonate with either with a diagnosis of osteoporosis, or aged over 65 years with radiological evidence of fragility fracture,
Intervention	Patient decision aid (information booklet, audio cassette and worksheet)
Comparison	Usual care
Length of follow up	4 months
Location	1 GP practice in Dorset, UK
Outcomes measures and effect size	Medicines adherence – no significant difference between groups Satisfaction with decision making – improved immediately after the intervention, but no significant difference between groups in final scores Decisional conflict – assessed in the intervention group only. Scores were significantly improved following the intervention
Source of funding	Eli Lilly and Merck Sharp and Dohme
Comments	The PDA was to be used at home by the patient, before an appointment with the GP. Patients in the intervention group were also invited to attend an osteoporosis workshop to introduce the decision aid

	PDA was developed in Canada and adapted for UK use

<Insert Note here>

Evidence table 93: Protheroe J et al, 2007

Bibliographic reference	Protheroe J, Bower P, Chew-Graham C, et al. (2007) Effectiveness of a computerized decision aid in primary care on decision making and quality of life in menorrhagia: results of the MENTIP randomized controlled trial. Medical Decision Making 27(5): 575-84
Study type	RCT
Study quality	Moderate
Number of patients	n=149 randomised
Patient characteristics	Women with menorrhagia
Intervention	Computerised patient decision aid plus written information
Comparison	Usual care (written information alone)
Length of follow up	6 months
Location	19 general practices in Northern England
Outcomes measures and effect size	Decisional conflict – a 2-week follow up there was significantly less decisional conflict in the PDA group (adjusted difference –16.6, 95%CI –21.5 to –11.7; P<0.001) Anxiety – no difference in anxiety scores at 2 weeks or 6 months follow up Patient knowledge – at 6 months, the PDA group showed better knowledge about menorrhagia (adjusted difference 9.3, 95%CI 1.9 to 16.6; P=0.014) Menorrhagia specific QoL – at 6 months, the PDA group showed better QoL (adjusted difference 10.9, 95%CI 0.9 to 21.0; P=0.033)
Source of funding	Medical Research Council
Comments	Outcomes assessed by postal questionnaires Planned sample size was not achieved
Abbreviations: QoL, Quality of life	

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Evidence table 94: Raynes-Greenow CH et al, 2010

Bibliographic reference	Raynes-Greenow CH, Nassar N, Torvaldsen S, et al. (2010) Assisting informed decision making for labour analgesia: a randomised controlled trial of a decision aid for labour analgesia versus a pamphlet. BMC Pregnancy and Childbirth 10: 15
Study type	RCT
Study quality	High
Number of patients	n=596 randomised
Patient characteristics	Primiparous women ≥ 37 weeks gestation, planning a vaginal birth of a single infant, with sufficient command of English language
Intervention	Labour analgesia patient decision aid in 2 formats (n=395): • Booklet only • Booklet plus audio guide
Comparison	Information pamphlet on risks and benefits of labour analgesia (n=201)
Length of follow up	12 to 16 weeks post-partum
Location	Canada
Outcomes measures and effect size	**Primary outcomes (see table below):**

Outcome	PDA (n=395)	Pamphlet (n=201	Mean difference (95%CI)	P value

	Decisional conflict (1-100, 1 = low decisional conflict)				
	Baseline	31.4 (12.8)	31.2 (13.4)	0.22 (-2.0, 2.7)	0.84
	Primary follow-up	23.9 (10.6)	24.9 (12.9)	0.99 (-3.1, 1.1)	0.37
	Second follow-up	19.9 (12.3)	20.2 (14.1)	-0.31 (-2.9, 2.3)	0.82
	Patient knowledge (% correct responses)				
	Baseline	53.4 (21.9)	54.4 (20.9)	-0.94 (-4.6, 2.7)	0.61
	Primary follow-up	65.1 (29.5)	56.5 (27.4)	8.58 (3.7, 13.5)	<0.01
	Anxiety (20-80, 20 = low anxiety)				
	Baseline	33.9 (10.1)	34.3 (11.8)	-0.32 (-2.2, 1.5)	0.74
	Primary follow-up	33.3 (9.3) 0.32	34.3 (11.0)	-0.96 (-2.8, 0.8)	
	Second follow-up	29.4 (8.5)	29.0 (9.5)	0.55 (-2.3, 1.2)	0.54
	Secondary outcomes: Satisfaction with decision making – no significant differences Participation in decision making – the decision aid group were significantly more likely to consider their care providers opinion (RR 1.28 95%CI 0.64 to 0.95). Analgesia use – no significant differences Pregnancy labour and birth outcomes – no significant differences Acceptability – no significant differences				
Source of funding	National Health and Medical Research Council				
Comments	Knowledge, decisional conflict and anxiety were measured using self-administered questionnaires that have been extensively used and validated in decision aid analysis. The question format was based on the style of the Ottawa Health decision group, and on previous work adapted for the context				
Definitions: Decisional conflict, uncertainty regarding analgesia decision					

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Evidence table 95: Schapira et al, 2007

Bibliographic reference	Schapira MM, Gilligan MA, McAuliffe T, et al. (2007) Decision-making at menopause: a randomized controlled trial of a computer-based hormone therapy decision-aid. Patient Education and Counseling 67(1-2):100-7
Study type	RCT
Study quality	Moderate
Number of patients	n=177
Patient characteristics	Post-menopausal women aged 45 to 74 years (mean 58 years)
Intervention	Hormone replacement therapy (HRT) computerised patient decision aid (n=89)
Comparison	Information pamphlet on risks and benefits of HRT (n=88)
Length of follow up	3 months
Location	Veterans Affairs primary care clinic
Outcomes measures and effect size	There was no significant difference in the primary outcomes of: • Patient knowledge • Patient satisfaction with decision making

	• Decisional conflict • HRT use
Source of funding	Department of Veterans Affairs

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Evidence table 96: Sheridan SL et al, 2006

Bibliographic reference	Sheridan SL, Shadle J, Simpson RJ, et al. (2006) The impact of a decision aid about heart disease prevention on patients' discussions with their doctor and their plans for prevention: a pilot randomized trial. BMC Health Services Research 6: 121
Study type	RCT
Study quality	Moderate
Number of patients	n=75 randomised
Patient characteristics	Patients (aged 35 to 75 years) with no prior history of cardiovascular disease
Intervention	Heart disease prevention computerised patient decision aid (n=41)
Comparison	Usual care (list of cardiovascular risk factors) (n=34)
Length of follow up	Not stated
Location	1 US internal medicine clinic
Outcomes measures and effect size	Participation in decision making – increased in 3 outcome measures in the PDA group, but this was not statistically significant for any outcome (see table below):

	Control group (n = 34)	**Decision aid group (n=41)**	**Absolute difference (95%CI)***
CHD discussion with their doctor	24%	40%	16% (–4 to +37%)
Have a specific plan to reduce CHD risk and discuss with their doctor	24%	37%	13% (–7% to +34%)
Have a specific plan to reduce CHD risk regardless of whether they discuss it with their doctor	74%	90%	16% (1% to –33%)

** Pearson chi-square tests*

Source of funding	University of North Carolina, USA

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Evidence table 97: Sheridan SL et al, 2011

Bibliographic reference	Sheridan SL, Draeger LB, Pignone MP, et al. (2011) A randomized trial of an intervention to improve use and adherence to effective coronary heart disease prevention strategies. BMC Health Services Research 11: 331
Study type	RCT
Study quality	Moderate
Number of patients	n=160 randomised
Patient characteristics	Patients with moderate or high CHD risk over 10-years based on Framingham (no prior history of cardiovascular disease, diabetes or other serious medical condition that limited life expectancy to less than 5 years)
Intervention	CHD primary prevention computerised patient decision aid plus 3 tailored medicines adherence reminders at 2, 4 and 6 weeks (n=81)
Comparison	Usual care (n=79)

Length of follow up	3 months
Location	1 US internal medicine practice
Outcomes measures and effect size	Change in predicted CHD risk – intervention group had significantly lower mean 10-year CHD risk than the control group (adjusted absolute difference –1.1%; 95%CI –2.0% to –0.16%). Intent to start risk reduction strategy – intervention group had significantly higher intentions to start or increase any of the effective CHD risk reducing therapies promoted by the intervention (control 42%, intervention 63%; absolute difference 21%; 95%CI 5% to 37%; adjusted p < 0.01) Medicines adherence – intervention group had higher self-reported adherence to the chosen risk reducing therapies promoted by the PDA (adjusted absolute difference +25%; P < 0.01
Source of funding	American Heart Association
Comments	
Note: This study is a secondary analysis of Sheridan SL et al, 2011 (see evidence table below)	

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Evidence table 98: Sheridan SL et al, 2014

Bibliographic reference	Sheridan SL, Draeger LB, Pignone MP, et al. (2014) The effect of a decision aid intervention on decision making about coronary heart disease risk reduction: secondary analyses of a randomized trial. BMC Medical Informatics and Decision Making 14(1): 14
Study type	RCT
Study quality	Moderate
Number of patients	n=160 randomised
Patient characteristics	Patients with moderate or high CHD risk over 10-years based on Framingham (no prior history of cardiovascular disease, diabetes or other serious medical condition that limited life expectancy to less than 5 years)
Intervention	CHD primary prevention computerised patient decision aid plus 3 tailored medicines adherence reminders at 2, 4 and 6 weeks (n=81)
Comparison	Usual care (n=79)
Length of follow up	3 months
Location	1 US internal medicine practice
Outcomes measures and effect size	Patient knowledge – significantly increased knowledge of effective CHD prevention strategies in PDA group (+21 percentage points; adjusted P<0.0001) and the accuracy of perceived CHD risk (+33 percentage points; adjusted P<0.0001) Decisional conflict – after viewing the PDA, patients in the PDA group had significantly decreased decisional conflict (–0.63; adjusted P<0.0001) (data reported for PDA group only) Patient interactions with provider – PDA also significantly increased CHD prevention discussions with providers (+31 percentage points; adjusted P<0.0001) and improved perceptions of some features of patient-provider interactions Participation in decision making – no significant difference in number of patients who made a shared-decision
Source of funding	American Heart Association
Note: This study is a secondary analysis of Sheridan SL et al, 2011 (see evidence table above)	

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Evidence table 99: Thomson RG et al, 2007

Bibliographic	Thomson RG, Eccles MP, Steen IN, et al. (2007) A patient decision aid

reference	to support shared decision-making on anti-thrombotic treatment of patients with atrial fibrillation: randomised controlled trial. Quality and Safety in Health Care 16(3): 216-23
Study type	RCT
Study quality	High
Number of patients	n=109 randomised
Patient characteristics	Patients with atrial fibrillation
Intervention	Antithrombotic computerised patient decision aid
Comparison	Usual care (following evidence-based guidelines)
Length of follow up	3 months
Location	40 UK general practices
Outcomes measures and effect size	**Primary outcome:** Decision conflict score – Decision conflict was lower in the computerised PDA group immediately after the clinic; mean difference 20.18 (95% CI 20.34 to 20.01) **Secondary outcomes:** Patient knowledge – no significant difference between groups Anxiety – no significant difference between groups Participation in decision-making – PDA group were significantly more likely to judge that they were more important in making the decision (P=0.018) Treatment decision – patients in the PDA group were significantly less likely to start warfarin Use of primary and secondary care services – no significant difference between groups
Source of funding	Wellcome Trust

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Evidence table 100: Vuorma S et al, 2003

Bibliographic reference	Vuorma S, Rissanen P, Aalto AM, et al. (2003) Impact of patient information booklet on treatment decision – a randomized trial among women with heavy menstruation. Health Expectations 6(4): 290-97
Study type	RCT
Study quality	Moderate
Number of patients	n=363 randomised
Patient characteristics	Women (aged 35 to 54 years) with menorrhagia or fibroids
Intervention	Menorrhagia patient decision aid (booklet) self-completed before first clinic appointment (n=184)
Comparison	Usual care (n=179)
Length of follow up	12 months
Location	Gynaecology outpatient clinics in 14 Finnish hospitals
Outcomes measures and effect size	Treatment choice – treatment decision within 3 months was made significantly more often in the PDA group (96% vs 89% respectively, P<0.02). Oral medication was more frequently chosen, and newly introduced treatments (minor surgery, hormonal intrauterine system) were less frequently used in the PDA group (at 3-month follow-up 21% vs. 29%, respectively). The differences persisted at the 12-month follow-up. Patient knowledge – no significant difference Patient satisfaction with communication – no significant difference Anxiety – no significant difference Hysterectomy rates – no significant difference

Source of funding	Not stated
Note: This study is the same RCT as Vuorma S et al, 2004. Different outcomes were reported in each published study (see evidence table below)	

<Insert Note here>

Evidence table 101: Vuorma S et al, 2004

Bibliographic reference	Vuorma S, Rissanen P, Aalto AM, et al. (2004) Randomized trial among women with heavy menstruation – impact of a decision aid on treatment outcomes and costs. Health Expectations 7: 327-37
Study type	RCT
Study quality	Moderate
Number of patients	n=363 randomised
Patient characteristics	Women (aged 35 to 54 years) with menorrhagia or fibroids
Intervention	Menorrhagia patient decision aid (booklet) self-completed before first clinic appointment (n=184)
Comparison	Usual care (n=179)
Length of follow up	12 months
Location	Gynaecology outpatient clinics in 14 Finnish hospitals
Outcomes measures and effect size	Health outcomes e.g. general health status – improved in both groups, with no significant differences between groups Satisfaction with treatment – no significant difference Use of health care services – no significant differences for any outcome
Source of funding	Not stated
Note: This study is the same RCT as Vuorma S et al, 2003. Different outcomes were reported in each published study (see evidence table above)	

<Insert Note here>

Evidence table 102: Weymiller AF et al, 2007

Bibliographic reference	Weymiller AJ, Montori VM, Jones LA, et al. (2007) Helping patients with type 2 diabetes mellitus make treatment decisions: statin choice randomized trial. Archives of Internal Medicine 167(10): 1076-82
Study type	RCT
Study quality	High
Number of patients	n=98 randomised
Patient characteristics	Patients with type 2 diabetes (within no contraindications to statin use)
Intervention	Statin choice patient decision aid
Comparison	Usual care (information pamphlet)
Length of follow up	3 months
Location	Mayo clinic, USA
Outcomes measures and effect size	Patient acceptability – patients significantly favoured using the decision aid (OR 2.8; 95%CI 1.2 to 6.9) Patient knowledge – PDA group had significantly better knowledge (difference 2.4 out of 9 points; 95%CI 1.5 to 3.3) Estimated CV risk – PDA group had significantly lower estimated cardiovascular risk (OR 22.4; 95%CI 5.9 to 85.6) Decisional conflict immediately after the visit – PDA group had significantly less decisional conflict (difference −10.6; 95%CI −15.4 to −5.9 on a 100-point scale) Medicines adherence – of 33 patients in the intervention group taking statin drugs at 3 months, 2 reported missing 1 dose or more in the last week compared with 6 of 29 patients in the control group taking statin drugs (OR 3.4; 95%CI 1.5 to 7.5)

Source of funding	Mayo clinic and American Diabetes Association
Abbreviations: OR, Odds ratio	

<Insert Note here>

Evidence table 103: Whelan T et al, 2003

Bibliographic reference	Whelan T, Sawka C, Levine M, et al. (2003) Helping patients make informed choices: a randomized trial of a decision aid for adjuvant chemotherapy in lymph node-negative breast cancer. Journal of the National Cancer Institute 95(8): 581-87
Study type	RCT
Study quality	Low
Number of patients	n=176 randomised
Patient characteristics	Women with lymph node-negative breast cancer who were candidates for adjuvant chemotherapy
Intervention	Adjuvant chemotherapy in breast cancer patient decision aid (n=83)
Comparison	Usual care (medical consultation only) (n=93)
Length of follow up	12 months
Location	Canadian and US cancer centres
Outcomes measures and effect size	Patient knowledge – significantly better knowledge scores in the PDA group, compared with control group (mean knowledge score = 80.2 [on a scale of 0–100], 95%CI 77.1 to 83.3, and 71.7, 95%CI 69.0 to 74.4, respectively; P<0.001) Patient satisfaction – over the entire study period, satisfaction with decision making was significantly higher for patients in the PDA group than for patients in the control group (P = .032). Participation in decision-making – the number of patients preferring an active role in decision-making after the intervention was significantly increased in the PDA group (P=0.033) Treatment decision – no significant difference in the number of patients who chose adjuvant chemotherapy (P=0.303) Anxiety – no significant difference between groups
Source of funding	Canadian Breast Cancer Research Initiative
Comments	The PDA was a 'decision board' that was a visual aid and presented information about treatment options in written and graphical format

Abbreviations used in evidence tables	PDA, Patient decision aid CI, Confidence interval

D.1.7 Clinical decision support

Evidence table 104: Bell LM et al, 2010

Bibliographic reference	Electronic health record-based decision support to improve asthma care: a cluster-randomized trial
Study type	Cluster randomised trial
Study quality	Low
Number of patients	n=19450
Patient characteristics	Children aged 2 to 18 years with persistent asthma
Intervention	Clinical decision support (CDS) alerts and reminders activated to guide clinicians to asthma management tools. The recommendations

	were personalized for each patient on the basis of information captured in the Paediatric Asthma Control Tool (PACT) and diagnosis and medication history. These alerts were defined by using the NAEPE guidelines. The asthma management tools available to all practices and available in the electronic health record consisted of: 1. the PACT data-entry tool for capturing asthma symptom frequency; 2. standardized documentation templates to facilitate severity classification; 3. order sets to facilitate ordering controller medications and spirometry; 4. an asthma care plan that can be supplied to families.
Comparison	Usual care, no active alerts
Length of follow up	1 year
Location	USA
Outcomes measures and effect size	**Proportion of children with persistent asthma with at least 1 prescription for a controller medication** There was a statistically significant increase in controller-medication prescriptions in the intervention urban practices compared with control urban practices (7% vs 1%, respectively; P=0.006). There was no significant difference seen in the suburban practice setting between intervention and control group for this outcome.
Source of funding	The authors have indicated they have no financial relationships relevant to this article to disclose.
Comments	• In the 6 months before the intervention, all 12 practices participated in an educational program designed to improve asthma knowledge and communication between clinicians and patients. • 4 clusters of practices were compared in the analysis: 2 control urban practices, 2 intervention urban practices, 4 control suburban practices, and 4 intervention suburban practices.
Abbreviations: NAEPP, National Asthma Education and Prevention Program.	

<Insert Note here>

Evidence table 105: Bosworth HB et al, 2009

Bibliographic reference	Patient education and provider decision support to control blood pressure in primary care: a cluster randomized trial
Study type	Cluster randomised trail
Study quality	Moderate
Number of patients	n=588
Patient characteristics	Patients had a mean age of 63 years and 98% male, 40% African-American with a diagnosis of hypertension.
Intervention	Computer-assisted medication decision support system (DSS), providing patient-specific recommendations at the point of care for managing hypertension. For example, intensifying therapy if blood pressure was found to be inadequately controlled.
Comparison	Hypertension reminder control (RC) was the control version of the decision support system that displayed the patients' most recent blood pressure, current blood pressure medications and an optional box for logging updated blood pressure. No alerts or reminders on the level of blood pressure control.
Length of follow up	2 years
Location	USA

<table>
<tr><td>Outcomes measures and effect size</td><td>Blood pressure control
Table showing mixed-effects model results: blood pressure control by intervention group
<table>
<tr><td></td><td>Baseline</td><td>24 months</td><td>Difference</td><td>P[a]</td></tr>
<tr><td colspan="5">Estimated % BP control (SE[b])</td></tr>
<tr><td>RC</td><td>32.0 (4.6)</td><td>43.9 (7.7)</td><td>11.9 (8.8)</td><td>0.18</td></tr>
<tr><td>DSS</td><td>44.9 (5.1)</td><td>43.7 (7.7)</td><td>-1.2 (9.1)</td><td>0.89</td></tr>
<tr><td>Patient behavioural intervention</td><td>44.2 (5.1)</td><td>59.5 (7.6)</td><td>15.7 (8.9)</td><td>0.08</td></tr>
<tr><td>Combined (DSS & Patient behavioural intervention)</td><td>36.2 (4.8)</td><td>48.1 (8.4)</td><td>11.8 (9.8)</td><td>0.23</td></tr>
<tr><td colspan="5">[a] P value refers to the expected baseline to 24-month change within each group
[b] table only includes estimated values as reported in the study generated from a mixed-effects model</td></tr>
</table>
There were no significant differences in the amount of change in blood pressure control in each of the intervention groups as compared to the reminder control group. In the decision support system (DSS) group there was a non-significant reduction in blood pressure control.

Health care use
The number of primary care visits over the 24-months was similar between the 4 groups. The mean number ranged from 7.1 for the combined group to 7.7 for the remainder control group (P=0.52). Health care use figure not reported for decision support intervention group</td></tr>
<tr><td>Source of funding</td><td>Department of Veterans Affairs, Veterans Health Administration, Health Services Research, and Development Service (Washington DC), investigator initiative grants.</td></tr>
<tr><td>Comments</td><td>• Provider clusters were randomised to decision support intervention or hypertension reminders. Patients in the decision support group were then randomised to a telephone behavioural intervention or no behavioural intervention. Patients in the hypertension reminders group were also randomly allocated to either telephone behavioural intervention or no behavioural intervention.
• Inadequate blood pressure control was defined as SBP >140mm Hg and DBP >90mm Hg for non-diabetics and SBP>130mm Hg and DBP >85mm Hg for diabetics according to the JNC VI guidelines.
• The decision support intervention was displayed at 68% (n=929 of 1370) of all patient visits and providers interacted with the intervention 57% (n=528 of 929) of the time.</td></tr>
<tr><td colspan="2">Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; JNC VI guidelines,The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure 1997.</td></tr>
</table>

Evidence table 106: Bourgeois FC et al, 2010

Bibliographic reference	Impact of a computerized template on antibiotic prescribing for acute respiratory infections in children and adolescents
Study type	RCT
Study quality	Low
Number of patients	n=12,316
Patient characteristics	Patients were 18 years old or under presenting with a diagnosis of acute respiratory infection (ARI)

Intervention	The acute respiratory infection-interactive template (ARI-IT) was embedded into the electronic health records that assisted physicians in the management of 8 ARIs and also included options for weight-based, age- and diagnosis-appropriate antibiotic prescriptions.
Comparison	Usual care
Length of follow up	6 months
Location	USA
Outcomes measures and effect size	**Antimicrobial use (proportion of all ARI visits that generated an antibiotic prescription, regardless of diagnosis)** Clinicians in the control group prescribed antibiotics for 46% of all ARI visits, whereas clinicians in the intervention group prescribed antibiotics for 39.7% of visits (p=0.84) – no significant difference (adjusted for clinician clustering). Intervention group clinicians who were users of the ARI-IT were significantly less likely to prescribe antibiotics for visits in which the ARI-IT was used (31.7% of ARI visits) compared with visits in which ARI-IT was not used (39.9% of ARI visits; P=0.020).
Source of funding	Agency for healthcare research and quality grant Improving paediatric safety and quality with healthcare IT.
Comments	none
Abbreviations: ARI, acute respiratory infection.	

Evidence table 107: Boustani MA et al, 2012

Bibliographic reference	Enhancing care for hospitalized older adults with cognitive impairment: a randomized controlled trial
Study type	RCT
Study quality	Moderate
Number of patients	n=424
Patient characteristics	Hospitalised older adults (at least 65 years old) with cognitive impairment.
Intervention	A clinical decision support system (CDSS) alerts the physicians of the presence of cognitive impairment, recommends early referral into a geriatric consult, and suggests discontinuation of the use of Foley catheterization, physical restraints, and anticholinergic drugs. If the physician ordered any of the 18 inappropriate anticholinergics, they received interruptive alerts recommending that the drug be stopped, suggesting an alternative medication, or recommending dose modification.
Comparison	Usual care
Length of follow up	21 months
Location	USA, hospital
Outcomes measures and effect size	**Discontinuation of potentially inappropriate anticholinergic medicines** Table showing differences between the intervention group and the usual care group in regard to physician prescribing behaviour for anticholinergic medicines

	CDSS (n=199)	Usual care (n=225)	P value[a]
% Anticholinergic order, (n)			
First 48 hours	13.6% (27)	14.7% (33)	0.91
Entire hospital stay	23.6% (47)	21.3% (48)	0.33
% Anticholinergic discontinuation order, (n)[b]			
First 48 hours	7.4% (2/27)	3.0% (1/33)	0.46

Entire hospital stay	48.9% (23/47)	31.2% (15/48)	0.11
[a] P value adjusted for baseline gender and Charleston Comorbidity Index score [b] Denominator was the number of orders eligible for discontinuation			

Physicians receiving the CDSS issued more discontinuation orders of definite anticholinergics; however, this result was not statistically significant.

Health outcomes

No statistically significant effects on the following health outcomes:

- the mean days of hospital stay (intervention: 7.7 days vs usual care: 6.8, p= 0.12),
- 30-day mortality rate (intervention: 6% vs usual care: 5.8%, p=0.69),
- home discharge (intervention: 43.2% vs usual care: 36.9%, p=0.13),
- 30-day readmission rates (intervention: 18.6% vs usual care: 16.4%, p=0.53)

Source of funding	National Institute on Aging.
Comments	• The study investigators and the expert panel jointly selected the list of prohibited anticholinergic medications (along with suggestions for alternatives) and the process of eliminating physical restraints. The team selected only 18 medications with moderate to severe centrally acting anticholinergic properties as inappropriate for patients with cognitive impairment and offered alternative treatments, changed doses of ordered medications, or discontinued medications.

Evidence table 108: Chen YX et al, 2009

Bibliographic reference	Impact of decision support in electronic medical records on lipid management in primary care
Study type	RCT
Study quality	Moderate
Number of patients	n=64,250
Patient characteristics	All active patients aged 20-79 years. Active was defined in the study as having at least one office visit to the study physician in the year before and the year after the intervention began.
Intervention	Interactive point-of-care electronic medical record (EMR) disease management tool that was integrated into the physicians usual encounter form. Part of the tool consisted of an electronic form that contained prompts regarding suboptimal care based on the Adult Treatment Panel III guidelines (ATP-III) on lipid management.
Comparison	Usual care
Length of follow up	1 year
Location	USA
Outcomes measures and effect size	**Proportion of high-risk patients with an LDL-C ≥130mg/dl who were prescribed lipid lowering medicines** Table showing change in lipid management from baseline to study end

	Intervention			**Control**		
	Baseline	End	P*	Baseline	End	P*
Lipid modification if not at goal risk group, high	63.2	70.1	<0.001	55.8	62.8	<0.001
*P value for difference from baseline to end point by McNemar test for matched pairs						

The proportion of high-risk patients on lipid modifying medicines if not at

	goal increased significantly for both intervention and control groups.
Source of funding	Not specified
Comments	• Control group significantly younger with low risk compared to intervention group. The authors stated that these differences were not unexpected given that the groups were randomised by practice and not by patient.
Abbreviations: LDL-C, low density lipoprotein cholesterol.	

<Insert Note here>

Evidence table 109: Eaton CB et al, 2011

Bibliographic reference	Translating cholesterol guidelines into primary care practice: a multimodal cluster randomized trial.
Study type	RCT
Study quality	Moderate
Number of patients	n=4239
Patient characteristics	Patient criteria not specified in the study.
Intervention	Intervention practices received a patient education toolkit, a computer kiosk with patient activation software, and a personal digital assistant-based decision support tool for each physician, which included 4 booster academic detailing sessions. This software determined the patient's lipid diagnosis, calculated the LDL non-HDL cholesterol as per National Cholesterol Education Program (NCEP) Adult Treatment Panel III guidelines (ATP-III) on lipid management goals (when appropriate), made recommendations regarding therapeutic lifestyle management and provided optimal dosage of lipid-lowering therapy tailored to the patient's risk factor status to meet the ATP III goals.
Comparison	Control practices received a personalised digital assistant but without the decision support tool and had minimal further contact to mimic usual care.
Length of follow up	1 year
Location	USA
Outcomes measures and effect size	**Proportion of patients screened and treated according to the 2001 NCEP ATP-III Cholesterol Management Guidelines to their LDL and non-HDL cholesterol goals within 1 year of the intervention.** There was no statistically significant difference between the intervention and control groups over time in screening or guideline-appropriate treatment.
Source of funding	Not specified
Comments	• The physicians reported that the tool changed their recommendations 27% of the time, and 55% of the time it changed the patient's behaviour.
Abbreviations: LDL-C, low density lipoprotein cholesterol; HDL-C, high density lipoprotein cholesterol; CI, confidence interval; ICC, intra-class cluster coefficient.	

Evidence table 110: Field TS et al, 2009

Bibliographic reference	Computerized clinical decision support during medication ordering for long-term care residents with renal insufficiency.
Study type	RCT
Study quality	Moderate

<table>
<tr><td>Number of patients</td><td>n=833</td></tr>
<tr><td>Patient characteristics</td><td>Patients with renal insufficiency (average age 86 years)</td></tr>
<tr><td>Intervention</td><td>Alerts were triggered when a physician used the computerised prescriber order entry (CPOE) system to initiate an order for one of the specific medicines included in the computerised decision support system (CDSS) for a patient with renal insufficiency.
The CDSS had four types of alerts recommending; maximum frequency; maximum total daily dose; avoiding the use of the medicine selected and notifying the physician that the creatinine clearance could not be calculated due to missing data.</td></tr>
<tr><td>Comparison</td><td>Usual care (alerts were hidden but tracked in the control group)</td></tr>
<tr><td>Length of follow up</td><td>12 months</td></tr>
<tr><td>Location</td><td>Canada</td></tr>
<tr><td>Outcomes measures and effect size</td><td>Proportions of alerts that led to an appropriate final order of medicine
Table showing rates of appropriate medicine orders by alert type
<table>
<tr><th>Alert type</th><th colspan="2">Intervention</th><th colspan="2">Control</th><th>Relative risk (RR)</th><th>95% CI</th></tr>
<tr><td></td><td>Alert numbers</td><td>%</td><td>Alert numbers</td><td>%</td><td></td><td></td></tr>
<tr><td>Dose</td><td>114</td><td>75.4</td><td>134</td><td>79.9</td><td>0.95</td><td>0.83–1.1</td></tr>
<tr><td>Frequency</td><td>49</td><td>61.2</td><td>35</td><td>25.7</td><td>2.4</td><td>1.4–4.4</td></tr>
<tr><td>Avoid</td><td>64</td><td>40.6</td><td>65</td><td>15.4</td><td>2.6</td><td>1.4–5.0</td></tr>
<tr><td>Missing information</td><td>47</td><td>63.8</td><td>23</td><td>34.8</td><td>1.8</td><td>1.1–3.4</td></tr>
<tr><td>Total</td><td>274</td><td>62.8</td><td>257</td><td>52.1</td><td>1.2</td><td>1.0–1.4</td></tr>
</table>
The proportions of final orders of medicines for which doses were appropriate were similar between intervention and control groups.

A significantly higher proportion of orders for medicines were appropriate for frequency, medicines to avoid and missing information in the intervention group compared to the control group.

Across all categories of alerts, orders for medicines in the intervention group were more often significantly appropriate.</td></tr>
<tr><td>Source of funding</td><td>Agency for Healthcare Research and Quality</td></tr>
<tr><td>Comments</td><td>none</td></tr>
<tr><td colspan="2">Abbreviations: CI, confidence interval.</td></tr>
</table>

<Insert Note here>

Evidence table 111: Fiks AG et al, 2009

Bibliographic reference	Impact of electronic health record-based alerts on influenza vaccination for children with asthma
Study type	Cluster RCT (prospective)
Study quality	Low
Number of patients	During the study the year: n=11,919
Patient characteristics	Children and adolescents with asthma >60 months of age and <20 years of age.
Intervention	Influenza vaccine alerts appeared on the computer screen whenever a patient encounter was opened within the electronic health record for the

	study subject who was due for the vaccine and link was provided for the physician to order. The physician, in consultation with the family decided to order the vaccine. In addition a 30 minute internet-based slide presentation describing mortality and morbidity rates and current recommendations and contraindications for influenza vaccination was delivered by primary care paediatricians.
Comparison	Usual care
Length of follow up	18 months
Location	USA
Outcomes measures and effect size	**Rates of captured opportunities for influenza vaccination (visit-level analysis)** Rates of captured opportunities for vaccinations increased 3.8% from 12.3% to 16.1% at control practices and 4.8% from 14.4% to 19.2% at intervention sites, a difference of 1% (95% CI -2.4% to 4.9%), unadjusted analysis, (adjusted analysis 0.6% [95% CI -1.9% to 2.5%])
	Up-to-date influenza vaccination among patients with asthma Rates of up-to-date influenza vaccination increased from 44.2% to 48.2% at control sites and from 45% to 53% at intervention sites, a 4% (95% CI -1.3% to 9.1%) greater but not significant improvement.
Source of funding	Not specified
Comments	none
Abbreviations: CI, confidence interval.	

Evidence table 112: Fortuna RJ et al, 2009

Bibliographic reference	Reducing the prescribing of heavily marketed medications: a randomized controlled trial
Study type	RCT
Study quality	Moderate
Number of clinicians	n=257 (number of clinicians used in the study, in each arm)
Patient characteristics	Patient characteristics not specified in the study, only clinician characteristics specified.
Intervention	The decision support system provided alerts with recommendations for the alternatives generic zolpidem or trazodone when any new hypnotic prescriptions for the following study medicines (all under trade names in America); Ambien®, Sonata®, Lunetsa® or Rozerem® were selected. The decision support system also provided links to graphical summaries of current evidence from literature, prescribing information and patient educational material.
Comparison	Usual care, decision support system (as described above) plus educational sessions
Length of follow up	1 year
Location	USA
Outcomes measures and effect size	**Proportion of prescriptions for hypnotic medicines that were heavily marketed medicines** (study medicines/study medicines plus generic zolpidem or trazodone) Table showing changes in the proportion of prescriptions for heavily markets medicines after implementation of computerised prescribing

Study arms	Baseline period	Intervention period RR (95% CI)	Intervention period adjusted RR[a] (95% CI)	Ratio of RR[b] (95% CI)
Usual care	1.0	1.27 (1.05,	1.31 (1.08,	1.0

(control)		1.54)	1.60)	
Decision support	1.0	0.99 (0.84, 1.17)	0.97 (0.82, 1.14)	0.74 (0.57, 0.96)
Decision support plus education	1.0	1.03 (0.89, 1.21)	0.98 (0.83, 1.17)	0.74 (0.58, 0.97)

[a] adjusted for physician age, gender, full time status, years in practice, degree, primary care or urgent care physician
[b] a ratio of the risk ratios was used to compare the adjusted risk ratios between the intervention groups and control group.

The relative risk of prescribing heavily marketed medicines in the decision support group during the intervention period was less than in the usual group and similar for the decision support plus education group.

Source of funding	State Attorney General Consumer and Prescriber Education Grant Program
Comments	• The study also captured clinicians attitudes to the prescribing alerts through a survey.

Abbreviations: CI, confidence interval.

Evidence table 113: Gill JM et al, 2011

Bibliographic reference	Impact of electronic health record (EHR)-based clinical decision support on adherence to guidelines for patients on non-steroidal anti-inflammatory drugs (NSAIDs): a randomized controlled trial
Study type	RCT
Study quality	Low
Number of patients	n=5234
Patient characteristics	Active patients (visited the physician office at least 1 year before the study and 1 year during the study) at high risk for NSAIDs-related gastrointestinal complications. High-risk was defined as patients taking a traditional NSAID and had a gastrointestinal risk factor but were not taking a gastrointestinal protective medicine. Age not reported in study.
Intervention	EHR-based clinical decision support was to be used during office visits for high-risk patients. The decision support software consisted of a 2-part form. The first part alerted to the physician that the patient was on a NSAID and had a risk factor. The second part provided tools to prescribe gastroprotective medication, discontinue the NSAID or change it to one with less gastrointestinal risk
Comparison	Usual care
Length of follow up	1 year
Location	USA
Outcomes measures and effect size	**Proportion of patients who received guideline-concordant care** This was defined as having their traditional NSAID discontinued (including a switch to lower risk medicine), having a gastroprotective medicine or both.

Table showing guideline-concordant care overall and by risk factors

	No. (%) of patients with guideline-concordant care[a]		
Risk factor	**Intervention**	**Control**	**OR (95% CI)[b]**
Overall (any risk factor)	564 (25.2)	675 (22.4)	1.194 (1.005-1.419)
Individual risk factors			
History of peptic ulcer disease	118 (30.0)	104 (25.9)	1.314 (0.920-1.877)
Any concomitant medication[c]	394 (26.8)	477 (23.3)	1.232 (0.996-1.521)
Low-dose aspirin	228 (25.0)	254 (20.8)	1.298 (1.041-1.618)

	Other concomitant medication[d]	166 (29.7)	223 (27.1)	1.160 0.875-1.537)
	Age ≥75 years	171 (20.9)	253 (19.8)	1.043 (0.826-1.316)
	[a] traditional NSAID was discontinued and/or new gastroprotective medicine was co-prescribed [b] for patients with risk factor vs patients without risk factor, controlling for age, sex, and number of office visits during the study and clustering by clinician and practice [c] anticoagulation, antiplatelet medication (including aspirin), and/or systematic corticosteroid [d] other than low-dose aspirin			

For the overall at-risk group patients, 25.4% in the intervention group and 22.4% in the control group were provided guideline-concordant care, this difference was statistically significant (adjusted).

When looking at the individual components of guideline-concordant care, 9.6% in the intervention group and 7.5% in the control group were prescribed a new gastroprotective medicine during the study (adjusted OR 1.33 , 95% CI 1.01-1,74), while 18.6% in the intervention group and 16.4% in the control group had their traditional NSAID discontinued during the study (adjusted OR 1.18 95% CI 0.99-1.40).

Source of funding	AstraZeneca pharmaceuticals
Comments	• Risk factor definitions were based on guidelines from American College of Gastroenterolgy with some modifications. • Of the 43 intervention clinicians completing the study, 30% found the form helpful for improving patient care, whereas 44% found it disruptive to office work flow on more than rare occasions. The most common reason cited that it took too much time during patient visits.

Abbreviations: CI, confidence interval; OR, odds ratio.

Evidence table 114: Khan BA et al, 2013

Bibliographic reference	Clinical decision support system and incidence of delirium in cognitively impaired older adults transferred to intensive care
Study type	RCT
Study quality	Moderate
Number of patients	n=60
Patient characteristics	Patients were at least 65 years old, transferred to the intensive care unit (ICU) at any point during their hospital stay, and had cognitive impairment at the time of admission to the hospital.
Intervention	A clinical decision support system (CDSS) alerts the physicians of the presence of cognitive impairment, recommends early referral into a geriatric consult, and suggests discontinuation of the use of Foley catheterization, physical restraints, and anticholinergic drugs. If the physician ordered any of the 18 inappropriate anticholinergics, they received interruptive alerts recommending that the drug be stopped, suggesting an alternative medication, or recommending dose modification.
Comparison	Physicians providing care to patients randomised to usual care did not receive the clinical decision support system alerts but were able to review the results of the cognitive screening.
Length of follow up	21 months
Location	USA
Outcomes measures and effect size	M**ortality** There was no significant difference found between the 2 groups for

	in-hospital mortality and survival at 30 days after discharge.
	Order to discontinue use of anticholinergics In the intervention group 67% of anticholinergic orders were discontinued compared to 36% in the control group, P=0.37.
	Healthcare utilisation There was no significant difference found between the 2 groups for length of stay in ICU and in hospital and the percentage discharged home.
Source of funding	National Institutes of Health
Comments	• The study investigators and the expert panel jointly selected the list of prohibited anticholinergic medications (along with suggestions for alternatives) and the process of eliminating physical restraints. The team selected only 18 medications with moderate to severe centrally acting anticholinergic properties as inappropriate for patients with cognitive impairment and offered alternative treatments, changed doses of ordered medications, or discontinued medications.

Evidence table 115: Linder JA et al, 2009

Bibliographic reference	Documentation-based clinical decision support to improve antibiotic prescribing for acute respiratory infections (ARI) in primary care: a cluster randomised controlled trial
Study type	Cluster RCT
Study quality	Low
Number of patients	n=111,820
Patient characteristics	Not specified, all patients visiting for potential ARI
Intervention	The ARI Smart Form is an electronic health record-integrated, documentation based clinical decision support system for the care of patients with ARIs. The ARI Smart Form provides decision support in several ways. Clinicians' selection of a particular ARI diagnosis results in the generation of a diagnosis appropriate order set. Antibiotic prescribing and antibiotic choices are based on the recommendations of the Centers for Disease Control and Prevention (CDC) and the American College of Physicians (ACP).
Comparison	Usual care
Length of follow up	7 months
Location	USA
Outcomes measures and effect size	**Antibiotic prescribing rate for ARI visits** Clinicians prescribed antibiotics to 43% of patients with ARI diagnoses in control clinics and to 39% of patients with ARI diagnoses in intervention clinics (OR, 0.8; 95% CI, 0.6–1.2; P = 0.30).
	Antibiotic prescribing for antibiotic appropriate diagnosis or non-antibiotic appropriate ARI There was no significant difference in antibiotic prescribing for antibiotic appropriate ARIs (OR, 0.8; 95% CI, 0.5–1.3) or for non-antibiotic appropriate ARIs (OR, 0.9; 95% CI, 0.6–1.4).
	Healthcare utilisation The 30-day revisit rate to study clinics for control ARI visits was 26% (2566/10 007) and for intervention visits was 23% (2765/11 954; P = 0.32). The 30-day revisit rate to study clinics attributable to ARIs (a second visit

	within 30 days of the index ARI visit with another ARI diagnosis) was 9% 913/10 007) in control clinics and 8% (969/11 954) in intervention clinics (P = 0.29).
Source of funding	Agency for Healthcare Research and Quality
Comments	none
Abbreviations: CI, confidence interval; OR, odds ratio.	

Evidence table 116: McGinn TG et al, 2013

Bibliographic reference	Efficacy of an evidence-based clinical decision support in primary care practices: a randomized clinical trial
Study type	RCT
Study quality	Moderate
Number of patients	n=984
Patient characteristics	Median age of patients included was 46 years presenting with pneumonia or streptococcal pharyngitis.
Intervention	The clinical decision support was integrated into the electronic health record and consisted of 2 clinical prediction rules that were used at the point of care. The clinical prediction rules were based on providing support and management for pneumonia or streptococcal pharyngitis. Recommendations were provided to the physician based on the clinical prediction rule scores.
Comparison	Usual care
Length of follow up	1 year
Location	USA
Outcomes measures and effect size	**Changes in provider patterns of ordering antibiotics** The physicians in the intervention group were significantly less likely to order antibiotics (age-adjusted RR 0.74 95% CI 0.06-0.92) compared to the physician in the control group. The absolute risk of intervention was 9.2% and the number needed to treat was 10.8.
	Healthcare utilisation No significant differences were found between the intervention and the control groups in the proportion of visits resulting in a patient returning to the emergency department (P>0.99) or outpatient clinic (P=0.10) for follow up treatment.
Source of funding	Agency for Health and Quality Research
Comments	none
Abbreviations: CI, confidence interval; RR, risk ratio.	

Evidence table 117: O'Connor PJ et al, 2011

Bibliographic reference	Impact of electronic health record clinical decision support on diabetes care: a randomized trial
Study type	RCT
Study quality	Low
Number of patients	n=2556
Patient characteristics	Primary care physicians were eligible for the study if they practiced in a study clinic, provided care to at least 10 adults with type 2 diabetes, aged between 18–75 years.
Intervention	The electronic health record-based diabetes clinical decision support

	system was referred to as the Diabetes Wizard that provided recommendations to the physician consistent with evidence-based diabetes guidelines. The recommendations included treatments for managing diabetes type 2.
Comparison	Usual care
Length of follow up	6 months
Location	USA
Outcomes measures and effect size	**Change in HbA_{1c}** The intervention group diabetes patients had significantly greater improvement (intervention effect –0.26%; 95% confidence interval, –0.06% to –0.47%; P=0.01) in HbA_{1c} levels than control patients. The intervention had no significant positive or negative impact on proportion remaining in control for HbA_{1c} (intervention 78% vs control 79% intervention effect –0.8%; P=0.80)
	Change in blood pressure There was no significant difference in the mean change in systolic blood pressure (P=0.56) and mean diastolic blood pressure (P=0.38) between intervention and control groups. The intervention group diabetes patients had better maintenance of systolic blood pressure control (80.2% vs 75.1%, P=0.03) and non-significant better maintenance of diastolic blood pressure control (85.6% vs 81.7%, P=0.07)
	Change in low density lipoprotein–cholesterol (LDL-C) There was no significant difference between the intervention and control groups for the mean change in LDL-C (P=0.62) and for the proportion remaining in control for LDL-C values (P=0.53)
Source of funding	National Institute of Diabetes, Digestive, and Kidney Diseases (NIDDK) to Health Partners Research Foundation.
Comments	• Among intervention group physicians, 94% were satisfied or very satisfied with the intervention, and moderate use of the support system persisted for more than 1 year after feedback and incentives to encourage its use were discontinued.
Abbreviations: HbA_{1c}, glycated haemoglobin.	

<Insert Note here>

Evidence table 118: Saenz A et al, 2012

Bibliographic reference	Development and validation of a computer application to aid the physician's decision-making process at the start of and during treatment with insulin in type 2 diabetes: a randomized and controlled trial
Study type	RCT
Study quality	Moderate
Number of patients	n=697
Patient characteristics	Patients (average age 68 years) with type 2 diabetes mellitus on: • insulin therapy • insulin therapy plus oral antidiabetics • oral antidiabetics
Intervention	A clinical decision support system was developed by computer company on a Microsoft.NET platform that manages a Microsoft Access database on the physician’s computer. It contains the patient’s demographic data, glycaemic profiles, and recommendations to the physician. In order to

	make decisions to change the insulin standard and the dosage for a specific patient, the physician has the freedom to choose between their own professional criteria or accept the automated recommendations offered by the decision support system. The decision support system included algorithms based on the clinical practice guides of the American Diabetes Association and the International Diabetes Federation (IDF) and the American Association of Clinical Endocrinologists. However, when these algorithms did not offer solutions to each insulin regimen, that part of the algorithm was designed by the authors specifically for this decision support system and were based on clinical experience of the consultant endocrinologist.
Comparison	Usual care
Length of follow up	18 months
Location	Spain
Outcomes measures and effect size	**Change in HbA1c** In the intervention group, the final HbA1c was 7.19% (SD±0.93), with a difference from the start of -0.69% (P=0.001). In the control group, it was 7.71% (SD±1.37), with a difference from the start of -0.09% (P not significant). The difference between the 2 groups at the end of the trial was -0.52, (P=0.01), significantly favouring the intervention.
Source of funding	Partially financed by a research grant from the Fund for Health Research of the Ministry of Health and Consumption, Spain.
Comments	• The daily doses of insulin was significantly higher (by 7.9 international units, P<0.01) in the intervention group than the control group.
Abbreviations: HbA_{1c}, glycated haemoglobin; SD, standard deviation.	

<Insert Note here>

Evidence table 119: Schwarz EB et al, 2012

Bibliographic reference	Clinical decision support to promote safe prescribing to women of reproductive age: a cluster-randomized trial
Study type	RCT
Study quality	LOW
Number of patients	n=9972
Patient characteristics	Females aged 18–50 years with no evidence of sterilisation, menopause or infertility
Intervention	The simple CDS stated “concern has been raised about the use of this medication during pregnancy” when a potentially teratogenic medication was ordered for a 18–50-year-old female with no indication of sterility in her record. The multifaceted CDS expanded upon this by providing a structured order set and tailored alert text that incorporated intake data on women’s pregnancy intentions and contraceptive use. Both CDS systems delivered disruptive alerts requiring physician acknowledgement.
Comparison	Usual care (no decision support available) prior to the start of the 2 interventions being compared as described above. Primary care providers were randomized to receive either “simple” or “multifaceted” clinical decision support (CDS). During a particular time point of the study the multifaceted CDS was de-activated and these primary care providers continued to be followed, allowing comparison of the effect of the simple CDS to no CDS.
Length of follow up	19 months
Location	USA

Outcomes measures and effect size

Proportion of visits with documented provision of family planning services when a potentially teratogenic medication was prescribed and change in percentage of prescriptions of teratogenic medicines

Table showing change in study outcomes by intervention group following implementation of the CDS

	Simple CDS			Multifaceted CDS		
Time period	T0	T1	T2	T0	T1	T2
CDS received	None	simple	Simple	None	multifaceted	none
Encounters[a]	5433	4397	4745	7243	6962	6330
%(n) with a potentially teratogenic prescription	14.2 (772)	13.9 (610)	14.4 (683)	14.3 (1035)	13.0 (906)	13.5 (857)
%(n) with documented provision of family planning services when potential teratogens prescribed	25.5 (197)	27.2 (166)	30.2 (206)	23.3 (241)	25.9 (235)	27.4 (235)

[a] 'Encounter' = visit made to a study PCP by a woman aged 18–50 years with no evidence of sterilization, menopause or infertility, whether or not a potential teratogen was prescribed

There was no significant difference between the simple and the multifaceted CDS for the change in percentage of prescriptions of teratogenic medicines during the study period, absolute difference -0.5 (95% CI -1.5 to 0.5, P=0.30).

At T2, the simple CDS resulted with14.4% of prescriptions of teratogenic medicines compared to 13.5% with the group after multifaceted CDS was deactivated. There was no significant difference between the 2 groups 0.0 (95% CI-1.2 to1.2, P=0.94).

Following CDS implementation (period T1), the proportion of visits with documented provision of family planning services when a potentially teratogenic medication was prescribed increased in both CDS groups [(simple: +1.1 adjusted percentage points (95% CI:-0.8 to 3.0) vs. multifaceted: +0.9 adjusted percentage points (95% CI:-0.6 to 2.4)], but the difference in change between the groups was not significant. There was also no significant difference seen at period T2 between the simple CDS group and the deactivated multifaceted CDS group (no intervention).

Source of funding: Nor specified

Comments:
- The multifaceted group reported a greater increase in the number of times per month they discussed the risks of medication use during pregnancy (multifaceted: +4.9±7.0 vs. simple: +0.8±3.2, p=0.03). The simple CDS system was associated with greater clinician satisfaction.

Abbreviations: CI, confidence interval.

Evidence table 120: Strom BL et al, 2010

Bibliographic reference	Unintended effects of a computerized physician order entry nearly hard-stop alert to prevent a drug interaction: a randomized controlled trial
Study type	RCT
Study quality	Low

Number of patients	n=96 involved in the alerts
Patient characteristics	Not specified.
Intervention	The intervention included clinicians subject to an automatic electronic hard-stop alert of a trimethoprim-sulfamethoxazole or warfarin order entered into the computerised provider order entry system whenever an order was placed for trimethoprim-sulfamethoxazole with an already-active warfarin order, if warfarin was ordered for a patient already taking trimethoprim-sulfamethoxazole, or when ordering both simultaneously. The hard-stop alert appeared as a pop-up window that notified the clinician that the order could not be processed because of a significant potential drug-drug interaction.
Comparison	Usual care
Length of follow up	6 months (terminated 1 month earlier than planned)
Location	USA
Outcomes measures and effect size	**Proportions of "desired responses" (not reordering the alert-triggering drug within 10 minutes after alert firing).** The proportion of desired responses was 57.2% (111 of 194 hard stop alerts) in the intervention group and 13.5% (20 of 148) in the control group (adjusted odds ratio, 0.12 95% CI, 0.045-0.33). The greatest proportion of desired responses was observed in the first 3 months of the intervention, after which it steadily declined, suggesting that the effectiveness of the alert may have started to wear off.
Source of funding	University of Pennsylvania Health System and by cooperative agreement from the Agency for Healthcare Research and Quality.
Comments	• The study was terminated early because of 4 unintended consequences identified among patients in the intervention group: a delay of treatment with trimethoprim-sulfamethoxazole in 2 patients and a delay of treatment with warfarin in another 2 patients. • This intervention precipitated clinically important treatment delays in 4 patients who needed immediate drug therapy. These results illustrate the importance of formal evaluation and monitoring for unintended consequences of programmatic interventions intended to improve prescribing habits.
Abbreviations: CI, confidence interval.	

Evidence table 121: Tamblyn R et al, 2012

Bibliographic reference	The effectiveness of a new generation of computerized drug alerts in reducing the risk of injury from drug side effects: a cluster randomized trial
Study type	Cluster RCT
Study quality	High
Number of patients	n=5628
Patient characteristics	Patients were aged 65 years or older, had an active dispensed prescription for a psychotropic drug, or were prescribed a new psychotropic drug at a visit during the follow-up period. Psychotropic drugs included those with central nervous system side effects that increased the risk of injury: benzodiazepines, antidepressants, antipsychotics, anticonvulsants, antihistamines, and opiates.
Intervention	Intervention physicians received information about patient-specific risk of injury computed at the time of each visit using statistical models of non-modifiable risk factors and psychotropic drug doses. Risk thermometers presented changes in absolute and relative risk with each change in drug treatment.
Comparison	Usual care

Length of follow up	22 months
Location	Canada
Outcomes measures and effect size	**Injury risk from psychoactive medicines** The intervention reduced the risk of injury by 1.7 injuries per 1000 patients (95% CI 0.2/1000 to 3.2/1000; P=0.02). The effect of the intervention was greater for patients with higher baseline risks of injury (P<0.03).
Source of funding	Authors were individually funded or supported by: • The Canadian Institutes of Health Research and the Canadian Patient Safety Institute • The CIHR Frederick Banting and Charles Best Canada Graduate Scholarship and CIHR Emerging Team Grant • Canada Research Chair in Public Health Informatics
Comments	• The most common reason for not changing therapy in response to the alert was that physicians perceived the benefit of treatment to be greater than the risk. This reason was particularly common when the patient was starting new medication, possibly because a physician who starts a patient on medication will generally have decided that the benefit exceeds the risk before prescribing, even if the precise risk and benefit are not known.
Abbreviations: CI, confidence interval.	

Evidence table 122: Terrell KM et al, 2009

Bibliographic reference	Computerized decision support to reduce potentially inappropriate prescribing to older emergency department patients: a randomized, controlled trial
Study type	RCT
Study quality	Moderate
Number of patients	n=5162 patient visits to emergency department
Patient characteristics	Patient aged 65 and older who were being discharged from the emergency department.
Intervention	The intervention was computer-assisted decision support designed to reduce prescribing of medications that are potentially inappropriate for older adults. An expert panel chose to target nine high-use and high-impact potentially inappropriate medications. Decision support was provided only when a physician in the intervention group attempted to prescribe a targeted inappropriate medication for a patient aged 65 and older who was being discharged from the emergency department. For most, the recommendations varied according to the indication for prescribing the medication.
Comparison	Usual care
Length of follow up	31 months
Location	USA
Outcomes measures and effect size	**Proportion of emergency department visits by seniors that resulted in one or more prescriptions for an inappropriate medication** Intervention physicians prescribed one or more inappropriate medications during 2.6% of ED visits by seniors, compared with 3.9% of visits managed by control physicians (Odds ratio 0.55, 95% CI 0.34–0.89, P=0.02). This difference represents an absolute risk reduction of 1.3% (95% CI 0.4– 2.3%).
	Proportions of medications prescribed that were inappropriate The proportion of medications that were potentially inappropriate was significantly reduced, from 5.4% to 3.4% (Odds Ratio 0.59, 95%

	CI 0.41–0.85, P=0.006), with an absolute reduction of 2.0% (95% CI 0.7–3.3%).
Source of funding	This research was supported by the author's Jahnigen Career Development Award, which is funded by the American Geriatrics Society, the John A. Hartford Foundation, and Atlantic Philanthropies Inc.
Comments	• The most common reason for rejecting decision support was that the patient had no prior problems with the medication.
Abbreviations: CI, confidence interval.	

<Insert Note here>

Evidence table 123: Terrell KM et al, 2010

Bibliographic reference	Computerized decision support for medication dosing in renal insufficiency: a randomized, controlled trial
Study type	RCT
Study quality	High
Number of patients	n=6014 patient visits with prescription initially written for a target medicine (highlighted by the clinical decision support system)
Patient characteristics	Patients aged over 18 years who had a creatinine clearance level below the threshold for dosage adjustment.
Intervention	The clinical decision support provided dosing recommendations (via alerts) for targeted medicines in patients who had a creatinine clearance level below the threshold for dose adjustment.
Comparison	Usual care
Length of follow up	2 years
Location	USA
Outcomes measures and effect size	**Proportion of targets medicines that were excessively overdosed** Physicians in the intervention group excessively prescribed targeted medications significantly less often compared with control physicians, 43% vs 74%, P=0.001, effect size 31%, 95% CI 14% to 49%,
Source of funding	This research was supported by the author's Jahnigen Career Development Award, which is funded by the American Geriatrics Society, the John A. Hartford Foundation, and Atlantic Philanthropies Inc.
Comments	none
Abbreviations: CI, confidence interval.	

D.1.8 Medicines-related models of organisational and cross-sector working

Evidence table 1: Al Mazroui NR et al. 2009

Bibliographic reference	Influence of pharmaceutical care on health outcomes in patients with type 2 diabetes mellitus
Study type	RCT
Study quality	Low
Number of patients	n=240
Patient characteristics	Patients included had a confirmed diagnosis of Type 2 diabetes mellitus and receiving oral hypoglycaemic therapy, and had no exclusion criteria present (i.e. secondary forms of hypertension, serum creatinine >184mmol/l, macroalbuminuria >300mg/24h, history of cerebrovascular accidents, convulsive disorder, diabetic proliferative retinopathy or diabetic autonomic neuropathy).
Intervention	Patients who were randomized to the intervention group were educated on their illness and their medicines in a structured fashion, including discussion on risk of diabetes complications, proper dosage, side-effects and storage of medicines, healthy lifestyle and management of diabetes mellitus signs and symptoms through self-monitoring. The research pharmacist had discussions with the patient's physicians regarding medicines therapy and, if necessary, treatment modification was recommended, e.g. more intensive management of hypertension or simplification of dosage regimens if deemed appropriate.
Comparison	Usual care (from medical and nursing staff)
Length of follow up	12 months
Location	United Arab Emirates
Outcomes measures and effect size	**Change in clinical parameters** **Table showing change in mean values for clinical parameters**

Parameter	Baseline		At 12 months		P value
	Intervention	Control	Intervention	Control	
BMI (kg m-^{2})	28.34 (27.55, 29.13)	27.98 (27.09, 28.86)	27.29 (26.57, 28.02)	27.99 (25.15, 28.83)	0.004
Fasting blood glucose (mmol^{-1})	10.83 (10.28, 11.38)	10.26 (9.82, 10.70)	7.78 (7.50, 8.06)	9.48 (9.04, 9.91)	<0.001
HbA_{1c} (%)	8.5 (8.3, 8.7)	8.4 (8.2, 8.6)	6.9 (6.7, 7.1)	8.3 (8.1, 8.5)	<0.001
SBP (mm Hg)	131.4 (128.1, 134.7)	132.6 (129.0, 136.2)	127.2 (124.4, 130.1)	132.1 (130.8, 135.1)	<0.001
DBP (mm Hg)	85.2 (83.5, 86.8)	83.9 (82.0, 85.8)	76.3 (74.9, 77.7)	84.1 (82.4, 85.8)	<0.001
Serum TC (mmol^{-1})	5.26 (5.06, 5.45)	5.27 (5.07, 5.47)	4.47 (4.33, 4.61)	5.32 (5.12, 5.52)	<0.001
Serum HDL-C (mmol^{-1})	1.20 (1.16,1.25)	1.19 (1.13,1.24)	1.32 (1.27, 1.38)	1.20 (1.14, 1.25)	<0.01
Serum LDL-C (mmol^{-1})	3.55 (3.37, 3.74)	3.48 (3.31, 3.64)	3.04 (2.92, 3.16)	3.61 (3.44, 3.78)	<0.001
Serum triglycerides (mmol^{-1})	1.60 (1.46,1.74)	1.55 (1.43, 1.67)	1.25 (1.17, 1.33)	1.74 (1.61, 1.87)	<0.001

	Significantly favours intervention for the clinical parameter outcomes **Health-related quality of life questionnaire** Intervention group patients' quality of life scores improved over time ($P < 0.001$), whereas those of control group patients remained relatively constant. **Diabetes knowledge and medicines adherence** <u>Diabetes knowledge</u> At baseline: 60.8% ($n = 73$) of intervention group patients and 64.2% ($n = 77$) of control group patients had poor knowledge of medicines. At 12 months, 47% (55 out of 117) of the intervention group patients had poor knowledge compared with 64.1% (75 out of 117) in the control group. This indicates a positive impact on knowledge on medicines of the intervention group patients. <u>Medicines adherence</u> At baseline: non-adherence (self-reported) with prescribed medicines was 48.3% in the intervention group at baseline and 49.1% in the control group. At 12-months assessment: intervention group reported 21.4% and control group reported 32.5% non-adherence. Overall knowledge of medicines, medicines adherence and lifestyle adherence were significantly higher at the 12-month assessment in the intervention patients when compared with control group patients ($P < 0.05$). **10-year coronary heart disease (CHD) risk scores calculated by British National Formulary (BNF) and Framingham methods** <u>BNF risk calculation</u> The BNF risk prediction at 12 months indicated a marked increase in the number of patients (from baseline) at low risk (from 63.3% to 85.5%) in the intervention group, the control group decreased (from 65% to 59%), however percentage of patients in the moderate risk category in the control group increased from 31.7% to 37.6%, whereas in the intervention group, patients in the moderate risk group reduced from 36.7% to 13.7%. <u>Framingham risk calculation</u> At baseline, mean (CI) Framingham prediction scores were: Intervention: 10.6 (9.7, 11.4) Control: 11.4 (10.6, 12.2) At the 12-month assessment, mean (CI) Framingham prediction scores were: Intervention: 7.7 (6.9, 8.5; P < 0.001) Control: 11.5 (10.5, 12.3; P >0.05)
Source of funding	Not specified
Comments	• Carried out on a Arab population

	• For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service

Evidence table 124: Capoccia KL et al, 2004

Bibliographic reference	Randomized trial of pharmacist interventions to improve depression care and outcomes in primary care
Study type	RCT
Study quality	Low
Number of patients	n=74
Patient characteristics	Patients diagnosed with a new episode of depression and started on antidepressant medicines.
Intervention	In addition to usual care (see comparison below), the intervention group received follow-up contact and care provided by the clinical pharmacist or PharmD resident in conjunction with the primary care provider and if needed the study psychiatrist. Bimonthly, the pharmacist and the study psychiatrist review individual cases or have informal discussion sessions regarding treatment or counselling.
Comparison	Patients in usual care were encouraged to use all resources such as primary care providers, pharmacist, nurses and metal health providers.
Length of follow up	12 months
Location	USA
Outcomes measures and effect size	**Depression symptoms** Defined as a 50% or more decrease in SCL-20 score from baseline <table><tr><th>Follow-up</th><th>Control</th><th>Intervention</th></tr><tr><td>3 months</td><td>64%</td><td>52%</td></tr><tr><td>6 months</td><td>67%</td><td>72%</td></tr><tr><td>9 months</td><td>73%</td><td>75%</td></tr><tr><td>12 months</td><td>72%</td><td>80%</td></tr></table>Both intervention and control groups clinically improved in depression symptoms, however, the number with a 50% or more decrease in SCL-20 score during the study period did not differ between groups (χ^2_1= 0.75, p = 0.39). **Health outcomes** Mean SCL-20 and SF-12 mental health scores and the number of patients with a DSM-IV diagnosis of major depression improved from baseline in both groups during the 12-month follow-up period. However the overall difference between the groups during that follow-up period was not significant for the following study outcomes: • mean SCL-20 score (χ^2_1= 0.01, p = 0.92) • mean SF-12 mental health score (χ^2_1= 0.54, p = 0.46) • diagnosis of major depression (χ^2_1= 0.98, p = 0.32) • mean SF-12 physical health score (χ^2_1 = 1.76, p = 0.18). Subgroup analyses of the patients with major depression found no significant difference in SCL-20 scores between treatment Groups (χ^2_1 = 0.01, p = 0.94). **Healthcare utilisation** Self-reported visits to healthcare providers during follow-up. Using the Kruskal-Wallis test, subgroup analyses of specific health

	care providers found no difference between treatment groups in the number of visits to: • all health care providers (χ^2_1 = 0.0003, p = 0.99) • physicians (χ^2_1 = 0.02, p = 0.88) • psychiatrists or psychologists (χ^2_1 = 0.0003, p = 0.99) • emergency rooms (χ^2_1= 1.21, p = 0.27) • counsellors or other mental health providers (χ^2_1= 1.07, p = 0.30) • alternative medicine providers (χ^2_1= 0.57, p = 0.45). **Medicines adherence** Based on self-reported telephone interview (defined as use of antidepressants for at least 25 of the past 30 days) **Follow-up** / **Control** / **Intervention** 3 months / 81% / 85% 6 months / 73% / 78% 9 months / 67% / 48% 12 months / 57% / 59% No significant difference between the groups on adherence to antidepressants (X^2_1 =0.01, P=0.91). **Patient satisfaction** Questionnaire used to measure this outcome **Follow-up** / **Control** / **Intervention** 3 months / 58% / 78% 6 months / 73% / 88% 9 months / 77% / 78% 12 months / 77% / 80% There was no overall difference in satisfaction with depression care (χ^2_1 = 1.75, p = 0.19) or overall health care (χ^2_1 = 0.51, p = 0.48) between groups.
Source of funding	Unclear
Comments	• Hawthorne effect cannot be ruled out since patients in the intervention and control groups received follow-up telephone calls from a research assistant at 3,6,9 and 12 months. • Most patients did not adhere to the scheduled clinic visits at weeks 4 and 12. • For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service
Abbreviations: AUDIT, Alcohol Use Disorders Identification Test; SCL-20, Hopkins Symptom Checklist; DSM-IV SCID, The Major Depression module from the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; SF-12, Medical Outcomes Study Short Form 12.	

Evidence table 125: Carter BL et al. 2008

Bibliographic reference	A cluster-randomised trial to evaluate physician/pharmacist collaboration to improve blood pressure control
Study type	RCT
Study quality	Moderate

Number of patients	n=179
Patient characteristics	Patients were included in the study if they were aged 21 to 85 years with a diagnosis of hypertension: • did not have diabetes and their clinic BP was between 145−179 mmHg systolic BP or 95−109 mmHg diastolic BP • with diabetes with a clinic BP between 135−179 mmHg systolic BP or 85−109 mmHg diastolic BP were eligible.
Intervention	The pharmacist assessed the patient's regimen, suggested a goal BP and provided recommendations to improve BP control. The primary focus of the pharmacists was to address suboptimal medicines regimens. Patients with poor medicines adherence was also assessed and addressed. Pharmacists could not independently prescribe therapy so all changes were approved by the physician. Most recommendations to the physician were performed face-to-face during the patient visit but some physicians provided the authority for pharmacists to make dosage changes and then inform them immediately after the visit.
Comparison	Usual care
Length of follow up	9 months
Location	There were five intervention clinical pharmacists, four of whom were faculty or clinical pharmacy residents in the university family medicine intervention site. The fifth was placed into the community-based intervention clinic, USA.
Outcomes measures and effect size	**Mean difference in blood pressure (control minus intervention) at 9 months** After adjustment for the covariates, the mean difference: SBP: 8.7 (95% CI: 4.4, 12.9) mmHg DBP: 5.4 (95% CI: 2.8, 8.0) mmHg 24-hour BP effect size was nearly identical with a mean difference of 8.8 (95% CI: 5.0, 12.6) mmHg for SBP and 4.6 (95% CI: 2.4, 6.8) mmHg for DBP. **Control of BP at 9 months** Overall, BP was controlled in 89.1% of patients in the intervention group and 52.9% in the control group (adjusted odds ratio 8.9; CI: 3.8, 20.7; p<0.001) BP was controlled in 62.8% of non-diabetics in the control group and 91.4% in the intervention group (adjusted odds ratio of 10.2; CI: 3.4, 29.9; p<0.001). Patients with diabetes, BP was controlled in 23.5% of patients in the control group and 81.8% in the intervention group (adjusted odds ratio of 40.1; CI: 4.1, 394.7; p=0.002).
	Mean number of antihypertensives Intervention group (2.4 ± 0.9) Control group (1.9 ± 1.0) (p=0.003) Significantly higher in the intervention group **Medicines adherence** At baseline, medicines adherence was significantly better in the control group (89%) compared to the intervention group (71%) (p<0.001). There was no apparent reason for this baseline difference. By the 9 month visit

	there was no difference in medicines adherence (92% in the control group vs 94% in the intervention group p=0.369). **Side-effect score** There was no difference in the side effect score at baseline (mean 26.5 control group vs. 28.8 intervention group, p=0.397). In spite of the increase in medicines in both groups, side effects scores declined at 9 months to 18.3 in the control group (p=0.003 vs. baseline) and 22.2 in the intervention group (p = 0.014 vs. baseline). There was no difference in side effect scores between groups at 9-months (p=0.135).
Source of funding	National Heart, Lung, and Blood Institute
Comments	• For the purpose of the review question this particular model of care has been classed as collaborative care model

Evidence table 126: Choe HM et al. 2005

Bibliographic reference	Proactive case management of high-risk patients with type 2 diabetes mellitus by a clinical pharmacist: A randomised controlled trial
Study type	RCT
Study quality	Low
Number of patients	n=80
Patient characteristics	Patients who were eligible for study enrolment were high-risk individuals whose most recent HbA1c levels were 8.0% or greater.
Intervention	The clinical pharmacist evaluated patients' therapeutic regimens based on efficacy, safety, adverse effects, drug interactions, medicines costs, and monitoring. All therapeutic recommendations were discussed with the primary care physicians before significant therapy alterations. The clinical pharmacist followed up on disease management and medicines management protocols approved by the primary care physicians.
Comparison	Usual care
Length of follow up	12 months
Location	USA
Outcomes measures and effect size	**Change in HbA_{1C} level (reference range, 3.8%-6.4%)** **Table showing decrease in HbA_{1C} levels during 12-24-month follow-up (data is given as means ± SD unless otherwise indicated)** HbA_{1C} levels / Control / Intervention / P[a] Baseline / 10.2 ± 1.7 / 10.1 ±1.8 / 0.65 Final / 9.3 ± 2.1 / 8.0 ± 1.4 / 0.01 Decrease / 0.9 ± 2.0 / 2.1 ± 2.5 / 0.03 [a] based on Wilcoxon rank sum test Significantly favours intervention.
Source of funding	Funding for the clinical pharmacist was provided by the University of Michigan College of Pharmacy.
Comments	• Obtaining the final HbA_{1c} measurement was slightly shorter in the intervention group than the control group (13.6 vs. 14.9 months, P=0.046). • Findings demonstrated that those with poor glycemic control at baseline received most of the benefit of the intervention. • The study also reported on process measures as a secondary outcome measure one of which was the use of angiotensin converting

	enzyme inhibitors, however no figures were provided for this and the authors reported that there was no difference seen between the two groups. • For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service.

Evidence table 127: Crotty M et al. 2004 (1)

Bibliographic reference	Does the addition of a pharmacist transition co-ordinator improve evidence-based medication management and health outcomes in older adults moving from the hospital to a long term care facility? Results of a randomised controlled trial
Study type	RCT
Study quality	Low
Number of patients	n=110
Patient characteristics	Participants (recruited from 3 hospitals and assigned to 85 long term care facilities) included in the study had a life expectancy of ≥1 month and had a mean age of 82 years.
Intervention	Pharmacist transition coordinator involved coordinating: • Medicines management transfer summaries from hospitals • timely coordinated medication reviews by accredited community pharmacists • case conferences with physicians and pharmacists. The intervention focused on transferring information on medicines to care providers in the long-term care facilities, including the nursing staff, the family physician, and the accredited community pharmacist.
Comparison	Usual care, community pharmacists are paid to perform an annual medication review for residents of long term care facilities, usually independent of the GP and not necessarily coordinated with the first-time transfer.
Length of follow up	8 weeks
Location	Australia
Outcomes measures and effect size	**Change in medication appropriateness index (MAI)** Intervention (n=44) change in MAI score from baseline = 2.5 (1.4-3.7) Control (n=44) change in MAI score from baseline = 6.5 (3.9-9.1) P=0.007 The mean MAI was significantly lower in the intervention group compared with the control group.
	Hospital usage (emergency department visits and hospital readmissions) RR 0.38 (95% CI, 0.15-0.99, P=0.0035) **Worsening pain** RR 0.55 (95% CI, 0.32-0.94, P=0.023) The intervention group significantly improved the secondary outcomes above compared to usual care. There were no significant differences between intervention and control groups for the following secondary outcomes: **Adverse drug events** RR 1.05 (95% CI, 0.66-1.68, P=0.830)

	Falls RR 1.19 (95% CI, 0.71-1.99, P=0.514) **Worsening mobility** RR 0.39 (95% CI, 0.13-1.15, P=0.072) **Worsening behaviours** RR 0.52 (95% CI, 0.25-1.10, P=0.077) **Increased confusion** RR 0.59 (95% CI, 0.28-1.22, P=0.160)
Source of funding	Australian commonwealth department of Health and Ageing National Demonstration Hospital Program, Phase 4.
Comments	• The small study size may have led to the study's being underpowered to detect differences in secondary outcomes. • When the data for the patients who had died were included, the intervention had no effect on hospital usage in all patients (0.58 [0.28-1.21]). • Case conferencing that involved family physician, residential facility nursing staff, and community pharmacist and held within the first 4 weeks after admission to the facility took place in only 8 (14.3%) patients in the intervention group and 2 (3.7%) in the control group. • Majority of patients in both groups changed physicians as part of the transition into the long term care facility. • For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service.

Evidence table 128: Crotty M et al. 2004 (2)

Bibliographic reference	An outreach geriatric medication advisory service in residential aged care: a randomised controlled trial of case conferencing.
Study type	Cluster RCT
Study quality	Moderate
Number of patients	n=154 5 nursing care homes assigned to control and intervention
Patient characteristics	Included participants within the nursing care home met the following criteria: • difficult behaviour (pain and dementia-related) about whom staff would like more advice and information • prescribed more than five medicines.
Intervention	• The resident's GP, a geriatrician, a pharmacist, residential care staff and a representative of the Alzheimer's Association of South Australia attended the case conferences, which were held at the facility. • Residential care staff expanded on any issues in the case notes that required discussion and the Alzheimer's Association of South Australia representative discussed non-pharmacological management of dementia-related behaviour. • Each case conference was chaired by the GP, who used their medical records in addition to case notes from the facility. A problem list was developed by the GP in conjunction with the care staff and a

	medication review was conducted prior to each case conference.
Comparison	Usual care (no collaborative case-conferencing)
Length of follow up	3 months
Location	Australia
Outcomes measures and effect size	**Change in medication appropriateness index (MAI)** Intervention (n=54) change in MAI score from baseline = 4.10 (2.11-6.10) Control (n=50) change in MAI score from baseline = 0.41 (-0.42-1.23) p=0.004 MAI scores for benzodiazepines, p=0.017 Intervention (n=54) mean change in MAI score 0.73 (95% CI,0.16-1.30) Control (n=50) mean change in MAI score -0.38 (95% CI, -1.02-0.27) Multidisciplinary case-conferencing significantly reduced the use of inappropriate medicines in residential care. **Change in residents behaviour using the Nursing Home Behaviour Problem Scale (NHBPS)** Intervention (n=54) mean change in NHBPS from baseline = 1.2 (-9.1-11.6) Control (n=50) mean change in NHBPS from baseline = 3.9 (-2.7-10.5) mean change in NHBPS between control and intervention, P=0.191 NB: negative values indicates an decrease in NHBPS Multidisciplinary case-conferencing showed no significant difference in managing behaviour compared to usual care.
Source of funding	Quality Use of Medicines Evaluation Program 2000–2001, Health and Aged Care, General Practice National Innovations Funding Pool 1999–2000, Health and Aged Care.
Comments	• Improved medication appropriateness was only seen in those residents discussed in the case conference; no effect was seen on the medication appropriateness of other residents in the facility. • There were no significant differences between the within-facility control and the control groups, no evidence of a carry-over effect of the multidisciplinary case conferences to other residents in the facility was found. • For the purpose of the review question this particular model of care has been classed as collaborative care

Evidence table 129: Edelman D et al. 2010

Bibliographic reference	Medical clinics versus usual care for patients with both diabetes and hypertension: a randomized trial
Study type	RCT
Study quality	Low
Number of patients	n=239
Patient characteristics	Patients included in the study had both diabetes and hypertension (outpatient or inpatient diagnostic codes), were receiving medicines for diabetes, and had poorly controlled diabetes (most recent HbA_{1c} level >7.5%) and hypertension (most recent systolic blood pressure

	>140mmHg or diastolic blood pressure >90mmHg).
Intervention	• Group Medical Clinics (GMC) comprised 7 to 8 patients and a care team that consisted of a primary care general internist, a pharmacist, and a nurse or other certified diabetes educator. Each session included structured group interactions moderated by the educator. The pharmacist and physician adjusted medicines to manage each patient's HbA_{1c} level and blood pressure. The group met every 2 months. • Patients had their blood pressure checked and home blood glucose values collated when they arrived at each GMC session, and then they attended an educational session delivered by the nurse or educator. The group members chose topics from a list, so each GMC could tailor the education sessions to its members' needs. Sessions were interactive, and the nurse or educator facilitated conversation among the patients. • The pharmacist and the primary care internist reviewed patient medical records, blood pressures, and home blood glucose readings during each session and developed individualized plans for medicines or lifestyle management directed toward improving blood pressure and HbA_{1c} level. • Patients' primary care providers were informed of changes to medicines solely by means of the electronic medical record. Sessions lasted 90 to 120 minutes.
Comparison	Usual care
Length of follow up	Median 12.8
Location	USA
Outcomes measures and effect size	**Primary outcomes (adjusted figures as reported in study)** • Table showing primary outcomes

Outcomes	Intervention (n=133)	Control (n=106)	Mean difference between groups (95%CI)	p value
Mean SBP. mmHg				
Baseline[a]	152.9	152.9	-7.3 (-12.8 to -1.7)	0.011
Final	139.2	146.5		
Mean HbA_{1c} level, %				
Baseline[a]	9.2	9.2	-0.33 (-0.80 to 0.13)	0.159
Final	8.3	8.6		
[a] assumed a common baseline value between treatment groups				

Secondary outcomes

• Table showing secondary outcomes

Outcomes	Intervention (n=133)	Control (n=106)	Mean difference between groups (95%CI)	p value
Mean DBP. mmHg				
Baseline[a]	84.5	84.5	-3.8 (-6.9 to -0.8)	0.015
Final	78.3	82.1		
Mean perceived competence score				
Baseline[a]	14.1	14.1	1.6 (0.9 to 2.4)	<0.001
Final	16.1	14.5		

			Odds ratio (95% CI)	
Adherence, %[b]				
Baseline[a]	34	34	0.8 (0.5 to 1.4)	0.53
Final	38	42		
Blood pressure control, %[c]				
Midpoint	24	21	2.0 (1.0 to 4.2)	0.064
Final	22	12		
HbA1c control, %[c]				
Midpoint	12	14	1.5 (0.7 to 3.3)	0.33
Final	17	12		

[a] assumed a common baseline value between treatment groups
[b] using the scale by Morisky and collaegues
[c] uncontrolled in all patients at baseline

Number of emergency department and primary care visits

- Patients in the intervention group had 0.4 (CI, 0.20 to 0.70) fewer emergency care visits than the usual care group (0.9 vs. 1.3 visits per patient-year; P < 0.001).
- Patients in the intervention group also had 0.9 (CI, 0.2 to 1.5) fewer primary care visits (5.3 vs. 6.2 per patient-year; P = 0.010).
- For inpatient stays, 23 patients (17%) in the GMC group were hospitalized a total of 32 times and 23 patients (22%) in the usual care group were hospitalized a total of 39 times (OR, 0.8 [CI, 0.4 to 1.4]).

Number of adverse events

Most adverse events were similar between the groups with no significant difference in hypoglycaemia, hypotension, decrease in eGFR or elevated AST or ALT level.

More than 50% of patients in the intervention group reported no falls or light-headedness, compared with 37% in the usual care group (P = 0.006).

Source of funding	U.S. Department of Veterans Affairs Health Services Research and Development Service
Comments	• Measurements of effectiveness may have been limited by concomitant improvements in the usual care group that were due to co-intervention • The authors estimated an average GMC visit required 1.5 hours of physician time and 2 hours each of pharmacist and nurse time. In addition, physicians and pharmacist placed 104 brief (<5-minute) calls and 71 longer (5- to 30-minute) follow-up calls to the 133 patients in the GMC group. • For the purpose of the review question this particular model of care has been classed as collaborative care.

Abbreviations: CI, confidence intervals; SBP, systolic blood pressure; DBP, diastolic blood pressure: ALT, alanine aminotransferase; AST, aspartate aminotransferase; eGFR, estimated glomerular filtration rate.

Evidence table 130: Finley PR et al. 2003

Bibliographic reference	Impact of collaborative care model on depression in a primary care setting: a randomised controlled trial
Study type	RCT
Study quality	Very low

Number of patients	n=125
Patient characteristics	Patients were included who were started on new antidepressant therapy for the expressed purpose of treating depressive symptoms.
Intervention	Collaborative care model consisted of clinical pharmacy specialists providing medicines maintenance, patient education and follow-up patient care services at a clinic. Clinical pharmacy specialists proceeded to coordinate follow-up with the patients for six months through a combination of scheduled office visits and telephone calls. Working closely with psychiatric liaisons, pharmacists were granted limited prescribing privileges to provide co-management of medicines.
Comparison	Usual care involved brief counselling on the prescribed medicine, therapeutic end points, and side effects in a manner consistent with patient education routinely delivered to members receiving prescriptions from the health maintenance organisation outpatient pharmacy.
Length of follow up	6 months
Location	USA
Outcomes measures and effect size	**Patient-reported outcomes** Clinical and functional outcomes were measured using BIDS and WSDS • Change in BIDS score at 6 months (mean ±SD): Control group (n=24): -8.9±8.3 Intervention (n=54): -6.6±7.3 P=0.23 Non-significant trends were noted in the percentage of patients achieving remission and those exhibiting a therapeutic response. • Functional outcomes (evident from WSDS scores) indicated that 56% of the patients in the intervention group who returned the survey experienced an improvement in their condition and 67% of the control patients who returned a survey had the same benefit (p=0.357). • Patient satisfaction Responses to the survey were greater numerically (i.e. superior) for all 11 items addressing satisfaction and statistically significant differences were found for six of these measures (nonparametric analysis). Specifically, patients in the intervention group expressed greater satisfaction than did control patients with the personal nature of care, availability of providers, ability of providers to listen, explanation of why antidepressants were prescribed, explanation of how to take the antidepressants, and patient's overall satisfaction with the health maintenance organisation (p<0.05 for all measures, Wilcoxon scores of ranked sums). **Medicines adherence rate** Assessed using medication possession ratio (MPR) or in terms of compliance with HEDIS specifications. <u>Adherence in the early phase</u>: HEDIS: OR 2.11, 95% confidence interval [CI] 0.97-4.58, p=0.057 <u>Adherence in the continuation phase</u> HEDIS: OR 2.17, CI 1.04-4.51, p=0.038 MPR was higher for the intervention group than for the control group at both 3 months (0.92 vs 0.89, p=0.48) and 6 months (0.83 vs 0.77, p=0.26), but the difference did not achieve statistical significance. **Provider satisfaction** Assessed using a survey and reported as a figure in the paper:

	• Survey results returned by providers were very positive, conveying the physician's satisfaction with workflow, patient welfare, and the pharmacists' abilities. • Results of the provider satisfaction survey determined that primary care physicians were very pleased with the intervention and thought that the collaborative care model enabled them to increase productivity. **Medical resource utilisation** Assessed by mean number of visits/patient 12 months before and after randomization (reported in a figure in the paper): • Overall resource utilisation Increased slightly in the intervention group (5% increase in visits) and to a greater extent in the control group (24% increase in visits), a difference that was not statistically significant (p=0.54). • Primary care visits Collaborative care model experienced a 15% decrease in the total number of primary care visits, whereas the group receiving usual care had a 2% decrease (p=0.14 Student's t test between-group differences). • Emergency department visits The number of patients seeking emergency department visits increased slightly in the intervention group (7% increase in visits) and more dramatically in the usual care group (119% increase in visits, p=0.10 Student's t test). • Utilisation of psychiatric services Non-significant increase in utilization of psychiatric services was recorded for both study groups during the 12 months after randomization (p=0.66).
Source of funding	Funded in part by a grant from the Sidney Garfield Memorial Fund (as part of the Interregional Depression Initiative) and by an unrestricted educational grant from Pfizer Inc.,
Comments	• This aim of this study was to measure the effects of a collaborative care model that emphasized the role of clinical pharmacists in providing therapy management with medicines and treatment follow-up. • Study size too small to apply the findings. • For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service. • MPR was defined as the number of days' supply of medicine that the patient received during the 6-month study period, incorporating the quantity and strength of medicine as well as prescribing directions. The MPR values ranged from 0.167 (i.e., 1 month's supply during 6-month study period) to 1.0. For study purposes, full medicines adherence was defined as an MPR value of 0.83 or more during the 6-month follow-up period (i.e., minimum of 5 months' supply of antidepressant medicines dispensed). • Within the context of HEDIS specifications, subjects were assessed for compliance within the early treatment phase (defined as at least 84 days' supply of medicine during the first 114 days of treatment) and the continuation treatment phase (minimum of 180 treatment days during the 231-day study period).
Abbreviations: BIDS, Brief Inventory for Depressive Symptoms (a validated 14-item patient-rated survey that ranks the severity of symptoms on a 4-point scale [range 0-42]); WSDS, Work and Social Disability Scale (5-point scale used to assess the degree of disability ranging from absent to severe); HEDIS, Health Plan Employer Data Information Set.	

Evidence table 131: Hogg W et al. 2009

Bibliographic reference	Randomised controlled trial of a anticipatory and preventative multidisciplinary team care
Study type	RCT
Study quality	Low
Number of patients	n=241
Patient characteristics	Patients were 50 years or older.
Intervention	The intervention consisted of care provided by a multidisciplinary team. One pharmacist and 3 nurse practitioners (NPs) were added to the family practice. NPs delivered their care almost exclusively in the patients' homes or by telephone. Both performed comprehensive chart reviews and home visits for each patient at the start of the study. The pharmacist then conducted a medication management review, identifying potential medicines-related problems and actions required to address such issues. The pharmacist worked directly with the patients and in collaboration with the NPs and family physicians to address these and new medicines-related problems as they arose. Each patient's NP developed an individualised care plan in collaboration with the patient and in consultation with the pharmacist and the patient's family physician. The care plan identified the patient's active health issues and outlined the management goals that the patient and the team of providers would work toward over the course of the intervention.
Comparison	Usual care with family practice
Length of follow up	12-18 months (mean 14.9 months in each arm)
Location	Primary care setting in Canada
Outcomes measures and effect size	**Chronic disease management score** (see comments below) • Quality of care-chronic disease, proportion of patients (C=78, I=74): Absolute difference 0.091(0.037 to 0.144), p= 0.0013 • Diabetes, proportion of patients (C=39, I=40): Absolute difference 0.131 (0.036 to 0.226), p=0.0074 • CAD, proportion of patients (C=40, I=31): Absolute difference 0.050 (-0.008 to 0.109), p=0.090 • COPD, proportion of patients (C=20, I=22): Absolute difference 0.063 (-0.058 to 0.183), p=0.30 • CHF, proportion of patients (C=11, I=9): No differences between baseline and intervention **Intermediate outcomes:** Diabetes, mean HbA_{1c} % -0.04 (-0.09 to 0.02), p=0.19 Hypertension, mean systolic BP, mmHg -0.93 (-5.79 to 3.92), p=0.70, mean diastolic BP, mmHg -3.30 (-6.88 to 0.28), p=0.071
	SF-36 Physical component, score out of 100: Absolute difference 1.6 (-0.8 to 4.1), p=0.18 Mental component, score out of 100: Absolute difference -1.1 (-3.7 to 1.6), p=0.44

	HRQoL Self-assessed poor or fair health,%: Absolute difference 0.1 (-12.8 to 13.1), p=0.98 No. of unhealthy days in the last 30 days: Absolute difference -1.4 (-4.5 to 1.8), p=0.39 **IADL score** out of 31: Absolute difference -0.3 (-1.1 to 0.5), p=0.50 **Care giver burden** score out of 88: Absolute difference 5.0 (1.4 to 8.6), p=0.0070 **Any emergency department visit**, % of patients (compared by χ2 test): Absolute difference -4 (-16.4 to 8.4), p=0.46 Average number of emergency department visits (encounters during the intervention where 0 assigned as the baseline value): Absolute difference 0.10 (-0.38 to 0.18), p=0.48 **Any hospital admission**, % of patients (compared by χ2 test): Absolute difference 0 (-11.1 to 11.1), p=0.97 Average number of hospital admissions (encounters during the intervention where 0 assigned as the baseline value): Absolute difference -0.06 (-0.31 to 0.2), p=0.67
Source of funding	Ontario Ministry of Health and Long-Term Care Primary Health Care Transition Fund
Comments	• Part way through the study, the objective was altered to examine differences in the quality of care for chronic disease management (instead of emergency department visits) in 4 conditions - diabetes, coronary artery disease, congestive heart failure, and chronic obstructive pulmonary disease. • A CDM QOC (chronic disease management quality of care) composite score based on 12 indicator manoeuvres for 4 chronic diseases (diabetes, coronary artery disease, congestive heart failure, and chronic obstructive pulmonary disease) was developed to measure adherence to guidelines at study start and study end. Indicators were based on the guideline recommendations. This could only be evaluated in the subset of patients with at least 1 of these chronic conditions. • Quality-of-care scores were calculated for individual diseases, then combined to create an overall score for CDM in which each chronic disease had equal weight. • For the purpose of the review question this particular model of care has been classed as collaborative care.
Abbreviations: BP, blood pressure; CAD, coronary artery disease; CHF, congestive heart failure, CI, confidence interval, COPD, chronic obstructive pulmonary disease; HRQoL, health-related quality of life; IADL, instrumental activities of daily Living; SF-36, Short-Form 36.	

Evidence table 132: Hunt JS et al. 2008

Bibliographic reference	A randomised control trial of team-based care: impact of physician-pharmacist collaboration on uncontrolled hypertension
Study type	RCT
Study quality	Low
Number of patients	n=463

Patient characteristics	Patients included had a diagnosis of hypertension, and a last systolic blood pressure ≥160 mmHg and/or a last diastolic blood pressure ≥100mmHg.
Intervention	Consistent with Network-approved collaborative hypertension management guidelines, the pharmacists reviewed subjects' medicines and lifestyle habits, assessed vital signs, screened for adverse drug reactions, identified barriers to adherence, provided education, optimised the antihypertensive regimen, and scheduled follow-up appointments as judged necessary. Antihypertensive regimen optimisation included alterations in antihypertensive regimens to titrate the dose of an existing medicines, add a new agent, switch a medicine, or consolidate antihypertensive therapy. The pharmacist had access to patients' medical records to assist medicines selection and dosing, as well as access to the primary care physician (PCP) to discuss the hypertension treatment plan or other medical issues as needed. Following each interaction, a note was documented in the EMR and forwarded to the PCP for approval and co-signature.
Comparison	Usual care
Length of follow up	12 months
Location	Primary care setting in USA
Outcomes measures and effect size	**Primary outcomes** • Difference in mean systolic and diastolic blood pressure at study end Significant differences in mean systolic (Δ=6 mmHg, p=0.007) and diastolic (Δ= 3 mmHg, p=0.003) blood pressures between groups with subjects receiving collaborative care achieving lower systolic and diastolic blood pressures as compared to control. • In addition, 62% (88/142) of intervention subjects had a blood pressure <140/90 mmHg at the exit visit as compared to 44% (57/130) of control subjects (p=0.003). • The odds of achieving blood pressure target in the intervention group were 2.08 times higher than the control group (95% CI=1.29–3.38).
	Self-management At study end, there was no difference in hypertension-related knowledge scores between study arms with a mean score of 7.5 (SD=1.86) in the control arm and 7.9 (SD=1.65) in the intervention arm (p=0.27). There was a statistically significant interaction between time and group (p=0.0013) such that hypertension-related knowledge increased in the intervention arm and decreased in the control arm from study start to end. Only in the intervention arm, there was a significant difference in hypertension knowledge between those subjects who achieved the target blood pressure (mean score=8.2) and those who did not meet target (mean score=7.4, p=0.03). **Medicines adherence** There was no difference between groups at study end in the proportion of subjects reporting high medicines adherence 67% (95/142) intervention vs. 69% (90/130) control, p=0.77. **Resource utilisation** The total number of clinic visits (physician and pharmacist) was significantly higher in the intervention arm as compared to control. However, the number of physician visits was significantly lower in the

	intervention arm (3.2 vs. 4.7, p<0.0001). The number of office visits was not statistically associated with systolic blood pressure in either study arm (intervention: r=0.16, p=0.06 and control: r=–0.1, p=0.22), but was negatively associated with diastolic blood pressure in both study arms (intervention: r=–0.22, p=0.01 and control: r=–0.18, p=0.04) **Number of antihypertensive medicines** The number of antihypertensive medicines increased significantly in both groups as compared to baseline. Although subjects in the intervention arm were prescribed a higher number of antihypertensive medicines, there was a small but insignificant decrease in the daily pill burden of this group (explained by use of combination medicines). **Quality of life** Assessed using SF-36 There were no significant differences between groups with respect to subjects' quality of life at follow-up with the exception of the general health domain (p=0.01), in which scores were slightly higher in the control (mean [SD], 44 [6]) group compared to intervention (42 [6]). **Satisfaction with components of healthcare delivery and hypertension treatment** The overall satisfaction was 8.5 in the control group compared to 8.6 in the intervention group (p=0.75). There was no significant difference between groups in any of the 11 satisfaction measures and no association between satisfaction and blood pressure goal attainment (p=0.4)
Source of funding	Grant support from Boehringer Ingelheim was used to fund the cost of the educational mailings and the conduction of the study
Comments	• For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service

Evidence table 133: Jacobs M et al. 2012

Bibliographic reference	Pharmacist associated medication program enhancing the regulation of Diabetes (PAMPERED) study
Study type	RCT
Study quality	Low
Number of patients	n=396
Patient characteristics	Patients were 18 years or older with a documented glycosylated HbA_{1c} value greater than 8% obtained more than 6 months the data acquisition date.
Intervention	Pharmacist-patient clinic visits included obtaining a comprehensive medication review, performing targeted physical assessment including weight, height, blood pressure, pulse, and foot exam; educating on diabetes pathophysiology and importance of control; ordering laboratory tests, reviewing, modifying and monitoring patients medicines therapy and providing detailed counselling on all therapies, facilitating self-monitoring of blood pressure and providing reinforcement of dietary guidelines and exercise. Any adjustment in therapy, laboratory testing or referral to other services required approval by the referring physician before being implemented by the pharmacist.

Comparison	Usual care directed their physician
Length of follow up	12 months
Location	Primary care, USA
Outcomes measures and effect size	**Clinical outcomes at 12 months:** **HbA_{1c} (%), mean±SD** **Control – 8.4±1.6** **Intervention – 7.7±1.3** **P=0.003 significant difference, favours intervention** **Low density lipids (mg/dL), mean±SD** Control – 105.1±34.3 Intervention – 93.7±21.2 P=0.010 significant difference, favours intervention **Blood pressure (mmHg), mean±SD** Control – systolic, 135.4±14.0 Intervention – systolic, 132.5±16.3 P=0.223 - no significant difference **Control, diastolic, 77.6±8.4** Intervention, diastolic, 72.0±8.5 P=0.001- significant difference, favours intervention
	Secondary outcomes **Medicines use at 12 months, mean±SD** Control – 6.0±3.5 Intervention – 7.1±2.7 P=0.031 Intervention group had significantly more use of antiplatelets, angiotensin receptor blockers and statins then control group.
Source of funding	Unrestricted medical grant from Pfizer
Comments	• Population include was Caucasian and obese • For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service

Evidence table 134: Jameson JP et al. 2010

Bibliographic reference	Pharmacist collaborative management of poorly controlled diabetes mellitus: a randomised controlled trial
Study type	RCT
Study quality	Low
Number of patients	n=104
Patient characteristics	Patients with diabetes 18 years or older having HbA_{1C} levels of 9.0% or higher or no office visits within 12 months were included.
Intervention	The pharmacist followed guidelines of the Management of Hyperglycaemia in Type 2 Diabetes. This included early switching to insulin therapy after failure of 2 oral medicines. The patient's primary care physician approved any changes to medicines or therapy, although the pharmacist was given autonomy to adjust insulin doses as needed. The number of subsequent visits with the pharmacist was based on the need to further educate the patient about diabetes control or to monitor therapeutic changes. Follow-up visits were supplemented with telephone calls as needed for medicines management.

	Patients in the intervention group also met with the pharmacist at their respective primary care site for an assessment of adherence, barriers to optimizing blood glucose levels, and current medicines regimen. All intervention patients received individualized education regarding diabetes self-management, including diet, exercise, blood glucose level testing, medicines, and insulin.
Comparison	Usual care
Length of follow up	12 months
Location	Community-based primary care practice, USA
Outcomes measures and effect size	**Reduction in glycosylated haemoglobin, HbA_{1C} level** Table showing reduction in HbA_{1C} level by study group[a]

Variable	Reduction in HbA_{1C} level, median (interquartile range), %	P[b]
Overall **Intervention (n=52)**	**-1.50 (-0.03 to -2.68)**	**0.06**
Control (n=51)	**-0.40 (0.50 to -2.10)**	
Patients of white race ethnicity **Intervention (n=36)**	**-1.8 (-0.2 to -2.7)**	**0.05**
Control (n=29)	**-1.2 (0.0 to -2.5)**	
Patients of non-white race ethnicity **Intervention (n=16)**	**-1.1 (0.1 to -1.9)**	**0.07**
Control (n=22)	**-0.1 (1.4 to -0.9)**	
Male patients **Intervention (n=25)**	**-1.90 (-0.05 to -2.95)**	**0.03[c]**
Control (n=26)	**-0.15 (0.98 to -1.38)**	

[a] There was a trend for greater improvement in the intervention group. Post hoc analysis showed significantly greater improvement among male patients in the intervention group.
[b] Mann-Whitney test
[c] Statistically significant

The overall median HbA_{1C} reduction in the intervention group was 1.1% greater than that of the control group. This difference did not achieve statistical significance.

Post hoc subgroup analysis showed that male patients in the intervention group achieved a statistically significant improvement in their HbA_{1C} level (see comments below)

Table showing patients who received at least 1.0% decrease in HbA_{1C} level[a]

Variable	No. (%)	P[b]
Overall **Intervention (n=52)**	**35 (67.3)**	**0.02[c]**
Control (n=51)	**21 (41.2)**	
Patients of white race ethnicity **Intervention (n=36)**	**25 (69.4)**	**0.23**
Control (n=29)	**16 (55.2)**	

	Patients of non-white race ethnicity **Intervention (n=16)** **Control (n=22)**	**9 (56.3)** **5 (22.7)**	**0.03**[c]
	Female patients **Intervention (n=27)** **Control (n=26)**	**16 (59.3)** **13 (50.0)**	**0.49**
	Male patients **Intervention (n=25)** **Control (n=26)**	**18 (72.0)** **7 (28.0)**	**0.002**[c]
	[a] Statistically significant differences were found in the intervention group overall. Secondary analysis showed significant improvement in the intervention group among male patients and among patients of non-white race/ethnicity. [b] X^2 test [c] Statistically significant		
Source of funding	Advantage Health Physician Network, Doran Foundation, Michigan Pharmacist Foundation, Priority Health, and Western Michigan Society of Health System Pharmacists.		
Comments	• There was one severe hypoglycaemic event in the intervention group. The study was unable to assess adverse events in the control group. • The HbA_{1C} changes were not normally distributed, so median values were used as the measure of central tendency. • Study was not originally powered to detect subgroup differences. • For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service.		

Evidence table 135: Jareb AS et al. 2012

Bibliographic reference	Randomised controlled trial of clinical pharmacy management of patients with type 2 diabetes in an outpatient diabetes clinic in Jordon
Study type	RCT
Study quality	Very low
Number of patients	n=171
Patient characteristics	Patients were included in the study if they were aged 18 years or older, treated at Royal Medical Services Hospital and diagnosed with type 2 diabetes at least 1 year previously, took at least 1 prescribed medicine for diabetes, and had an HbA1c level exceeding 7.5%.
Intervention	A clinical pharmacist intervention that consisted of optimizing pharmacotherapy, individualized self-management education, adherence support, and regular telephone follow-up
Comparison	Usual care provided by the medical and nursing staff, which included patient assessment, a 3- or 6-month review at which blood glucose and blood pressure were measured, advice on self-monitoring of blood glucose (SMBG), and nutrition counselling
Length of follow up	6 months
Location	Outpatient diabetes clinic, Jordon
Outcomes measures and effect size	**Glycaemic control using HbA_{1c} level** Percentage change at 6 month, mean difference (95% CI) **Control: 0.1 (-0.4 to 0.7), Intervention: -0.8 (-1.6 to 0.1), p=0.019 (t test)** Significantly favours intervention
	Secondary outcomes

Other key biomarker values change at 6 months[a] reported in the study presented in table below:

Biomarker	Intervention (n=77)	Control (n=79)	p value (change)[b]
FBG (mmol/L)	-2.3 (-5.7 to 1.1)	0.9 (-0.8 to 2.8)	0.014[c]
Systolic BP (mmHg)	-5.8 (-8.2 to -3.2)	1.1 (0.1 to 2.4)	0.035[c]
Diastolic BP (mmHg)	-7.1 (-9.8 to -4.2)	1.8(-1.1 to 4.8)	0.026[c]
Serum cholesterol (mmol/L)	-0.7 (-1.7 to 0.3)	0.1 (-3.1 to 3.8)	0.040[c]
LDL-C (mmol/L)	-0.6 (-1.7 to 0.6)	0.0 (-0.4 to 0.4)	0.031[c]
HDL-C (mmol/L)	-0.15 (-2.0 to 1.8)	0.0 (-0.7 to 0.9)	0.728
Serum triglycerides (mmol/L)	-0.5 (-2.8 to 2.1)	0.2 (-0.7 to 1.9)	0.017[c]
Body mass index (kg/m^2)	-0.5 (-1.9 to 2.0)	0.4 (-0.7 to 1.9)	0.189

[a] shown as mean difference (95% CI)
[b] p values from t test for independent samples for the between-group comparisons of baseline to follow-up change amounts.
[c] statistically significant – favours intervention

- Other study outcomes at 6 months presented in the table below:

Outcome	Intervention (n=77)	Control (n=79)	p value[a]
No. of medicines[b]	7 (6-8)	8 (6-10)	0.375
No. of antidiabetic medicines[b]	2 (1-4)	2 (1-3)	0.213
Patients on insulin therapy[c]	79.2% (61)	78.5% (62)	0.881
Patients taking antihypertensive therapy[c]	89.6% (69)	87.3% (69)	0.782
Patients taking statin therapy[c]	81.8% (63)	67.1% (53)	0.038[d]
Patients who achieved target HbA_{1C} < 7%[c]	23.4%	15.2%	0.031[d]
Patients who achieved target BP <130/80mmHg[c]	80.5% (62)	46.8% (37)	0.012[d]

Patients who achieved LDL-C target <2.6mmol/L[c]	54.5% (42)	30.4% (24)	0.018[d]
Patients who self-reported medicines non-adherence[c]	28.6% (22)	64.6% (51)	0.003[d]
Domains of SDSCA questionnaire[e]			
Total diet score[b]	4.7 (2.5 to 7.1)	3.8 (2.8 to 4.8)	0.041[d]
Physical activity score[b]	3.7 (3.0 to 4.5)	2.7 (0.9 to 3.0)	0.025[d]
SMBG score[b]	5.3 (2.2 to 7.6)	4.0 (0.5 to 7.9)	0.007[d]
Foot care[b]	3.5 (1.8 to 5.5)	3.0 (1.0 to 5.2)	0.172
Current smoker	53.2% (41)	46.8% (37)	0.331

[a] p values from Pearson chi-square test for categorical variables and Mann-Whitney U test for continuous variables.
[b] Values expressed as median (interquartile range).
[c] Values expressed as % (n)
[d] statistically significant – favours intervention
[e] Each score included in the table is the mean value of the answer to the questions included in each domain (e.g., the diet domain score was calculated as the sum of scores on questions about diet, divided by 4 because there were 4 questions for that domain).

Source of funding	All authors certify that there was no external funding for this research paper
Comments	• Although the study outcomes were statistically more favourable in the intervention group compared with usual care, the study was underpowered because the trial enrolled a small number of patients due to limited availability of a single investigator. • Generalisability of the results limited due to Arabic population in the study and model of healthcare in Jordon different compared to the UK. • For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service

Abbreviations: BP, blood pressure; FBG, fasting blood glucose; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; CI, confidence interval; SDSCA, Summary of Diabetes Self-Care Activities; SMBG, self-monitoring of blood glucose.

Evidence table 136: Krass I et al. 2007

Bibliographic reference	The pharmacy diabetes care program: assessment of a community pharmacy diabetes service model in Australia
Study type	RCT
Study quality	Low
Number of patients	n=299
Patient characteristics	Patients had: • type 2 diabetes • HbA_{1C} ≥7.5%, who were taking at least one oral glucose lowering medicineor insulin • HbA_{1C} ≥7.0%, who were taking at least one oral glucose lowering

<table>
<tr><td></td><td>medicine or insulin and who were on at least one anti-hypertensive, angina or lipid-lowering medicine.</td></tr>
<tr><td>Intervention</td><td>The elements of the service included a pharmacist review of self-monitoring blood glucose (SMBG), disease, medicines and lifestyle education; adherence support and detection of medicines-related problems; and referral to the patients GP when appropriate.</td></tr>
<tr><td>Comparison</td><td>Usual care – no visits during the intervention phase</td></tr>
<tr><td>Length of follow up</td><td>6 months</td></tr>
<tr><td>Location</td><td>Community pharmacy, Australia</td></tr>
<tr><td>Outcomes measures and effect size</td><td>Clinical outcomes
<table>
<tr><th>Outcome</th><th>Study group</th><th>Mean difference (95% CI)</th><th>Intervention vs control p value[a]</th></tr>
<tr><td rowspan="2">HbA_{1C} (%)</td><td>Intervention (n=125)</td><td>-1.0 (-0.8 to -1.3)</td><td rowspan="2"><0.01[c]</td></tr>
<tr><td>Control (n= 107)</td><td>-0.3 (-0.003 to -0.5)</td></tr>
<tr><td rowspan="2">BMI (kg/m^2)</td><td>Intervention (n=136)</td><td>-0.4 (-0.8 to -0.01)</td><td rowspan="2">0.37</td></tr>
<tr><td>Control (n= 131)</td><td>0.2 (-0.1 to 1.3)</td></tr>
<tr><td rowspan="2">Systolic BP (mmHg)</td><td>Intervention (n=87)</td><td>-2.2 (-5.4 to 1.0)</td><td rowspan="2">0.06</td></tr>
<tr><td>Control (n=92)</td><td>2.6 (-0.9 to 6.1)</td></tr>
<tr><td rowspan="2">Diastolic BP (mmHg)</td><td>Intervention (n=87)</td><td>-2.4 (-4.8 to -0.1)</td><td rowspan="2">0.52</td></tr>
<tr><td>Control (n=92)</td><td>-1.3 (-3.7 to 1.1)</td></tr>
<tr><td rowspan="2">Total cholesterol (mmol/L)</td><td>Intervention (n=112)</td><td>-2.1 (-4.1 to -0.02)</td><td rowspan="2">0.85</td></tr>
<tr><td>Control (n=98)</td><td>-2.1 (-4.4 to -0.01)</td></tr>
<tr><td rowspan="2">Triglycerides (mmol/L)</td><td>Intervention (n=112)</td><td>-0.3 (-0.05 to –0.5)</td><td rowspan="2">0.39[b]</td></tr>
<tr><td>Control (n=98)</td><td>-0.1 (-0.08 to -0.3)</td></tr>
<tr><td colspan="4">Changes over 6 months are mean difference (95% CI)
[a] Repeated measures multivariate ANOVA unless otherwise noted
[b] Mann-Whitney U-test on change scores
[c] Statistically significant – favours intervention</td></tr>
</table>
Quality of life
<table>
<tr><th>EQ-5D</th><th></th><th>Mean difference (95% CI)</th><th>Intervention vs control p value[a]</th></tr>
<tr><td rowspan="2">Utility score (range -0.6 to 1.0)</td><td>Intervention (n=143)</td><td>-0.04 (-0.08 to 0.005)</td><td rowspan="2">0.07b</td></tr>
<tr><td>Control (n= 137)</td><td>-0.02 (-0.04 to 0.03)</td></tr>
<tr><td rowspan="2">Health state scale (range 1-100)</td><td>Intervention (n=142)</td><td>5.3(1.73 to 8.8)</td><td rowspan="2">0.02b, c</td></tr>
<tr><td>Control (n= 137)</td><td>1.1 (-1.6 to 3.8)</td></tr>
<tr><td colspan="4">Changes over 6 months are mean difference (95% CI)</td></tr>
</table></td></tr>
</table>

	[a] Repeated measures multivariate ANOVA unless otherwise noted [b] Mann-Whitney U-test on change scores [c] Statistically significant – favours intervention
	Medication changes The mean number of glucose-lowering medicines taken increased from 1.8 at baseline to 2.0 in the intervention group with no change in the control group, (p=0.04).
Source of funding	Unclear
Comments	• For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service
Abbreviations: BMI, body mass index; CI, confidence intervals.	

Evidence table 137: Lee VW et al. 2009

Bibliographic reference	Clinical impact of a pharmacist-physician co-managed programme on hyperlipidaemia management in Hong Kong
Study type	RCT
Study quality	Low
Number of patients	n=119
Patient characteristics	Patients in the study were: • 18 years or older and were taking one or more lipid-modifying agents for dyslipidaemia • they had a baseline lipid profile within the previous 6 months that was not reaching targeted LDL-C goal based on the National Cholesterol Education Programme Adult Treatment Panel III guideline.
Intervention	In addition to usual care, the intervention group were seen by the pharmacist for 15-30mins and had the following: • Assessment for compliance • Assessment of patients' medicines knowledge and health belief • Identification and management of medicines-related problems • Education on reasons for taking lipid-lowering agents, co-morbidities associated with dyslipidaemia, consequences of non-compliances • Education on side-effects and precautions • Reinforcement of lifestyle modifications • Undertake pharmacological interventions if needed • Establish a follow-up plan • Phone follow-up and 2nd counselling and assessment and lipid profile obtained • Modification to any therapy was discussed with the physician
Comparison	Usual care
Length of follow up	1 year
Location	Clinic setting in Hong Kong
Outcomes measures and effect size	**LDL-C levels** Table below shows the change in lipid profiles at the end of the study

	Mean (SD) at study end		Mean difference (SD)		P-value
	Intervention (58)	Control (60)	Intervention (58)	Control (60)	
LDL-C (mmol/L)	2.80 (0.89)	3.24 (0.78)	-0.72 (0.09)	-0.12 (0.20)	<0.001

	HDL-C (mmol/L)	1.26 (0.38)	1.24 (0.29)	-0.06 (0.03)	-0.08 (0.07)	0.030
	TC (mmol/L)	4.75 (1.08)	5.18 (0.93)	-0.90 (0.08)	-0.29 (0.27)	<0.001
	TG (mmol/L)	1.57 (0.73)	1.89 (1.20)	-0.21 (0.11)	-0.06 (0.03)	0.022

The intervention group had a significant reduction in the LDL-C level compared to control group.

The percentage of subjects attaining LDL-C goal at the end of the study was 43.1% in the intervention group compared with 16.7% in the control group (p=0.0023).

Source of funding	Unclear
Comments	• Study carried out in Chinese population • More patients in the intervention group were on rosuvastatin compared to control group • Intervention patients had a higher risk then control patients, with more subjects with coronary artery disease and requiring pharmaceutical intervention with antihypertensive medicines. • For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service

Abbreviation: HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; TC, total cholesterol; TG, triglyceride.

Evidence table 138: Magid DJ et al. 2013

Bibliographic reference	A pharmacist-led, American Heart Association Heart360 web-based home blood pressure monitoring program (HBPM)
Study type	RCT
Study quality	Low
Number of patients	n=348
Patient characteristics	Adults 18 to 79 years of age and had the following: • diagnosis of hypertension and their 2 most recent clinic BP readings were above goal (systolic BP [SBP] ≥140mmHg or diastolic BP [DBP] ≥90mmHg or for those with DM or CKD, SBP ≥130mmHg or DBP ≥80mmHg); • were prescribed ≤3 antihypertensive medicines
Intervention	• Patients assigned to the HBPM intervention group were provided a properly fitted home BP cuff (Omron HEM-790IT) and were trained on how to use it. Patients were assisted in establishing an account at the Heart360 Web site and were shown how to automatically upload BPs stored on their home BP device into their Heart360 account. Patients in the HBPM group also met with a clinical pharmacy specialist who reviewed their current BP medicines regimen, provided counselling on lifestyle changes, and adjusted or changed antihypertensive medicines as needed. • Patients were asked to measure their BP at least 3 times per week and to upload their BPs to their Heart360 account weekly. From the Heart360 account, BPs were automatically uploaded nightly to KPCO and organized into BP summary reports that were viewed by the clinical pharmacy specialists managing their care.

	• The clinical pharmacy specialist reviewed the home BP measurements and adherence to antihypertensive medicines of the patients, made adjustments to medicines as needed, and communicated with patients via telephone or secure e-mail. Any changes to medicines were communicated to the primary care physician of the patient through the EHR.
Comparison	Usual care
Length of follow up	6 months
Location	Primary care based, USA
Outcomes measures and effect size	**Proportion of patients who attained their goal BP** The proportion of patients achieving BP goal at 6 months was significantly higher in the HBPM group (54.1%) than in the usual care group (35.4% adjusted risk ratio, 1.5; 95% CI, 1.2–1.9). In the subset of patients with DM and CKD, the proportion of patients achieving BP goal was also higher in the HBPM group (51.7% versus 21.9%; adjusted risk ratio, 2.5; 95% CI, 1.6–3.8).
	Change in SBP and DBP between the baseline and 6-month clinic visits Compared with the usual care group, the HBPM group experienced a 12.4-mmHg larger drop in SBP (95% CI, −16.3 to −8.6) and a 5.7-mmHg larger drop in DBP (95% CI, −7.8 to −3.6). In the subset of patients with DM and CKD the HBPM group experienced a 15.4-mmHg larger drop in SBP (95% CI, −21.0 to −9.8) and a 7.3-mmHg larger drop in DBP (95% CI, −10.4 to −4.1). **Change in antihypertensive medicines adherence** Overall, 120 of the 147 HBPM patients (82%) using prescription antihypertensive medicines and 115 of the 158 UC patients (73%) purchased their antihypertensive medicines exclusively at KPCO pharmacies during the study period. There was no difference in the mean medication possession ratio adherence score over the 6-month study period (0.86 versus 0.87; P=0.93). **Medicines used at 6 months**

Characteristics	Usual care (n=164)	HBPM (n=162)	P
No medicines, n (%)	15 (9.2)	6 (3.7)	0.05
Diuretic, n (%)	77 (47.0)	109 (67.3)	<0.001
ACE inhibitor/ARB, n (%)	109 (66.5)	123 (75.9)	0.06
□-Blocker, n (%)	55 (33.5)	54 (33.3)	0.97
Calcium channel blocker, n (%)	40 (24.4)	74 (45.7)	<0.001
Other, n (%)	11 (6.7)	16 (9.9)	0.30
Patients with ≥1 medicines added, n (%)	41 (25)	113 (70)	<0.001
Patients with ≥1 medicine	20 (12)	69 (43)	<0.001

	dose increases, n (%)			
	Change in medicines intensity score from baseline to 6months, mean (SD)	0.15 (0.82)	1.35 (1.37)	<0.001
	More HBPM patients had an antihypertensive medicines added to their regimen than usual care patients. Greater number of HBPM patients had the dose increased for an existing antihypertensive medicine. **Medical service used, including all hospitalizations, emergency department visits, clinic visits, telephone encounters, and e-mail encounters (assessed via chart review)** The mean number of outpatient clinic visits was similar for the HBPM and usual care groups (3.3 versus 3.1; P=0.16). The total number of emergency department visits (6 for HBPM and 9 for UC, P=0.44) and hospitalizations (5 for HBPM and 7 for UC P=0.57) did not differ significantly between the 2 groups. Compared with the usual care group, the HBPM group had a higher mean number of e-mail encounters (6.0 versus 2.4; P<0.001) and telephone encounters (5.3 versus 3.5; P=0.02).			
Source of funding	Funded in part by the American Heart Association.			
Comments	• BP goals were <140/90 mm Hg for all patients except those with DM and CKD, whose goal was <130/80mmHg. • Multiple imputations were used to estimate BP control for the 22 people missing this outcome. • For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service			
Abbreviations: HER, electronic health record; DM, diabetes mellitus; CKD, chronic kidney disease; KPCO, Kaiser Permanente Colorado; SBP, systolic blood pressure; DBP, diastolic blood pressure; BP, blood pressure; CI, confidence interval; ACE, angiotensin converting enzyme; ARB, angiotensin receptor blocker.				

Evidence table 139: Pape GA et al. 2011

Bibliographic reference	Team-based care approach to cholesterol management in diabetes mellitus: two-year cluster randomized controlled trial
Study type	RCT
Study quality	Low
Number of patients	n=6963
Patient characteristics	Patients with diabetes mellitus were included in this study
Intervention	• Intervention clinics implemented a team-based care approach for the management of cholesterol in patients with diabetes mellitus. • A pharmacist was stationed at a remote site serving multiple clinic locations and had access to the patients electronic medical record. • According to a protocol, the pharmacy practitioner reviewed the medical charts of patients with an elevated LDL-C level. Based on patients' medical conditions and medication history, the pharmacist developed individualized, evidence-based treatment recommendations

	to include medicines therapy and follow-up laboratory monitoring. The proposed treatment plan was electronically sent to the physician for review. • The physician had the option to ignore the recommendation, act on the recommendation, or approve intervention by the pharmacist. If the intervention was approved, the pharmacist would contact the patient by telephone. The telephonic intervention included an introduction of the pharmacist's role on the care team, confirmation of medication history and previous adverse reactions, and identification of barriers to adherence. • All patient communication and care was documented in the patient's medical chart and co-signed by the physician. • The pharmacist was supported by a medical assistant who triaged laboratory results, ordered overdue laboratories, scheduled appointments, and facilitated mailings according to protocol.
Comparison	Usual care
Length of follow up	24 months
Location	Community-based primary care setting, USA
Outcomes measures and effect size	**Proportion of participants in each arm achieving a target LDL-C level of 100 mg/dL or lower** Overall, 78% of the patients in the intervention arm achieved their target LDL-C level compared with 50% of the controls (p=0.003). **Difference in mean LDL-C levels between the groups** The mean LDL-C level was 12 mg/dL lower in the intervention arm compared with the control arm (p <0.001). **Proportion of patients prescribed lipid-lowering medicines** Patients in the intervention arm were also 15% more likely to receive a prescription for a lipid-lowering medicine (p=0.008).
	Secondary outcomes No significant differences seen in glycaemic and blood pressure control between the groups.
	Process measures **Proportion of patients with a LDL-C laboratory test performed within the last 12 months** Control: 82% Intervention: 95%, P (adjusted) =0.004 **Proportion of patients with a HbA_{1c} laboratory test performed within the last 12 months** Control: 85% Intervention: 96%, p (adjusted) = 0.004
Source of funding	Grants from the Merck Foundation and Providence Health Plan
Comments	• For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service
Abbreviations: LDL-C, low-density lipoprotein cholesterol.	

Evidence table 140: Rothman RL et al. 2005

Bibliographic reference	A randomized trial of a primary care-based disease management program to improve cardiovascular risk factors and glycated haemoglobin levels in patients with diabetes.
Study type	RCT

Study quality	Low
Number of patients	n=217
Patient characteristics	Included patients met the following criteria: • 18 years or older • had a clinical diagnosis of type 2 diabetes and were followed for their diabetes care in the practice • had poor glucose control (HbA_{1c} level ≥8.0%)
Intervention	This was a clinical pharmacists-led intervention within a general medical practice that involved the following: • application of evidence-based treatment algorithms to manage medicines, help reduce cardiovascular risk factors and improve glycaemic control • intensive education sessions • proactive management of clinical parameters • frequent contacts with the patients by telephone or in person every 2-4 weeks or more frequently if indicated • dedicated clinics slots to see patients directly or in consultation with an attending physician • results of the session were shared with the patients primary care provider. All adjustments to medicines were done with the approval of the patient's primary care provider who could choose if they wanted to be contacted by telephone before making change to medicines or if they wanted to receive written documentation after the changes.
Comparison	Usual care
Length of follow up	12 months
Location	Primary care, USA
Outcomes measures and effect size	**Change in blood pressure levels** Change in systolic blood pressure (SBP) at 12 months from baseline Control: 2 mmHg increase in SBP Intervention: 7 mmHg decrease in SBP Difference 9 mmHg (95% CI 3 to 16 mmHg; P=0.008) Change in diastolic blood pressure (DBP) at 12 months from baseline Control: 1 mmHg increase in SBP Intervention: 4 mmHg decrease in SBP Difference 5 mmHg (95% CI 1 to 9 mmHg; P=0.02) **Change in HbA_{1c} levels** Control: 1.6% decrease in HbA_{1c} level Intervention: 2.5% decrease in HbA_{1c} level Difference 0.8% (95% CI 0 to 1.7%; P=0.05) **Aspirin use for cardiovascular risk prevention** Control: 58% (54/93) Intervention: 91% (87/96) P< 0.0001 **Change in lipid levels** Control: 12mg/dL decrease in total cholesterol Intervention: 27mg/dL decrease in total cholesterol Difference: 15mg/dL (95% CI 4 to 35; P value not reported, author reports no significance)

Secondary outcomes

Table below shows the results of secondary outcomes

Variable	Control (n=95)	Intervention (n=99)	Difference[a] or rate ratio[b] (95% CI)
Diabetes knowledge	+13	+27	+14a (9 to 20)
Diabetes treatment satisfaction	+4	+8	+3a (1 to 6)
Rate of event from 6 to 12 months follow-up			
General medicine visits	1.9	2.0	1.1b (0.9 to 1.3)
Urgent care visits	0.2	0.2	0.8b (0.4 to 1.6)
Emergency department visits	0.5	0.4	0.8b (0.5 to 1.4)
Hospitalisations	0.2	0.2	1.1b (0.6 to 2.0)
Hypoglycaemic episodes	1.0	1.3	1.3b (0.6 to 2.5)
Hypotensive episodes	0.2	0.1	0.3b (0.1 to 1.6)

Intervention patients had more improvement in diabetes knowledge and treatment satisfaction than control group.

There were no differences seen in healthcare resources use or adverse events between the 2 groups (study was not powered to detect these differences).

Process measures

- The diabetes management team made a median on 45 contacts or care-related activities, a total of 460 minutes (38mins/month) for each intervention patient.
- Intervention patients had a median of three new medicines added to their regimen by the disease management team and 4 titrations or adjustments to existing medicines.

Source of funding

Not specified

Comments

- Statin use was also included as part of the analysis but was not originally reported as an outcome measure. At 12 months follow up the rate was 47% (44/93) in control group and 48% (47/99) in intervention group (p=0.98).
- For the purpose of the review question this particular model of care has been classed as professional-led (pharmacist) service

Abbreviations: CI, confidence intervals.

D.2 Grade profiles and forest plots

D.2.1 Identifying, reporting and learning from medicines-related patient safety incidents

GRADE profile 1: Pharmacist-led information technology intervention for medication errors (PINCER)

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	PINCER	Control	Relative (95% CI)	Absolute		
Patients with a history of peptic ulcer prescribed an NSAID without co-prescription of a PPI (follow-up 6 months)												
1[1,2]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	51/1852 (2.8%)	86/2014 (4.3%)	Adjusted OR 0.58 (0.38 to 0.89)[3]	18 fewer per 1000 (from 5 fewer to 26 fewer)	⊕⊕⊕⊕ HIGH	IMPORTANT
Patients with a history of peptic ulcer prescribed an NSAID without co-prescription of a PPI (follow-up 12 months)												
1[1,2]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	61/1852 (3.3%)	78/2035 (3.8%)	Adjusted OR 0.91 (0.59 to 1.39)[4]	3 fewer per 1000 (from 16 fewer to 15 more)	⊕⊕⊕⊕ HIGH	IMPORTANT
Patients with asthma prescribed a beta-blocker (follow-up 6 months)												
1[1,2]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	499/20312 (2.5%)	658/22224 (3%)	Adjusted OR 0.73 (0.58 to 0.91)[3]	8 fewer per 1000 (from 3 fewer to 12 fewer)	⊕⊕⊕⊕ HIGH	IMPORTANT
Patients with asthma prescribed a beta-blocker (follow-up 12 months)												
1[1,2]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	545/21359 (2.6%)	692/23520 (2.9%)	Adjusted OR 0.78 (0.63 to 0.97)[4]	6 fewer per 1000 (from 1 fewer to 11 fewer)	⊕⊕⊕⊕ HIGH	IMPORTANT
Patients aged 75 years and older prescribed an ACEI or a loop diuretic long-term who have not had a computer-recorded check of their renal function and electrolytes in the previous 15 months (follow-up 6 months)												
1[1,2]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	255/4851 (5.3%)	436/5329 (8.2%)	Adjusted OR 0.51 (0.34 to 0.78)[3]	40 fewer per 1000 (from 18 fewer to 54 fewer)	⊕⊕⊕⊕ HIGH	IMPORTANT
Patients aged 75 years and older prescribed an ACEI or a loop diuretic long-term who have not had a computer-recorded check of their renal function and electrolytes in the previous 15 months (follow-up 12 months)												
1[1,2]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	306/5242 (5.8%)	452/5813 (7.8%)	Adjusted HR 0.63 (0.41 to 0.95)1	29 fewer per 1000 (from 4 fewer to 46 fewer)	⊕⊕⊕⊕ HIGH	IMPORTANT
Patients with at least one prescription problem/at risk of at least one prescription problem (follow-up mean 6 months)												
1[1,4]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	553/24073 (2.3%)	752/26239 (2.9%)	Adjusted OR 0.71 (0.59 to 0.86)3	8 fewer per 1000 (from 4 fewer to 12 fewer)	⊕⊕⊕⊕ HIGH	CRITICAL
Patients with at least one prescription problem/at risk of at least one prescription problem (follow-up mean 12 months)												
1[1,4]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	610/25246 (2.4%)	785/27808 (2.8%)	Adjusted OR 0.78 (0.64 to 0.94)1	6 fewer per 1000 (from 2 fewer to 10 fewer)	⊕⊕⊕⊕ HIGH	CRITICAL
Patient with at least one monitoring problem/at risk of at least one monitoring problem (follow-up mean 6 months)												
1[1,4]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	584/6963 (8.4%)	868/7409 (11.7%)	Adjusted OR 0.56 (0.44 to 0.7)[3]	52 fewer per 1000 (from 35 fewer to 66 fewer)	⊕⊕⊕⊕ HIGH	CRITICAL
Patient with at least one monitoring problem/at risk of at least one monitoring problem (follow-up mean 12 months)												
1[1,4]	randomised	no serious	no serious	no serious	no serious	none	652/7449	901/8011	Adjusted OR 0.64	40 fewer per 1000 (from	⊕⊕⊕⊕	CRITICAL

trials	risk of bias	inconsistency	indirectness	imprecision		(8.8%)	(11.2%)	(0.51 to 0.82)1	20 fewer to 55 fewer)	HIGH	

[1] Avery 2012
[2] Co-primary outcome
[3] Adjusted for randomisation stratum, baseline prevalence of errors, deprivation, and training status unless otherwise stated. Adjustment for other variables not calculable
[4] Only critical secondary outcomes are reported in GRADE profile; composite secondary outcome measure

Abbreviations: NSAID, Non-steroidal anti-inflammatory drug; PPI, Proton pump inhibitor; ACEI, Angiotensin-converting enzyme (ACE) inhibitor

GRADE profile 2: STOPP/START tool

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**STOPP/START**	**Control**	**Relative (95% CI)**	**Absolute**		
Mortality (From hospital admission to discharge; 6 months follow-up)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	5.3%	7.3%	No significant difference between groups[4] (P=0.414)		⊕⊕OO LOW	CRITICAL
Patients with improvement in MAI scores[5] (From hospital admission to discharge)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	135/190 (71.1%)	68/192 (35.4%)	RR 2.01 (1.62 to 2.48)	358 more per 1000 (from 220 more to 524 more)	⊕⊕OO LOW	CRITICAL
Patients in whom MAI scores stayed the same[6] (From hospital admission to discharge)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	33/190 (17.4%)	60/192 (31.3%)	RR 0.56 (0.38 to 0.81)	138 fewer per 1000 (from 59 fewer to 194 fewer)	⊕⊕OO LOW	CRITICAL
Patients with deterioration in MAI scores[7] (From hospital admission to discharge)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	22/190 (11.6%)	64/192 (33.3%)	RR 0.35 (0.22 to 0.54)	217 fewer per 1000 (from 153 fewer to 260 fewer)	⊕⊕OO LOW	CRITICAL
Patients with improvement in AOU[5] (From hospital admission to discharge)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	60/190 (31.6%)	20/192 (10.4%)	RR 3.03 (1.90 to 4.82)	211 more per 1000 (from 94 more to 398 more)	⊕⊕OO LOW	CRITICAL
Patients in whom AOU stayed the same[6] (From hospital admission to discharge)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	130/190 (68.4%)	160/192 (83.3%)	RR 0.82 (0.73 to 0.92)	150 fewer per 1000 (from 67 fewer to 225 fewer)	⊕⊕OO LOW	CRITICAL
Patients with deterioration in AOU[7] (From hospital admission to discharge)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	0/190 (0%)	12/192 (6.3%)	RR 0.04 (0 to 0.68)	60 fewer per 1000 (from 20 fewer to 62 fewer)	⊕⊕OO LOW	CRITICAL

[1] Gallagher 2011
[2] The intervention was unblinded to the researchers, patients and their physicians. Allocation was concealed until baseline data had been collected and inclusion criteria verified
[3] There were small numbers of participants in each study arm and small numbers of events
[4] Study was not powered to detect a clinically significant difference in mortality
[5] Improvement in MAI or AOU scores means lower scores which indicates less inappropriate prescribing
[6] MAI or AOU scores staying the same means no change in the appropriateness of prescribing
[7] Deterioration in MAI or AOU scores means higher scores which indicates more inappropriate prescribing

Abbreviations: STOPP, Screening Tool of Older Persons' potentially inappropriate Prescriptions; START, Screening Tool to Alert to Right Treatment; MAI, Medication Appropriateness Index; AOU, Assessment Of Underutilisation index

D.2.2 Medicines-related communication systems when patients move from one care setting to another

GRADE profile 3: Mortality outcome

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Medicines-related communication system	Usual care	Relative (95% CI)	Absolute		
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Mortality (follow-up 3 months)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	10/164 (6.1%)	5/176 (2.8%)	RR 2.15 (0.75 to 6.15)	33 more per 1000 (from 7 fewer to 146 more)	⊕⊕OO LOW	CRITICAL[4]
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Mortality (follow-up 6 months)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	22/137 (16.1%)	19/151 (12.6%)	RR 1.28 (0.72 to 2.25)	35 more per 1000 (from 35 fewer to 157 more)	⊕⊕OO LOW	CRITICAL[4]
Post-discharge home visit by GP and district nurse, with 2 follow-up contacts: Mortality (follow-up 6 months)												
1[5]	randomised trials	serious[6]	no serious inconsistency	no serious indirectness	serious[3]	none	15/148 (10.1%)	20/145 (13.8%)	HR 0.72 (0.37 to 1.41)	37 fewer per 1000 (from 84 fewer to 51 more)	⊕⊕OO LOW	CRITICAL[4]

[1] Nazareth 2001
[2] Randomisation described, blinding and allocation concealment not described
[3] Small sample size
[4] Secondary outcome
[5] Rytter 2010
[6] Randomisation described, unblinded, allocation concealment not described

GRADE profile 4: Health and social care utilisation outcomes

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Medicines-related communication system	Usual care or other intervention[1]	Relative (95% CI)	Absolute		
Communication of patient discharge form plus follow-up support: Hospital readmission within 31 days												
1[2]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[4]	none	4/47 (8.5%)	4/49 (8.2%)	RR 1.04 (0.28 to 3.93)	3 more per 1000 (from 59 fewer to 239 more)	⊕⊕OO LOW	CRITICAL[5]
Communication of patient discharge form plus follow-up support: ED visit within 31 days												
1[2]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[4]	none	1/47 (2.1%)	1/49 (2%)	RR 1.04 (0.07 to 16.19)	1 more per 1000 (from 19 fewer to 310 more)	⊕⊕OO LOW	CRITICAL[5,6]
Communication of patient discharge form plus follow-up support: Patients with one or more undesirable outcomes[7]												
1[2]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[4]	none	12/47 (25.5%)	27/49 (55.1%)	RR 0.46 (0.27 to 0.80)	298 fewer per 1000 (from 110 fewer to 402 fewer)	⊕⊕OO LOW	CRITICAL[7,8]
Communication of patient discharge form plus follow-up support: No outpatient follow-up within 21 days (follow-up 21 days)												
1[2]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[4]	none	7/47 (14.9%)	20/49 (40.8%)	RR 0.36 (0.17 to 0.78)	261 fewer per 1000 (from 90 fewer to 339 fewer)	⊕⊕OO LOW	CRITICAL[8]
Electronic discharge summary communication: Adverse outcome at 30 days[9] (follow-up 30 days)												
1[10]	randomised trials	serious[11]	no serious inconsistency	no serious indirectness	serious[4]	none	Electronic: 22/105 (21%)	Dictated: 21/104 (20.2%)	RR 1.04 (0.61 to 1.77)	8 more per 1000 (from 79 fewer to 155 more)	⊕⊕OO LOW	CRITICAL[8,9]
Electronic discharge summary communication: Attendance at outpatient follow-up tests and appointments (follow-up 30 days)												
1[10]	randomised trials	serious[11]	no serious inconsistency	no serious indirectness	serious[4]	none	Electronic: 22/105 (21%)	Dictated: 21/104 (20.2%)	RR 1.04 (0.61 to 1.77)	8 more per 1000 (from 79 fewer to 155 more)	⊕⊕OO LOW	CRITICAL[8]
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Hospital readmission (follow-up 3 months)												
1[12]	randomised trials	serious[13]	no serious inconsistency	no serious indirectness	serious[4]	none	64/164 (39%)	69/176 (39.2%)	RR 1.00 (0.76 to 1.30)	0 fewer per 1000 (from 94 fewer to 118 more)	⊕⊕OO LOW	CRITICAL[14]
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Hospital readmission (follow-up 6 months)												
1[12]	randomised	serious[13]	no serious	no serious	serious[4]	none	38/136	43/151	RR 0.98	6 fewer per	⊕⊕OO	CRITICAL[14]

	trials		inconsistency	indirectness			(27.9%)	(28.5%)	(0.68 to 1.42)	1000 (from 91 fewer to 120 more)	LOW	
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Outpatient department attendance (follow-up 3 months)												
1[12]	randomised trials	serious[13]	no serious inconsistency	no serious indirectness	serious[4]	none	75/164 (45.7%)	84/176 (47.7%)	RR 0.96 (0.76 to 1.20)	19 fewer per 1000 (from 115 fewer to 95 more)	⊕⊕OO LOW	CRITICAL[8]
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Outpatient department attendance (follow-up 6 months)												
1[12]	randomised trials	serious[13]	no serious inconsistency	no serious indirectness	serious[4]	none	39/137 (28.5%)	40/151 (26.5%)	RR 1.07 (0.74 to 1.56)	19 more per 1000 (from 69 fewer to 148 more)	⊕⊕OO LOW	CRITICAL[8]
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: GP attendance (follow-up 3 months)												
1[12]	randomised trials	serious[13]	no serious inconsistency	no serious indirectness	serious[4]	none	101/130 (77.7%)	108/144 (75%)	RR 1.04 (0.91 to 1.18)	30 more per 1000 (from 67 fewer to 135 more)	⊕⊕OO LOW	CRITICAL[8]
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: GP attendance (follow-up 6 months)												
1[12]	randomised trials	serious[13]	no serious inconsistency	no serious indirectness	serious[4]	none	76/107 (71%)	82/116 (70.7%)	RR 1.00 (0.85 to 1.19)	0 fewer per 1000 (from 106 fewer to 134 more)	⊕⊕OO LOW	CRITICAL[8]
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Number of days in hospital as % of days of follow-up (follow-up 3 months)												
1[12]	randomised trials	serious[13]	no serious inconsistency	no serious indirectness	serious[4]	none	0 (IQR 0 to 14.4)[19]	0 (IQR 0 to 11.0)[19]	P=0.80		⊕⊕OO LOW	CRITICAL[8]
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Number of days in hospital as % of days of follow-up (follow-up 6 months)												
1[12]	randomised trials	serious[13]	no serious inconsistency	no serious indirectness	serious[4]	none	0 (IQR 0 to 3.1)[19]	0 (IQR 0 to 4.4)[19]	P=0.90		⊕⊕OO LOW	CRITICAL[8]
Post-discharge home visit by GP and district nurse, with 2 follow-up contacts: Hospital readmission (follow-up 6 months)												
1[15]	randomised trials	serious[16]	no serious inconsistency	no serious indirectness	serious[4]	none	67/166 (40.4%)	86/165 (52.1%)	RR 0.77 (0.61 to 0.98)	120 fewer per 1000 (from 10 fewer to 203 fewer)	⊕⊕OO LOW	CRITICAL[5]
Pharmacist discharge counselling and follow-up by telephone: ED visit[6] or readmission (follow-up 31 days)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[4]	none	28/92 (30.4%)	25/84 (29.8%)	RR 1.02 (0.65 to 1.61)	6 more per 1000 (from 104 fewer to 182 more)	⊕⊕⊕O MODERATE	CRITICAL[6,8]
Pharmacist discharge counselling and follow-up by telephone: Medicines-related ED visit[6] or readmission (follow-up 31 days)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[4]	none	4/94 (4.3%)	7/84 (8.3%)	RR 0.52 (0.16 to 1.72)	40 fewer per 1000 (from 70 fewer to 60 more)	⊕⊕⊕O MODERATE	CRITICAL[8]

Pharmacist discharge counselling and follow-up by telephone: Preventable medicines-related ED visit[6] or readmission (follow-up 31 days)											
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[4]	none	1/92 (1.1%)	7/84 (8.3%)	RR 0.13 (0.02 to 1.04)	72 fewer per 1000 (from 82 fewer to 3 more)	⊕⊕⊕O MODERATE	CRITICAL[8]
Pharmacist discharge counselling prior to usual care: Mean actual outpatient follow-up visits made[19] (follow-up 90 days)											
1[20]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[4]	none	60.5% (SD ± 34.1)[22]	43.9% (SD ± 35.2)[22]	P=0.01		⊕⊕OO LOW	CRITICAL[8]
Pharmacy discharge planning: Hospital readmission (follow-up 12 weeks)											
1[22]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[4]	none	5/51 (9.8%)	12/46 (26.1%)	OR 3.25 (0.94 to 12.76)	273 more per 1000 (from 12 fewer to 557 more)	⊕⊕OO LOW	CRITICAL

[1] Usual care unless otherwise stated
[2] Balaban 2008
[3] Randomisation, blinding and allocation concealment not described
[4] Small study sample
[5] Co-primary outcome
[6] ED, Emergency department
[7] Undesirable outcomes were 1) no follow-up within 21 days, 2) readmission within 31 days, 3) emergency department visit within 31 days, or 4) incomplete outpatient workup recommended by doctor
[8] Secondary outcome
[9] Adverse outcome was a combined endpoint of emergency department visit, readmission or death
[10] Maslove 2009
[11] Randomisation and blinding not adequately described, allocation concealment not described
[12] Nazareth 2001
[13] Randomisation described, blinding and allocation concealment not described
[14] Primary outcome
[15] Rytter 2010
[16] Randomisation described, unblinded, allocation concealment not described
[17] Schnipper 2010
[18] IQR, Interquartile range
[19] Two-sample t tests (normal distribution)
[20] Shah 2013
[21] SD, Standard deviation
[22] Shaw 2000

GRADE profile 5: Patient-reported outcomes

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Medicines-related communication system	Usual care or other intervention[1]	Relative (95% CI)	Absolute		
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Patient satisfaction questionnaire score[2] (follow-up 3 months)												
1[3]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	3.3 (SD 0.6)[6]	3.3 (SD 0.6)[6]	-	Mean difference = 0	⊕⊕OO LOW	CRITICAL[7]
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Patient satisfaction questionnaire score[2] (follow-up 6 months)												
1[3]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	3.4 (SD 0.6)[6]	3.2 (SD 0.6)[6]	-	Mean difference = 0.2 (95%CI[8] –0.56 to 0.96)	⊕⊕OO LOW	CRITICAL[7]
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Medicines adherence[9] (follow-up 3 months)												
1[3]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	0.75 (SD 0.3)[6]	0.75 (SD 0.28)[6]	-	Mean difference = 0	⊕⊕OO LOW	CRITICAL[7]
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Medicines adherence[9] (follow-up 6 months)												
1[3]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	0.78 (SD 0.3)[6]	0.78 (SD 0.3)[6]	-	Mean difference = 0	⊕⊕OO LOW	CRITICAL[7]
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Patient knowledge of prescribed medicines[9] (follow-up 3 months)												
1[3]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	0.69 (SD 0.33)[6]	0.62 (SD 0.34)[6]	-	Mean difference = 0.07 (95%CI[8] – 0.032 to 0.173)	⊕⊕OO LOW	CRITICAL[7]
Communication of pharmacy discharge plan plus domiciliary assessment by community pharmacist: Patient knowledge of prescribed medicines[17] (follow-up 6 months)												
1[3]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	0.69 (SD 0.35)[6]	0.68 (SD 0.32)[6]	-	Mean difference = 0.01 (95%CI[8] – 0.106 to 0.126)	⊕⊕OO LOW	CRITICAL[7]
Pharmacist discharge counselling and follow-up by telephone: Patient satisfaction (follow-up 31 days)												
1[10]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[5]	none	60/71 (84.5%)	57/65 (87.7%)	RR 0.96 (0.84 to 1.10)	35 fewer per 1000 (from 140 fewer to 88 more)	⊕⊕⊕O MODERATE	CRITICAL[7]
Pharmacist discharge counselling and follow-up by telephone: Median adherence score on previous day (follow-up 31 days)												
1[10]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[5]	none	88.9 (IQR 0.71 to 1.00)[11]	87.5 (IQR 0.73 to 1.00)[11]	P=0.91		⊕⊕⊕O MODERATE	CRITICAL[7]
Post-discharge home visit by GP and district nurse, with 2 follow-up contacts: Patient reported outcomes (follow-up 12 weeks)												
1[12]	randomised trials	serious[13]	no serious inconsistency	no serious indirectness	serious[5]	none	Patients in the intervention group felt their GPs were better informed about their hospital admission (very well informed: 42% vs. 16%, P=0.01). No significant differences were found between groups in functional ability, self-rated health, or patient satisfaction with the whole admission to hospital or with the services given by GPs and municipalities in general.				⊕⊕OO LOW	CRITICAL

Pharmacist discharge counselling prior to usual care: Overall diabetes medicines adherence[14] (follow-up 150 days)											
1[15]	randomised trials	serious[16]	no serious inconsistency	no serious indirectness	serious[5]	none	55.2 (SD ± 42.0)[6]	34.8 (SD ± 37.9)[6]	P=0.004	⊕⊕OO LOW	CRITICAL[17]
Pharmacist discharge counselling prior to usual care: Diabetes medicines adherence 30 days after discharge[19] (follow-up 30 days)											
1[15]	randomised trials	serious[16]	no serious inconsistency	no serious indirectness	serious[5]	none	58.6 (SD ± 48.4)[6]	44.1 (SD ± 48.8)[6]	P=0.12	⊕⊕OO LOW	CRITICAL[7]
Pharmacist discharge counselling prior to usual care: Diabetes medicines adherence 60 days after discharge[19] (follow-up 60 days)											
1[15]	randomised trials	serious[16]	no serious inconsistency	no serious indirectness	serious[5]	none	52.7 (SD ± 48.3)[6]	34.1 (SD ± 45.9)[6]	P=0.016	⊕⊕OO LOW	CRITICAL[7]
Pharmacist discharge counselling prior to usual care: Diabetes medicines adherence 90 days after discharge[19] (follow-up 90 days)											
1[15]	randomised trials	serious[16]	no serious inconsistency	no serious indirectness	serious[5]	none	62.0 (SD ± 48.2)[6]	36.4 (SD ± 46.2)[6]	P=0.001	⊕⊕OO LOW	CRITICAL[7]
Pharmacist discharge counselling prior to usual care: Diabetes medicines adherence 120 days after discharge[14] (follow-up 120 days)											
1[15]	randomised trials	serious[16]	no serious inconsistency	no serious indirectness	serious[5]	none	47.2 (SD ± 49.9)[6]	24.4 (SD ± 41.6)[6]	P=0.006	⊕⊕OO LOW	CRITICAL[7]
Home visit from community liaison pharmacist after discharge: Medicines adherence (follow-up 8 to 12 weeks)											
1[18]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	Significant improvements in medicines adherence from baseline were found in both the intervention group (P<0.005) and the usual care group (P<0.022), but adherence improved more in the intervention group patients			⊕⊕OO LOW	CRITICAL
Home visit from community liaison pharmacist after discharge: Patient self-perceived medication understanding (follow-up 8 to 12 weeks)											
1[18]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	Patient self-perceived medication understanding improved at follow-up in the intervention group patients (P<0.001)			⊕⊕OO LOW	CRITICAL
Home visit from community liaison pharmacist after discharge: Patient knowledge about medication (follow-up 8 to 12 weeks)											
1[18]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	0.70 (SD ± 0.24)[6]	0.78 (SD ± 0.14)[6]	P=0.001	⊕⊕OO LOW	CRITICAL
Pharmacy discharge planning: Patient knowledge about medication (follow-up 12 weeks)											
1[19]	randomised trials	serious[16]	no serious inconsistency	no serious indirectness	serious[5]	none	No significant difference was found between intervention and control groups in medication knowledge scores			⊕⊕OO LOW	CRITICAL

[1] Usual care unless otherwise stated
[2] 1 = dissatisfied, 4 = satisfied
[3] Nazareth 2001
[4] Randomisation described, blinding and allocation concealment not described
[5] Small sample size
[6] SD, Standard deviation
[7] Secondary outcome
[8] CI, Confidence interval
[9] 0 = none, 1 = total/highest
[10] Schnipper 2006
[11] IQR, Interquartile range
[12] Rytter 2010
[13] Randomisation described, unblinded, allocation concealment not described
[14] Mann-Whitney test (nonparametric); values reported are mean medicines adherence %
[15] Shah 2013

[16] Randomisation, blinding and allocation concealment not described
[17] Primary outcome
[18] Vuong 2008
[19] Shaw 2000

GRADE profile 6: Clinical outcomes as reported in the study

Quality assessment							No of patients				
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Pharmacist discharge counselling in patients with diabetes prior to usual care**	**Usual care[1]**	**P value**	**Quality**	**Importance**
Change in HbA1c[2] (follow-up 90 days)											
1[3]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	–1.97 (SD ± 2.3)[6]	0.114 (SD ± 2.5)[6]	0.002	⊕⊕OO LOW	CRITICAL[7]
HbA1c at follow-up[8] (follow-up 90 days)											
1[3]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	7.83 (SD ± 1.6)[6]	9.48 (SD ± 2.9)[6]	0.003	⊕⊕OO LOW	CRITICAL[7]
Patients achieving HbA1c target[9] (follow-up 90 days)											
1[3]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	35.5%	28.6%	0.512	⊕⊕OO LOW	CRITICAL[7]

[1] Usual care consisted of diabetes education pamphlet and routine diabetes education from nurse
[2] Mann-Whitney test (nonparametric)
[3] Shah 2013
[4] Randomisation, blinding and allocation concealment not described
[5] Small sample size
[6] SD, Standard deviation
[7] Secondary outcome
[8] Two-sample t tests (normal distribution)
[9] Fisher exact test

GRADE profile 7: Medicines-related problems outcomes

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Medicines-related communication system	Usual care or other intervention[1]	Relative (95% CI)	Absolute		
Pharmacist discharge counselling and follow-up by telephone: Preventable adverse drug events (follow-up 31 days)												
1[2]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[3]	none	1/79 (1.3%)	8/73 (11%)	RR 0.12 (0.01 to 0.90)	96 fewer per 1000 (from 11 fewer to 108 fewer)	⊕⊕⊕O MODERATE	IMPORTANT[4]
Pharmacist discharge counselling and follow-up by telephone: All adverse drug events (follow-up 31 days)												
1[2]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[3]	none	14/79 (17.7%)	12/73 (16.4%)	RR 1.08 (0.53 to 2.18)	13 more per 1000 (from 77 fewer to 194 more)	⊕⊕⊕O MODERATE	IMPORTANT[5]
Pharmacist discharge counselling and follow-up by telephone: Any medication discrepancy (follow-up 31 days)												
1[2]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[3]	none	44/72 (61.1%)	43/66 (65.2%)	RR 0.94 (0.73 to 1.21)	39 fewer per 1000 (from 176 fewer to 137 more)	⊕⊕⊕O MODERATE	IMPORTANT[5]
Communication of patient discharge form plus follow-up support: Incomplete outpatient workup recommended by doctor												
1[6]	randomised trials	serious[7]	no serious inconsistency	no serious indirectness	serious[3]	none	3/26 (11.5%)	5/16 (31.3%)	RR 0.37 (0.10 to 1.34)	197 fewer per 1000 (from 281 fewer to 106 more)	⊕⊕OO LOW	IMPORTANT[8]
Electronic discharge summary communication: Receipt of discharge summary by GP practice (follow-up 7 days)												
1[9]	randomised trials	serious[10]	no serious inconsistency	no serious indirectness	serious[3]	none	Email: 17/23 (73.9%)		Receipt rates for email and fax were comparable (P=0.712) and significantly higher (P<0.0002) than post and patient hand delivery		⊕⊕OO LOW	IMPORTANT
							Fax: 25/36 (69.4%)					
							Post: 14/32 (43.8%)					
							Patient hand delivery: 8/33 (24.2%)					
Medication discharge plan communicated to community pharmacists and treating physicians: Number of medication discrepancies												
1[11]	randomised trials	serious[12]	no serious inconsistency	no serious indirectness	serious[3]	none	13.2 (SD ± 16.6)[13,14]	15.3 (SD ± 18.2)[13,14]	P>0.05		⊕⊕OO LOW	IMPORTANT
							10.3 (SD ± 12.1)[13,15]	12.1 (SD ± 15.3)[13,15]	P>0.05			
Pharmacy discharge planning: Mean number of medication problems (follow-up 1 week)												
1[16]	randomised trials	serious[7]	no serious inconsistency	no serious indirectness	serious[3]	none	2.0 (SD ± 1.3)[13]	2.5 (SD ± 1.6)[13]	Significance not analysed		⊕⊕OO LOW	IMPORTANT
Pharmacy discharge planning: Mean number of medication problems (follow-up 4 weeks)												
1[16]	randomised trials	serious[7]	no serious inconsistency	no serious indirectness	serious[3]	none	1.9 (SD ± 1.5)[13]	2.9 (SD ± 1.8)[13]	Significance not analysed		⊕⊕OO LOW	IMPORTANT
Pharmacy discharge planning: Mean number of medication problems (follow-up 12 weeks)												
1[16]	randomised trials	serious[7]	no serious inconsistency	no serious indirectness	serious[3]	none	1.4 (SD ± 1.2)[13]	2.4 (SD ± 1.6)[13]	Significance not analysed		⊕⊕OO LOW	IMPORTANT

[1] Usual care unless otherwise stated
[2] Schnipper 2010
[3] Small sample size
[4] Primary outcome
[5] Secondary outcome
[6] Balaban 2008
[7] Randomisation, blinding and allocation concealment not described
[8] Co-primary outcome
[9] Chen 2010
[10] Randomisation described, blinding and allocation concealment not adequately described
[11] Lalonde 2008
[12] Unblinded study
[13] SD, Standard deviation
[14] Medication discharge plan vs. community pharmacy records
[15] Medication discharge plan vs. patient self-reporting
[16] Shaw 2000

GRADE profile 8: Practitioner-reported outcomes

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Electronic discharge summary	Dictated discharge summary	Difference of means (95% CI)	P value		
Overall discharge summary quality[1] (follow-up 2 months)												
1[2]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[4]	none	86.4 (SD ± 15.0)[5]	84.3 (SD ± 17.6)[5]	2.1 (–4.6 to 8.8)	0.53	⊕⊕OO LOW	IMPORTANT[6]
Housestaff satisfaction[1] (follow-up 2 months)												
1[2]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[4]	none	75.7	44.5	-	0.10	⊕⊕OO LOW	IMPORTANT[7]

[1] Mean value, assessed by a primary care physician (PCP) using a 100-point visual analogue scale, ranging from 0 (worst) to 100 (best)
[2] Maslove 2009
[3] Randomisation and blinding not adequately described, allocation concealment not described
[4] Small sample size
[5] SD, Standard deviation
[6] Primary outcome
[7] Secondary outcome

GRADE profile 9: Sub-optimal medicines use outcomes

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Medicines-related communication system	Usual care	Relative (95% CI)	Absolute		
Evidence summary added to discharge letter: Discontinuation of discharge medication												
1[1]	randomised	serious[2]	no serious	no serious	serious[3]	none	18.5%	29.4%	-	ARR 12.5%[4,5]	⊕⊕OO	IMPORTANT[6]

	trials		inconsistency	indirectness						P=0.039	LOW	
Post-discharge home visit by GP and district nurse, with 2 follow-up contacts: Patients using prescribed medicines that GP was unaware of (follow-up 12 weeks)												
1[7]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[8]	none	51/148 (34.5%)	70/145 (48.3%)	RR 0.71 (0.54 to 0.94)	140 fewer per 1000 (from 29 fewer to 222 fewer)	⊕⊕OO LOW	IMPORTANT[9]
Post-discharge home visit by GP and district nurse, with 2 follow-up contacts: Patients not taking medication as prescribed by the GP (follow-up 12 weeks)												
1[7]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[8]	none	42/148 (28.4%)	57/145 (39.3%)	RR 0.72 (0.52 to 1.00)	110 fewer per 1000 (from 189 fewer to 0 more)	⊕⊕OO LOW	IMPORTANT[9]

[1] Kunz 2007
[2] Unblinded study
[3] Large numbers lost to follow-up. Target sample size not achieved
[4] ARR, absolute risk reduction
[5] Difference adjusted for underlying medical condition
[6] Primary outcome
[7] Rytter 2010
[8] Small numbers of participants, single setting
[9] Co-primary outcome

D.2.3 Medicines reconciliation

GRADE profile 10: Medicines-related problems as reported in the study

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Medicines reconciliation	Usual care	Relative (95% CI)	Absolute		
Number of clinically important medication errors per patient during the first 30 days after hospital discharge (follow-up mean 30 days)												
1[1]	randomised trials	Serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	None	370/423 (87.5%)	407/428 (95.1%)	IRR 0.92 (0.77 to 1.1)[3]	76 fewer per 1000 (from 219 fewer to 95 more)	⊕⊕⊕O MODERATE	CRITICAL
							•	• 0%		• -		
Preventable or ameliorable adverse drug events (ADEs) per patient during the first 30 days after hospital discharge (follow-up mean 30 days)												
1[1]	randomised trials	Serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	None	183/423 (43.3%)	170/428 (39.7%)	IRR 1.09 (0.86 to 1.39)[3]	36 more per 1000 (from 56 fewer to 155 more)	⊕⊕⊕O MODERATE	CRITICAL
							•	• 0%		• -		
Potential adverse drug events during the first 30 days after hospital discharge (follow-up mean 30 days)												
1[1]	randomised trials	Serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	None	187/423 (44.2%)	237/428 (55.4%)	IRR 0.80 (0.61 to 1.04)[3]	111 fewer per 1000 (from 216 fewer to 22 more)	⊕⊕⊕O MODERATE	CRITICAL
							•	• 0%		• -		
Drug therapy inconsistencies and omissions (DTIO) - medicines reconciliation at discharge (follow-up mean 9 months; assessed with: Retrospective chart review)												
1[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	very serious[6]	None	0/28 (0%)	67/119 (56.3%)	RR 0.03 (0 to 0.48)[6]	546 fewer per 1000 (from 293 fewer to 563 fewer)	⊕OOO VERY LOW	CRITICAL
							•	• 0%		• -		
Drug therapy problems for seamless monitoring (DTPsm) (follow-up mean 9 months)												
1[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	very serious[6]	None	134	119	In the intervention group 129/134 patients had a DTPsm identified and the average number of patients with DTPsm was 3.59 (SD = 2.25). Of these DTPsm identified 83.8% of were deemed as 'somewhat significant or significant' with 56.6% being significant		⊕OOO VERY LOW	CRITICAL
							•	• 0%				
Unintentional discrepancies with potential adverse drug events (PADEs) per patient (follow-up mean 2 months; assessed with: number of events per patient)												
1[7]	randomised trials	Very serious[8,9]	no serious inconsistency	no serious indirectness	no serious imprecision	None	170/162 (104.9%)	230/160 (143.8%)	RR 0.74 (0.6 to 0.89)[10]	374 fewer per 1000 (from 158 fewer to 575 fewer)	⊕⊕OO	CRITICAL

							•	• 0%		• -	LOW	
Unintentional discrepancies with potential adverse drug events (PADEs) per patient admission (follow-up mean 2 months)												
1[7]	randomised trials	Very serious[8,9]	no serious inconsistency	no serious indirectness	no serious imprecision	None	44/162 (27.2%)	49/160 (30.6%)	RR 0.89 (0.59 to 1.33)[11]	34 fewer per 1000 (from 126 fewer to 101 more)	⊕⊕OO LOW	CRITICAL
							•	• 0%		• -		
Unintentional discrepancies with potential adverse drug events (PADEs) per patient at discharge (follow-up mean 2 months)												
1[7]	randomised trials	Very serious[8,9]	no serious inconsistency	no serious indirectness	no serious imprecision	None	126/162 (77.8%)	181/160 (113.1%)	RR 0.69 (0.55 to 0.86)[12]	351 fewer per 1000 (from 158 fewer to 509 fewer)	⊕⊕OO LOW	CRITICAL
							•	• 0%		• -		
Mean error rates between discharge prescription and home medication (follow-up mean 3 months; assessed with: 10-14 days after discharge)												
1[16]	randomised trials	Very serious[13,14]	no serious inconsistency	very serious[15]	no serious imprecision	None	81	81	• There was a significant improvement in the correlation between discharge prescription medication and home medication 10-14 days post discharge in the intervention group with drug name (P<0.005) and dosage frequency (P<0.004) but not for drug dose (P< 0.07)		⊕OOO VERY LOW	CRITICAL
							•	• 0%				

[1] Kripalani 2012 - study carried out in patients admitted for acute coronary syndrome, or acute decompensated heart failure
[2] Not all patients received the intervention as intended, although vast majority did.
[3] IRR incident risk ratio, unadjusted reported (adlusted similar see evidence table in Appendices)
[4] Nickerson 2005
[5] Selection bias
[6] Retrospective chart analysis conducted for every control patient (n=119), but only for a select number of intervention patients (n=28 out of the 134 enrolled)
[7] Schnipper 2009
[8] Performance bias and detection bias
[9] Full use of the computerised medication reconciliation tool was not achieved
[10] Adjusted and clustered relative risk 0.2 (0.52-0.99)
[11] For adjusted & clustered RR 0.87; 95% CI, 0.51-1.52
[12] Adjusted & clustered RR 0.67; 95% CI, 0.49-0.98
[13] Unclear adequate concealment of allocation in paper
[14] 11 enrolled patients not accounted for in the results reported for the outcome
[15] Specifics of the comparator unclear
[16] Bolas 2004

GRADE profile 11: Health care utilisation as reported in the study

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Medicines-reconciliation	Usual care	Relative (95% CI)	Absolute		
Health care utilisation (follow-up mean 2 months; assessed with: The rate of hospital readmission or emergency department visit within 30 days)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	very serious[3]	none	32/162 (19.8%)	38/160 (23.8%)	OR 0.76 (0.43 to 1.35)[4]	46 fewer per 1000 (from 119 fewer to 59 more)	⊕OOO VERY LOW	IMPORTANT
								0%		-		

[1] Schnipper 2009
[2] Performance and detection bias
[3] Study was not powered to detect this effect
[4] Clustered odds ratio calculated in the study

D.2.4 Medication review

GRADE profile 12: Mortality

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		Control	Relative (95% CI)	Absolute		
Mortality (follow-up mean 7.4 months)[1]												
10[2]	randomised trials	Serious	no serious inconsistency	no serious indirectness	Serious[3]	none	236/1597 (14.8%)	242/1584 (15.3%)	RR 0.96 (0.81 to 1.13)	6 fewer per 1000 (from 29 fewer to 20 more)	⊕⊕OO LOW	CRITICAL

[1] Random effects model used. To pool the data for this outcome the mean follow-up was calculated as studies that reported on this outcome varied in follow up period.
[2] Barker 2012, Bouvy 2003, Furniss 2000, Holland 2005, Lenaghan 2007, Zermansky 2006, Holland 2007, Sjoberg 2013, Mannheimer 2006, Spinewine 2007 (number of deaths calculated from the study by Spinewine as only rate of death was reported as percentages)
[3] Some of the studies included had lower sample size then calculated and different settings.

Note: All studies had patients with mean age ≥ 65years, Barker 2012 patient population was confined to those with congestive heart failure and Bouvy 2003 patient population was confined to patients with HF taking loop diuretics.

GRADE profile 13: Clinical outcomes as reported in the study

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Medication review	Usual care	Relative (95% CI)	Absolute		
Clinical outcome change in mean systolic blood pressure (follow-up mean 10.5 months[1]; measured with: mmHg[2]; Better indicated by higher values showing greater reduction in blood pressure)												
2[3]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	49	36	-	mean 12.68 higher (7.31 to 18.05 higher)	⊕⊕OO LOW	CRITICAL
Clinical outcome: Falls (follow-up mean 9 months[6]; assessed with: Number of falls)												
2[7]	randomised trials	Serious[8]	no serious inconsistency	no serious indirectness	no serious imprecision	none	108/431 (25.1%)	139/429 (32.4%)	RR 0.70 (0.52 to 0.94)	97 fewer per 1000 (from 19 fewer to 156 fewer)	⊕⊕⊕O MODERATE	CRITICAL
Proportion of patients achieving their target lipid levels (follow-up mean 12 months)												
1[9]	randomised trials	serious[10]	no serious inconsistency	no serious indirectness	Serious[5]	none	-	-	RR 1.16 (1.01 to 1.34)[11]	-	⊕⊕OO LOW	CRITICAL
								0%		-		
Change in overall asthma severity/control (follow-up mean 6 months)												
1[12]	randomised trials	serious[13]	no serious inconsistency	no serious indirectness	serious[14]	none	-	-	OR 2.68 (1.64 to 4.37)	-	⊕⊕OO LOW	CRITICAL
								0%		-		
Proportion of patients using a combination of reliever and preventer medications with or without a long-acting b2 agonist (follow-up mean 6 months)												
1[12]	randomised trials	serious[13]	no serious inconsistency	Serious[14]	no serious imprecision	none	-	-	OR 3.80 (1.40 to 10.32)	-	⊕⊕OO LOW	CRITICAL
								0%		-		
Severe exacerbations (follow-up mean 6 months)												
1[15]	randomised trials	Serious[16]	no serious inconsistency	Serious[14]	Serious[5]	none	10/107 (9.3%)	8/94 (8.5%)	OR 2 (0.75 to 5.7)	72 more per 1000 (from 20 fewer to 261 more)	⊕⊕OO LOW	CRITICAL
								0%		-		
Change in WOMAC pain score (follow-up mean 12 months; measured with: at 3 months; Better indicated by lower values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	none	98	89	-	MD 1.18 higher (0.3 to 2.1 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in WOMAC pain score (follow-up mean 12 months; measured with: at 6 months; Better indicated by lower values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	none	100	93	-	MD 0.41 higher (0.6 lower to 1.4 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in WOMAC pain score (follow-up mean 12 months; measured with: at 12 months; Better indicated by lower values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	none	94	87	-	MD 0.63 higher (0.5 lower to 1.8 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in WOMAC function scores (follow-up mean 12 months; measured with: at 3 months; Better indicated by lower values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	96	90	-	MD 1.80 higher (0.8 lower to 4.5 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in WOMAC function scores (follow-up mean 12 months; measured with: at 6 months; Better indicated by lower values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	94	94	-	MD 1.23 lower (4.4 lower to 1.9 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in WOMAC function scores (follow-up mean 12 months; measured with: at 12 months; Better indicated by lower values)												
1[17]	randomised	no serious	no serious	no serious	Serious[5]	None	92	89	-	MD 0.49 lower (4.0 lower to	⊕⊕⊕O	CRITICAL

	trials	risk of bias	inconsistency	indirectness						3.0 higher)[18]	MODERATE	
Change in pain severity (follow-up mean 12 months; measured with: at 3 months; Better indicated by higher values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	108	108[20]	-	MD 0.72 lower (1.4 to 0.1 lower)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in pain severity (follow-up mean 12 months; measured with: at 6 months; Better indicated by higher values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	108	108[20]	-	MD 0.41 lower (1.1 lower to 0.3 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in pain severity (follow-up mean 12 months; measured with: at 12 months; Better indicated by higher values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	108	108[20]	-	MD 0.32 lower (1.2 lower to 0.5 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in severity of main problem (follow-up mean 12 months; measured with: at 3 months; Better indicated by higher values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	108	108[20]	-	MD 0.46 lower (1.2 lower to 0.3 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in severity of main problem (follow-up mean 12 months; measured with: at 6 months; Better indicated by higher values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	108	108[20]	-	MD 0.39 lower (1.1 lower to 0.3 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in severity of main problem (follow-up mean 12 months; measured with: at 12 months; Better indicated by higher values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	108	108[20]	-	MD 0.01 lower (0.9 lower to 0.9 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in arthritis self-efficacy scale: pain (follow-up mean 12 months; measured with: at 3 months; Better indicated by higher values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	108	108[20]	-	MD 0.88 lower (3.8 lower to 2.0 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in arthritis self-efficacy scale: pain (follow-up mean 12 months; measured with: at 6 months; Better indicated by higher values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	108	108[20]	-	MD 1.08 lower (3.9 lower to 1.7 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in arthritis self-efficacy scale: other symptoms (follow-up mean 12 months; measured with: at 12 months; Better indicated by higher values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	108	108[20]	-	MD 3.44 lower (7.3 lower to 0.5 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in arthritis self-efficacy scale: other symptoms (follow-up mean 12 months; measured with: at 3 months; Better indicated by higher values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	108	108[20]	-	MD 0.53 higher (2.8 lower to 3.8 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Change in arthritis self-efficacy scale: other symptoms (follow-up mean 12 months; measured with: at 6 months; Better indicated by higher values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	108	108[20]	-	MD 1.30 lower (4.3 lower to 1.7 higher)[18]	⊕⊕⊕O MODERATE	CRITICAL
Cardiovascular outcomes (follow-up mean 12 months; measured with: Blood pressure)												
1[20]	randomised trials	serious[21]	no serious inconsistency	no serious indirectness	Serious[5]	None	Medication review significantly increased the number of patients at the target blood pressure compared to control (p=0.001).				⊕⊕OO LOW	CRITICAL
Cardiovascular outcomes (follow-up mean 12 months; measured with: Lipid reduction)												
1[20]	randomised trials	serious[21]	no serious inconsistency	no serious indirectness	serious[5]	None	Medication review significantly increased improved LDL cholesterol at 12 months compared to the control (p=0.001).				⊕⊕OO LOW	CRITICAL
Cardiovascular outcomes (follow-up mean 12 months; measured with: Target achievement of International Normalised Ratio (INR)												

1[20]	randomised trials	serious[21]	no serious inconsistency	no serious indirectness	serious[5]	None	Medication review significantly increased the number of Patients' INRs' within the targeted range compered to control (p=0.048).	⊕⊕OO LOW	CRITICAL
Diabetes (follow-up mean 12 months; measured with: Target achievement of percentage of patients meeting the goal of HbA1c ≤ 7.5)									
1[20]	randomised trials	serious[21]	no serious inconsistency	no serious indirectness	serious[5]	None	Medication review significantly increased the percentage of patients meeting the goal of HbA1c ≤ 7.5 % at 12 compared to control (P=0.001).	⊕⊕OO LOW	CRITICAL
Cardiovascular outcomes (follow-up mean 12 months as reported in the study)									
1[22]	randomised trials	serious[23]	no serious inconsistency	no serious indirectness	no serious imprecision	None	Medication review showed no significant difference compared to control in: • NSF recommended treatment for the secondary prevention of CHD • the 5-year risk of cardiovascular death.	⊕⊕⊕O MODERATE	CRITICAL
Cardiovascular outcomes (measured with: as reported in the study)									
1[9]	randomised trials	Serious[10]	no serious inconsistency	no serious indirectness	Serious[5]	None	Medication review showed no significant difference compared to control in: • LDL reduction • changes in other risk factors for cardiovascular disease.	⊕⊕OO LOW	CRITICAL
Asthma outcomes (follow-up mean 6 months; measured with: as reported in the study)									
1[12]	randomised trials	serious[13]	no serious inconsistency	Serious[14]	no serious imprecision	None	Medication review showed no significant difference compared to control in spirometric parameters. The proportion of intervention patients with correct inhaler technique increased significantly (from baseline) during the study (p,0.001), as did the proportion of patients with an asthma action plan (p,0.001). This was not assessed in the control group.	⊕⊕OO LOW	CRITICAL
Asthma outcomes (follow-up mean 6 months)									
1[15]	randomised trials	Serious[16]	no serious inconsistency	Serious[14]	Serious[5]	None	Medication review showed no significant difference compared to control: • in mean ACT scores • PEF morning (p=0.703) and PEF evening values (p=0.430). Medication review significantly: • reduced the need for rescue therapy compared to control (p=0.012). • reduced night-time awakenings due to asthma than control (p=0.044).	⊕⊕OO LOW	CRITICAL
Hip fractures (follow-up mean 12 months)									
1[24]	randomised trials	Serious[8]	no serious inconsistency	no serious indirectness	Serious[5]	None	Medication review showed no significant difference compared to control for individuals with hip fractures (p=0.64 for individuals, p=0.71 for occasions)	⊕⊕OO LOW	CRITICAL
Response to management of knee pain (follow-up mean 12 months)									
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[5]	None	According to the OMERACT-OARSI criteria at 3, 6 and 12 months, medication review significantly improved response to management of knee pain compared with control at 3 months only.	⊕⊕⊕O MODERATE	CRITICAL

1 Jamieson 2010 follow-up 12 months, Planas 2009 follow-up 9 months
2 Mean differences in systolic blood pressure used as both studies reported changes in blood pressure differently. NB Jamieson 2010 was a cross over study.
3 Jamieson 2010, Planas 2009
4 selection bias present and attrition bias.
5 Small study sample
6 Zermansky 2006 follow-up 6 months, Sjoberg 2013 follow-up 12 months
7 Zermansky 2006, Sjoberg 2013
8 detection bias

9 Villeneuve 2010
10 Performance and detection bias
11 After adjustment for baseline LDL cholesterol (crude RR 1.10, 95% CI 0.95 to 1.26)
12 Armour 2007
13 Selection bias
14 Short follow up
15 Mehuys 2008
16 Selection bias
17 Hay 2006
18 crude score change in score from baseline
19 Numbers not specified for these outcomes when reported, original enrolled numbers used for each group
20 Taylor 2003
21 Selection bias
22 Team 2007
23 Performance and detection bias
24 Sjoberg 2013
Note: where the study did not report figures to add to the Grade table, a short summary has been included.

GRADE profile 14: Medicines-related problems as reported in the study

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Medication review	Usual care	Relative (95% CI)	Absolute		
Adverse drug events: reporting by GPs and patients (follow-up mean 6 months)												
1[1]	randomised trials	serious[2]	no serious inconsistency	Serious[3]	serious[10]	None	106	196	No significant difference between the intervention and control for patient and GP reporting ADE at the end of the study.		⊕⊕OO LOW	CRITICAL
No. of medicines-related problems identified (follow-up mean 15 months[4]; Better indicated by higher values)												
2[5]	randomised trials	serious[6]	no serious inconsistency	no serious indirectness	No serious imprecision	None	310	180	-	MD 0.71 higher (0.36 to 1.05 higher)	⊕⊕⊕O MODERATE	CRITICAL
No. of medicines-related problems identified (follow-up mean 4 months; Better indicated by higher values)												
1[7]	randomised trials	serious[8]	no serious inconsistency	Serious[6]	Serious[10]	None	87	87	-	MD 16.3 lower (24.3 to 8.3 lower)	⊕⊕OO LOW	CRITICAL
No. of medicines-related and care-related problems identified (follow-up mean 6 months)												

1[9]	randomised trials	serious[8]	no serious inconsistency	no serious indirectness	serious[10]	None	150	150	In 150 (71%) patients a total of 299 medicines-related problems were not identified prior to intervention by usual care.	⊕⊕OO LOW	CRITICAL
No. of medicines-related and care-related problems identified,(follow-up mean 5 months)											
1[11]	randomised trials	Serious[12]	no serious inconsistency	no serious indirectness	No serious imprecision	None	431	458	Medication review identified at least 1 medicines-related problem in 79.8% of patients in the intervention with mean of 2.5 per senior (SD 2.1 range 0-9). No data for control group	⊕⊕⊕O MODERATE	CRITICAL
Medication Appropriateness Index, MAI score (follow-up mean 12 months; Better indicated by lower values)											
2[13]	randomised trials	Very serious[14,15]	no serious inconsistency	no serious indirectness	No serious imprecision	None	298	288	-	MD 5.60 lower (6.8 to 4.39 lower)	⊕⊕OO LOW	CRITICAL
Change in mean Medication Appropriateness Index score, (follow-up mean 12 months)											
1[16]	randomised trials	serious[8]	no serious inconsistency	no serious indirectness	serious[10]	None	207	143	A significant improvement in in the mean MAI score in the intervention group compared to control group at the end of the 12 month study.		⊕⊕OO LOW	CRITICAL
Number of prescriptions that were inappropriate using Medication Appropriateness Index score, (follow-up mean 12 months)											
1[17]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[10]	None	33	36	A decrease in all 10 MAI domains in the intervention group and increased in 5 domains in the control group. No significance was calculated for this outcome.		⊕⊕OO LOW	CRITICAL
Global assessment of change in medicines, (follow-up mean 12 months)											
1[18]	randomised trials	no serious risk of bias	no serious inconsistency	Serious[19]	No serious imprecision	None	250	253	An improvement in the medicines profile of 20% of subjects, deterioration in 5%, and that it remained stable in 70% between the pre-intervention and post-intervention measures for each group. There was no significant difference between the intervention and control group.		⊕⊕⊕O MODERATE	CRITICAL
Change in lipid-lowering pharmacotherapy, (follow-up mean 12 months)											
1[20]	randomised trials	serious[21]	no serious inconsistency	no serious indirectness	serious[10]	None	33/108 (30.6%)	21/117 (17.9%)	RR 1.70 (1.05 to 2.75)	126 more per 1000 (from 9 more to 314 more)	⊕⊕OO LOW	CRITICAL
								0%		-		

No. of subjects with one or more potentially inappropriate prescriptions (PIP), (follow-up mean 12 months)												
1[18]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	Serious[19]	None	18/127 (14.2%)	8/116 (6.9%)	RR 2.06 (0.93 to 4.55)	73 more per 1000 (from 5 fewer to 245 more)	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Inappropriate medicines per patient identified by Beers criteria, (follow-up mean 12 months)												
1[22]	randomised trials	serious risk of bias[23]	no serious inconsistency	no serious indirectness	serious[10]	None	0/96[24]	0/90[24]	OR 0.6 (0.3 to 1.1)[25]	-	⊕⊕OO LOW	CRITICAL
								0%		-		
Underuse of medicines, (follow-up mean 12 months; assessed with: ACOVE (Assessing care of vulnerable elders) criteria)												
1[22]	randomised trials	serious risk of bias[23]	no serious inconsistency	no serious indirectness	serious[10]	None	0/96[24]	0/90[24]	OR 6.1 (2.2 to 17)[26]	-	⊕⊕OO LOW	CRITICAL
								0%		-		
Adverse drug reactions - number of events per 1000 days (follow-up mean 12 months)												
1[27]	randomised trials	serious[14]	no serious inconsistency	no serious indirectness	no serious imprecision	None	516/814 (63.4%)	478/802 (59.6%)	RR 1.06 (0.98 to 1.15)	36 more per 1000 (from 12 fewer to 89 more)	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		

1 Sorenson 2004
2 Selection bias
3 short follow up
4 Sturgess 2003 follow-up period 18 months, Sjoberg 2013 follow-up period 12 months
5 Sturgess 2003, Sjoberg 2013 (falls-increasing medicines identified)
6 Results not available for some of the outcomes in the control group so comparison difficult.
7 Vinks 2009
8 Detection bias
9 Mannheimer 2006
10 Small study size
11 Sellors 2003
12 Results of comparison for some outcomes not available for control group
13 Spinewine 2007, Schmader 2004
14 attrition bias
15 some outcome data not accounted for
16 Bryant 2011
17 Taylor 2003
18 Allard 2001
19 Some outcomes measured with unvalidated tools
20 Villeneuve 2010
21 Performance and detection bias present
22 Spinewine 2007
23 Some results based on assumed data

24 Number of events not reported
25 Odds ratio for having at least one improvement from admission to discharge in the intervention group compared with control group.
26 Conditionally on the number of conditions with omitted medicines on admission
27 Schmader 2004
Note: where the study did not report figures to add to the Grade table, a short summary has been included.

GRADE profile 15: Patient-reported outcomes as reported in the study

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Medication review	Usual care	Relative (95% CI)	Absolute		
Compliance, (follow-up mean 18 months; assessed with: Refill compliance rate & self-reported)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	110	81	A significantly higher proportion of intervention patients were compliant with their medications at 12 and 18 months (chi-squared; p<0.05) compared to the control. The authors also reported that an analysis of change in compliance (change in compliance compared to that reported at baseline) had been carried out that significantly showed a higher proportion of intervention patients changed from non-compliant to compliant compared to control. Refill compliance rate showed a significantly higher proportion of intervention patients were compliant with their medications at 6 months compared to the control group (chi-squared; p = 0.02). Analysis of change shows no significant difference.		⊕⊕OO LOW	CRITICAL
Compliance, (follow-up mean 6 months; assessed with: medication event monitoring system (MEMS) with loop diuretics)												
1[4]	randomised trials	Very serious[5,6]	no serious inconsistency	no serious indirectness	no serious imprecision	None	6/48 (12.5%)	16/43 (37.2%)	RR 0.3 (0.1 to 0.9)[7]	260 fewer per 1000 (from 37 fewer to 335 fewer)	⊕⊕OO LOW	CRITICAL
								0%		-		
Compliance, (follow-up mean 12 months; assessed with: Self-reported using questionnaire; Better indicated by higher values)												
1[8]	randomised trials	serious[9]	no serious inconsistency	no serious indirectness	no serious imprecision	None	980	513	-	MD 1.0 higher (0.61 to 1.65 higher)[10]	⊕⊕⊕O MODERATE	CRITICAL
Compliance, (follow-up mean 12 months; assessed with: number of doses missed/duration)												
1[11]	randomised trials	serious[12]	no serious inconsistency	no serious indirectness	serious[13]	None	33/33 (100%)	32/36 (88.9%)	RR 1.12 (0.99 to 1.27)	107 more per 1000 (from 9 fewer to 240 more)	⊕⊕OO LOW	CRITICAL
								0%		-		
Satisfaction, (follow-up mean 12 months; assessed with: questionnaire)												
1[11]	randomised trials	serious[12]	no serious inconsistency	no serious indirectness	serious[13]	None	30/33 (90.9%)	34/36 (94.4%)	Reported no significant differences between the 2 groups with patient-related satisfaction to pharmaceutical care		⊕⊕OO LOW	CRITICAL

Satisfaction, (follow-up mean 18 months; assessed with: questionnaire)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	110	81	Approx. 80% reported that patients thought the intervention was better than the service received prior to the intervention (6 months 81.5%, 12 months 80% and 18 months 84.7%).		⊕⊕OO LOW	CRITICAL
Satisfaction,(follow-up mean 12 months; assessed with: patients selecting from positive and negative statements; Better indicated by higher values)												
1[8]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	no serious imprecision	None	980	513	-	MD 4 higher (1.7 to 6.3 higher)[14]	⊕⊕⊕O MODERATE	CRITICAL
Satisfaction, (follow-up mean 12 months; assessed with: questionnaire)												
1[15]	randomised trials	serious risk of bias[16]	no serious inconsistency	no serious indirectness	very serious[13]	None	96	90	Reports satisfaction with information received on medicines was higher in the intervention group (80.0% of intervention vs 60.9% of control were satisfied, p=0.10). Difference not statistically significant.		⊕⊕OO LOW	CRITICAL
Satisfaction, (follow-up mean 12 months; recorded from patients at 3 months)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	64/96 (66.7%)	41/88 (46.6%)	Difference -20 (-33 to -6)[18]	P=0.006	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Adherence, (follow-up mean 6 months; measured with prescription refill rates and self-reporting; Better indicated by higher values)												
1[19]	randomised trials	serious[12]	no serious inconsistency	no serious indirectness	Serious[13]	None	107	94	-	MD 15.7 higher (3 to 28.4 higher)[20]	⊕⊕OO LOW	CRITICAL
Adherence, (follow-up mean 9 months; measured with: Continuous measure of medication acquisition method (prescription claim data); Better indicated by higher values)												
1[21]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	32	20	-	MD 8.70 higher (1.28 lower to 18.68 higher)	⊕⊕⊕O MODERATE	CRITICAL
Change in depression, (follow-up mean 12 months; measured with: hospital anxiety and depression scale at 3 months; Better indicated by lower values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	108	108[22]	-	MD 0.55 lower (1.2 lower to 0.1 higher)	⊕⊕⊕O MODERATE	CRITICAL
Change in anxiety, (follow-up 12 months; measured with: hospital anxiety and depression scale at 3 months; Better indicated by lower values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	108	108[22]	-	MD 0.46 lower (1.2 lower to 0.3 higher)	⊕⊕⊕O MODERATE	CRITICAL
Participants' global assessment of change compared with baseline: (follow-up mean 12 months; measured with: OMERACT-OARSI criteria (five point ordinal scale)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	108	108[22]	The pharmacy intervention group compared to the control group were classified as responders according to the OMERACT-OARSI criteria at 3, 6 and 12 months, however significant difference was only seen at 3 months into the study.		⊕⊕⊕O MODERATE	CRITICAL
Adherence (follow-up mean 6 months)												
1[23]	randomised trials	serious[12]	no serious inconsistency	Serious[24]	No serious imprecision	None	-	-	OR 1.89 (1.08 to 3.3)	-	⊕⊕OO LOW	CRITICAL
								0%		-		
Change in depression, (follow-up mean 12 months; measured with: hospital anxiety and depression scale at 6 months; Better indicated by lower values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	108	108[22]	-	MD 0.46 lower (1.1 lower to 0.2 higher)	⊕⊕⊕O MODERATE	CRITICAL
Change in depression, (follow-up mean 12 months; measured with: hospital anxiety and depression scale at 12 months; Better indicated by lower values)												

1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	108	108[22]	-	MD 0.01 higher (0.7 lower to 0.7 higher)	⊕⊕⊕O MODERATE	CRITICAL
Change in anxiety, (follow-up 12 months; measured with: hospital anxiety and depression scale at 6 months; Better indicated by lower values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	108	108[22]	-	MD 0.10 higher (0.6 lower to 0.8 higher)	⊕⊕⊕O MODERATE	CRITICAL
Change in anxiety, (follow-up 12 months; measured with: hospital anxiety and depression scale at 12 months; Better indicated by lower values)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	108	108[22]	-	MD 0.23 lower (1.1 lower to 0.6 higher)	⊕⊕⊕O MODERATE	CRITICAL
Satisfaction, (follow-up mean 12 months recorded from patients at 6 months)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	53/93 (57%)	37/86 (43%)	Difference -14 (-28 to 1)[18]	P=0.06	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Satisfaction, (follow-up mean 12 months; recorded from patients at 12 months)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	47/91 (51.6%)	27/82 (32.9%)	Difference -19 (-32 to -4)[18]	P=0.01	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Usefulness for reducing knee pain (follow-up mean 12 months; Recorded from patients at 3 months)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	45/97 (46.4%)	27/89 (30.3%)	Difference -16 (-29 to -2)[18]	P=0.02	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Usefulness for reducing knee pain (follow-up mean 12 months; Recorded from patients at 6 months)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	37/93 (39.8%)	22/89 (24.7%)	Difference -17 (-29 to -3)[18]	P=0.02	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Usefulness for reducing knee pain (follow-up mean 12 months; Recorded from patients at 12 months)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	36/91 (39.6%)	19/82 (23.2%)	Difference -17 (-30 to -3)[18]	P=0.02	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Usefulness for helping to return to usual activities (follow-up mean 12 months; Recorded from patients at 3 months)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	38/96 (39.6%)	20/87 (23%)	Difference -17 (0-29 to -3)[18]	P=0.01	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Usefulness for helping to return to usual activities (follow-up mean 12 months; Recorded from patients at 6 months)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	30/94 (31.9%)	21/89 (23.6%)	Difference -8 (-21 to 5)[18]	P=0.2	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Usefulness for helping to return to usual activities (follow-up mean 12 months; Recorded from patients at 12 months)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	29/91 (31.9%)	18/78 (23.1%)	Difference -9 (-22 to 4)[18]	P=0.2	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Usefulness for giving practical advice (follow-up mean 12 months; Recorded from patients at 3 months)												

1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	71/96 (74%)	46/88 (52.3%)	Difference -22 (-34 to 8)[18]	P=0.002	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Usefulness for giving practical advice (follow-up mean 12 months; Recorded from patients at 6 months)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	62/94 (66%)	46/88 (52.3%)	Difference -14 (-27 to 0.1)[18]	P=0.06	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Usefulness for giving practical advice (follow-up mean 12 months; Recorded from patients at 12 months)												
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[13]	None	55/91 (60.4%)	29/80 (36.3%)	Difference -24 (-38 to -39[18]	P=0.002	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		

[1] Sturgess 2003
[2] Detection bias.
[3] study not powered for effect.
[4] Bouvy 2004
[5] performance and detection bias
[6] MEMS in the control group may have affected the results for compliance
[7] for less than 95% compliance
[8] Team 2007
[9] Performance and detection bias
[10] Adjusted for differences in outcomes at baseline: gender, age and previous CHD event and for cluster effects with pharmacies, GPs and areas.
[11] Taylor 2003
[12] selection bias
[13] Small study size
[14] Adjusted for differences in outcomes at baseline, gender, age and previous CHD event and for cluster effects with pharmacies, GPs and areas.
[15] Spinewine 2007
[16] some results based on assumed data
[17] Hay 2006
[18] Difference (control-intervention),%
[19] Mehuys 2008
20 Adjusted mean difference
21 Planas 2009
22 Numbers not specified for these outcomes when reported, original enrolled numbers used for each group
23 Armour 2007
24 Short follow up
Note: where the study did not report figures to add to the Grade table, a short summary has been included.

GRADE profile 16: Health and social care utilisation as reported in the study

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Medication review	Usual care	Relative (95% CI)	Absolute		
Number of bed days (follow-up mean 6 months; measured with: days; Better indicated by lower values)												

1[1]	randomised trials	serious[2]	no serious inconsistency	Serious[3]	serious[6]	None	No differences were found in the cumulative number of bed-days between intervention and control. Figures have not been reported in the paper.				⊕⊕OO LOW	IMPORTANT
Admission into care homes (follow-up mean 6 months)												
2[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	serious[6]	None	38/369 (10.3%)	35/352 (9.9%)	RR 1.03 (0.67 to 1.59)	3 more per 1000 (from 33 fewer to 59 more)	⊕⊕OO LOW	IMPORTANT
								0%		-		
Medicines-related hospital stay, (follow-up mean 5 months; measured with: mean number of visits; Better indicated by lower values)												
1[7]	randomised trials	serious risk of bias[8]	no serious inconsistency	no serious indirectness	No serious imprecision	None	No differences were found for this outcome between intervention and control (p=0.08)				⊕⊕⊕O MODERATE	IMPORTANT
Total number of hospitalisations (follow-up mean 8 months[9])												
11[10]	randomised trials	serious[11]	no serious inconsistency	no serious indirectness	serious[12]	None	681/2210 (30.8%)[13]	593/2113 (28.1%)[13]	RR 1.11 (1.02 to 1.2)	31 more per 1000 (from 6 more to 56 more)	⊕⊕OO LOW	IMPORTANT
								0%		-		
Hospital admissions, Sorenson et al 2004 (follow-up mean 6 months; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	Serious[3]	serious[6]	None	No differences were found in the number of hospitalisations between intervention and control. Figures have not been reported in the paper.				⊕⊕OO LOW	IMPORTANT

[1] Sorenson 2004
[2] Selection bias
[3] short follow up
[4] Holland 2005, Lenaghan 2007
[5] selection bias
[6] Small study size
[7] Sellors 2003
[8] Results of comparison for some outcomes not available for control group ti include in analysis
[9] Studies follow-up period varied between 3-18months
[10] Bouvy 2003 , Holland 2005, Holland 2006, Lenaghan 2007, Zermansky 2001, Zermansky 2006, Mannheimer 2006, Taylor 2003, Sturgess 2003, Spinewine 2007 , Krska 2001
[11] selection and detection bias
[12] some sample sizes in studies included were small, which may have affected the results and the measures used
[13] This includes admissions and readmission
Note: where the study did not report figures to add to the Grade table, a short summary has been included.

GRADE profile 17: Planned and unplanned contacts as reported in the study

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Medication review**	**Usual care**	**Relative (95% CI)**	**Absolute**		
Number of outpatient visits, (follow-up mean 12 months)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	313	325	Difference (95% CI) in proportions in control and intervention, in change pre- and post-intervention - 0.037 (-0.075 to 0) A greater proportion of the control group made fewer		⊕⊕OO LOW	IMPORTANT
								0%				

									visits for CVD-related reasons after intervention.		
Number of outpatient visits, (follow-up mean 12 months)											
1[9]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[4]	none	608 0%	580	No difference seen in the number of outpatient visits between the medication review group compared to usual care (median values (IQR) for intervention and control 1 (0-3), p=0.41).	⊕⊕⊕O MODERATE	IMPORTANT
GP visits, (follow-up mean 12 months)											
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	313 0%	325	Difference (95% CI) in proportions in control and intervention, in change pre- and post-intervention -0.018(-0.035 to-0.006) A greater proportion of the control group made fewer visits for CVD-related reasons after intervention	⊕⊕OO LOW	IMPORTANT
GP visits, (follow-up mean 6 months)											
1[5]	randomised trials	serious[6]	no serious inconsistency	Serious[8]	serious[7]	none	106	196	No apparent differences were found in the number of GP visits between intervention and control. Figures have not been reported in the paper.	⊕⊕OO LOW	IMPORTANT
GP visits, (follow-up mean 12 months)											
1[9]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[4]	none	608	580	No difference seen in the number of GP visits between the medication review group compared to usual care (median values (IQR) for intervention and control 6 (3-10), p=0.69).	⊕⊕⊕O MODERATE	IMPORTANT
GP visits, (follow-up mean 6 months)											
1[10]	randomised trials	no serious risk of bias	no serious inconsistency	Serious[8]	No serious imprecision	none	330 0%	331	Difference in relative risk 95% CI 1.03 (0.93 to 1.15)	- -	⊕⊕⊕O MODERATE	IMPORTANT
GP visits, (follow-up mean 12 months)											
1[11]	randomised trials	serious[12]	no serious inconsistency	no serious indirectness	serious[7]	none	108 0%	117	RR -0.45 (-1.48 to 0.58)[13]	- -	⊕⊕OO LOW	
Home visits, (follow-up mean 12 months)											
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	313 0%	325	Difference (95% CI) in proportions in control and intervention, in change pre- and post-intervention -0.029(-0.007 to -0.054) A greater proportion of the intervention group received fewer home visits for CVD-related reasons after the intervention.	- -	⊕⊕OO LOW	IMPORTANT
Number of contacts with healthcare professionals, (follow-up mean 18 months)											
1[14]	randomised trials	serious[15]	no serious inconsistency	no serious indirectness	serious[16]	none	110	81	Intervention patients reported more contact with a specialist during the second (7-12) and third (13-18) six-monthly periods compared to control patients (Independent t-test;p<0.05)		⊕⊕OO LOW	IMPORTANT
Number of contacts with healthcare professionals, follow-up mean 5 months; measured with: mean number of visits ; Better indicated by lower values)											
1[17]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[18]	none	431	458	-	MD 0.13 lower (3.52 to 3.26	⊕⊕⊕O MODERATE	

										lower)		
Number of clinic visits, (follow-up mean 5 months; measured with: mean number of visits; Better indicated by lower values)												
1[17]	randomised trials	serious risk of bias[18]	no serious inconsistency	no serious indirectness	No serious imprecision	none	431	458	-	MD 0.02 lower (1.23 lower to 1.19 higher)	⊕⊕⊕O MODERATE	IMPORTANT

[1] Bond 2007
[2] Performance bias
[3] Power of study reduced due to low recruitment numbers
[4] Generalisability of results limited
[5] Sorenson 2004
[6] Selection bias
[7] small study size
[8] short follow-up
[9] Zermansky 2001
[10] Zermansky 2006
[11] Villeneuve 2010
[12] Performance and detection bias
[13] Between group difference (95% CI)
[14] Sturgess 2003
[15] detection bias
[16] study not powered for effect.
[17] Sellors 2003
[18] Results of comparison for some outcomes not available for control group
Note: where the study did not report figures to add to the Grade table, a short summary has been included.

GRADE profile 18: Health and social care-related quality of life as reported in the study

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Medication review**	**Usual care**	**Relative (95% CI)**	**Absolute**		
SF-36 (follow-up mean 9.8 months[1]; measured with: SF-36 questionnaire)												
8[2]	randomised trials	serious[3,4]	no serious inconsistency	Serious[4]	No serious imprecision	none	2158	1734	Studies by Bryant 2001, Krska 2001, Sellors 2003, Sorenson 2004, Taylor 2007 and TEAM 2007 show no significant differences in any of the scores at baseline to study exit between intervention and control. None of the domains showed any significant changes in either group at follow up. Study by Barker 2012 shows significant difference in the physical functioning and mental health domain for the intervention group compared to control group. Study by Sturgess 2003 shows significance difference in the physical functioning and vitality domains for the control group compared to intervention group.		⊕⊕OO LOW	IMPORTANT
EQ-5D, (follow-up mean 12 months; measured with: questionnaire)												

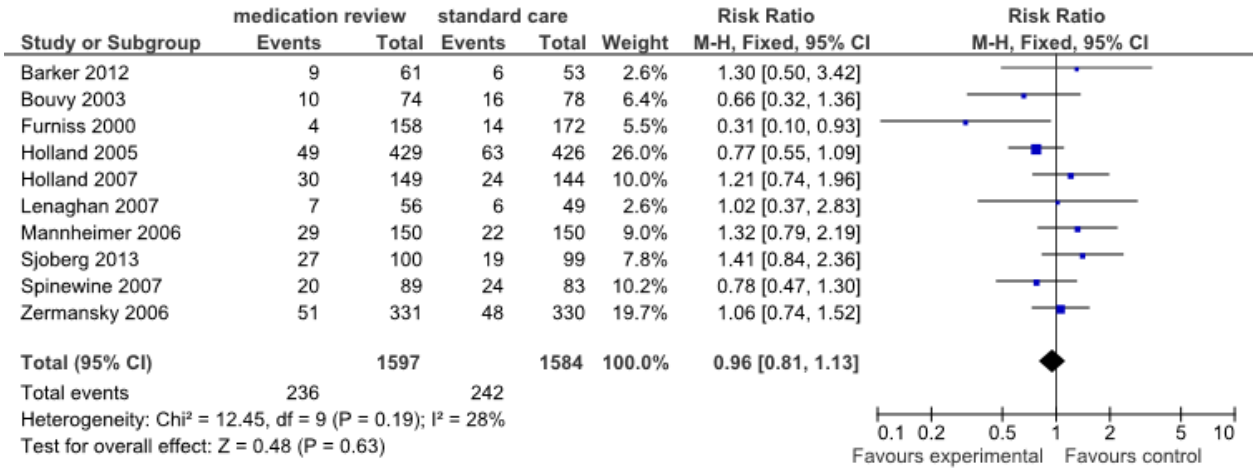
1[5]	randomised trials	serious[6]	no serious inconsistency	no serious indirectness	serious[7]	none	313	323	No significant difference seen in the EQ-5D score between the intervention group	⊕⊕OO LOW	IMPORTANT
EQ-5D (follow-up mean 6 months; measured with: questionnaire; Better indicated by higher values)											
2[8]	randomised trials	serious[9]	no serious inconsistency	Serious[10]	No serious imprecision	none	419	392	- MD 0.01 lower (0.06 lower to 0.03 higher)	⊕⊕OO LOW	IMPORTANT
EQ-5D, (follow-up mean 6 months; measured with: questionnaire; Better indicated by higher values)											
1[11]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[12]	none	69	67	- MD 0.09 higher (0.19 lower to 0.02 higher)	⊕⊕OO LOW	IMPORTANT
EQ-5D, (follow-up mean 12 months; measured with: questionnaire; Better indicated by higher values)											
1[13]	randomised trials	serious[14]	no serious inconsistency	no serious indirectness	no serious imprecision	none	980	513	- MD 0.04 higher (0.05 lower to 0.13 higher)	⊕⊕⊕O MODERATE	IMPORTANT
Asthma quality of life, AQoL, (follow-up mean 6 months; measured with: questionnaire ; range of scores: 0-7; Better indicated by higher values)											
1[15]	randomised trials	Serious[3]	no serious inconsistency	no serious indirectness	serious[12]	none	107	94	- MD 0.2 higher (-0.1 lower to 0.4 higher)	⊕⊕OO LOW	IMPORTANT
Asthma quality of life, (follow-up mean 6 months; measured with: questionnaire; range of scores: 2-10; Better indicated by higher values)											
1[16]	randomised trials	Very serious[3,17]	no serious inconsistency	Serious[10]	No serious imprecision	none	191	205	- MD - 0.23 lower (0.46 lower to 0 higher)	⊕⊕OO LOW	IMPORTANT
Assessment of quality of life, (follow-up mean 6 months; measured with: questionnaire)											
1[18]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[12]	none	61	53	No significant difference seen in the total AQoL score between the intervention group compared to control group.	⊕⊕OO LOW	IMPORTANT
Visual analogue scale (VAS) (follow-up mean 6 months; measured with: VAS scale; Better indicated by higher values)											
2[8]	randomised trials	serious[9]	no serious inconsistency	Serious[10]	No serious imprecision	none	408	377	- MD 2.98 lower (5.73 to 0.24 lower)	⊕⊕OO LOW	IMPORTANT
Visual analogue scale (VAS), (follow-up mean 6 months; measured with: vas scale; Better indicated by higher values)											
1[11]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[12]	none	67	69	- MD 4.8 higher (12.5 lower to 2.8 higher)	⊕⊕⊕O MODERATE	IMPORTANT

[1] mean months calculated as included studies had different follow-up periods
[2] Sturgess 2003, Taylor 2007, Sellors 2003, Sorenson 2004, Barker 2012, Bryant 2011, Krska 2001, Team 2007
[3] Selection bias
[4] Some figures not available, follow up for some studies too short
[5] Bond 2007
[6] performance bias
[7] Power of study reduced due to low recruitment numbers
[8] Holland 2005, Holland 2007
[9] Selection, performance bias
[10] short follow up
[11] Lenaghan 2007
[12] Small study size
[13] Team 2007
[14] Performance and detection bias
[15] Mehuys 2007
[16] Armour 2007
[17] difference in the severity of asthma between control and intervention at baseline may affect the results

[18] Barker 2012

Note: where the study did not report figures to add to the Grade table, a short summary has been included.

Forest plot 1: Medication review on mortality outcome



D.2.5 Self-management plans

GRADE profile 19: Anticoagulation self-management

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Self-management	Usual care	Relative (95% CI)	Absolute		
Patient self-management with coagulometer and dose nomogram												
Percentage of time in therapeutic INR range (follow-up 1-36 years)												
8[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	-	-	Eight studies looked at the control of anticoagulation between the self-management group and usual care group. All studies reported this outcome using different methods. Three studies showed that the percentage of time within target INR range was significantly higher in the self-management groups compared to usual care. Five studies showed no significant difference between the two groups.		⊕⊕OO LOW	CRITICAL
Hospitalisations (follow-up median 11.8 months; assessed with: number of events)												
1[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	serious[6]	None	68/99 (68.7%)	73/96 (76%)	HR 0.92 (0.66 to 1.28)	29 fewer per 1000 (from 150 fewer to 79 more)	⊕⊕OO LOW	CRITICAL
							(a)	(b) 0%		(c) -		
Death (follow-up median 11.8 months; assessed with: number of events)												
1[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	serious[6]	None	15/99 (15.2%)	11/96 (11.5%)	HR 1.41 (0.65 to 3.03)[7]	43 more per 1000 (from 39 fewer to 194 more)	⊕⊕OO LOW	CRITICAL
							(d)	(e) 0%		(f) -		
Patient satisfaction (follow-up mean 3 months; measured with: Structured questionnaire)												
1[8]	randomised	no	no serious	no serious	serious[6]	None	-	-	There were significant differences in all 5		⊕⊕⊕O	CRITICAL

	trials	serious risk of bias	inconsistency	indirectness					categories of the questionnaire in favour of the self-management group. Scores for general treatment satisfaction and self-efficacy were higher in the self-management group, whereas the score for daily anxieties, distress and strain were significantly lower.	MODERATE	
Adverse events - Bleeding (follow-up 3-12 months)											
5[9]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	-	-	Five studies looked at the adverse events of bleeding. There was no significant difference in the number of bleeding events (major or minor)between the self-management group and usual care group. Three studies had higher number of bleeding events in the usual care group compared to self-management group. Two studies had higher number of bleeding events in the self-management group compared to usual care group.	⊕⊕OO LOW	IMPORTANT
Adverse events - Thrombosis (follow-up 3-12 months)											
5[9]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	-	-	Five studies looked at the adverse events of thrombosis. There was no significant difference in the number of thrombotic events between the self-management group and usual care group. Two studies had higher numbers of thrombotic events in the usual care group. One study had higher number of thrombotic events in the self-management group compared to usual care group.	⊕⊕OO LOW	IMPORTANT
Thromboembolic/haemorrhagic complications (follow-up median 11.8 months; assessed with: number of events)											
1[10]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	no serious imprecision	None	8/368 (2.2%) (g)	27/369 (7.3%) (h) 0%	RR 0.3 (0.14 to 0.65)[11]	51 fewer per 1000 (from 26 fewer to 63 fewer) (i) -	⊕⊕⊕O MODERATE	IMPORTANT
Thromboembolic and major bleeding complications (follow-up median 11.8 months; assessed with: number of events)											
1[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	serious[6]	None	12/99 (12.1%) (j)	22/96 (22.9%) (k) 0%	HR 0.50 (0.25 to 1.00)	107 fewer per 1000 (from 166 fewer to 0 more) (l) -	⊕⊕OO LOW	IMPORTANT

Quality of life (follow-up 6-12 months; measured with: Survey, questionnaires, interviews)											
3[12]	randomised trials	serious[13]	no serious inconsistency	no serious indirectness	serious[6]	None	-	-	Three studies reported quality of life as an outcome. Two of the studies found no significant difference between self-management and usual care groups in quality of life improvement. One study looked at treatment related quality of life and showed that there was significantly greater improvement in self-efficacy in the self-management group compared to the usual care group and there was no significant difference in the anxiety scores between the two groups.	⊕⊕OO LOW	IMPORTANT

[1] Christenson 2006, Cromcheecke 2000, Fitzmaurice 2002, Fitzmaurice 2005, Grunau 2011, Menendez-Jandula B 2005, Siebenhofer 2008, Sunderji 2004.
[2] Selection, detection and attrition bias in some studies
[3] Some included studies had very small study size
[4] Siebenhofer 2008
[5] Attrition bias
[6] Small study size
[7] Two deaths in the usual care group were considered to be directly related to anticoagulation.
[8] Cromcheecke 2000
[9] Cromcheecke 2000, Fitzmaurice 2002, Fitzmaurice 2005, Grunau 2011. Sunderji 2004.
[10] Menendez-Jandula 2005
[11] Unadjusted analysis
[12] Fitzmaurice 2005, Grunau 2011, McMahon 2011
[13] Detection bias

GRADE profile 20: Asthma self-management/action plans

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Self management**	**Usual care**	**Relative (95% CI)**	**Absolute**		
Individualised action plans (home-management plan)[1]												
Acute asthma event (follow-up mean 1 years; calculated from the diary maintained by parent(s); Better indicated by lower values)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2]	none	32	28	-	MD 0.50 lower (0.83 to 0.17 lower)	⊕⊕⊕O MODERATE	CRITICAL
School days missed (follow-up mean 1 years; measured with: Calculated from the diary maintained by parent(s); Better indicated by lower values)												

1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2]	none	32	28	-	MD 1.04 lower (1.86 to 0.22 lower)	⊕⊕⊕O MODERATE	CRITICAL
Nocturnal awakening (follow-up mean 1 years; measured with: Calculated from the diary maintained by parent(s); Better indicated by lower values)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2]	none	32	28	-	MD 1.50 lower (2.13 to 0.87 lower)	⊕⊕⊕O MODERATE	CRITICAL
Symptom score (follow-up mean 1 years; measured with: Calculated from the diary maintained by parent(s) over preceding 7 days; Better indicated by lower values)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2]	none	32	28	-	MD 11.80 lower (18.22 to 5.38 lower)	⊕⊕⊕O MODERATE	CRITICAL
Written action plan designed for asthma attacks coupled with a prescription (WAP-P)[3]												
Patient adherence to fluticasone 1-14 days after randomisation (follow-up mean 28 days; measured with: sum of daily percentage of actuations recorded by the electronic dose counter over the number prescribed for each individual (area under the curve); Better indicated by higher values)												
1[3]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[4]	none	100	92	-	MD 5.02 higher (2.60 lower to 12.64 higher)[5,6]	⊕⊕OO LOW	CRITICAL
Patient adherence to fluticasone over 15-28 days after randomisation (follow-up mean 28 days; measured with: sum of daily percentage of actuations recorded by the electronic dose counter over the number prescribed for each individual (area under the curve); Better indicated by higher values)												
1[3]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[4]	none	47	30	-	MD 16.13 higher (2.09 to 29.91 higher)[5,6]	⊕⊕OO LOW	CRITICAL
Medical follow-up visits within 28 days when recommended (follow-up mean 28 days; assessed by treating physicians and asthma educators contacted to confirm attendance)												
1[3]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[4]	none	39/89 (43.8%) (m)	18/48 (37.5%) (n) 0%	RR 1.17 (0.76 to 1.80)	64 more per 1000 (from 90 fewer to 300 more) (o) -	⊕⊕OO LOW	CRITICAL
Medical follow-up visits within 90 days when recommended (follow-up mean 28 days; assessed by treating physicians and asthma educators contacted to confirm attendance)												
1[3]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[4]	None	46/89 (51.7%) (p)	19/48 (39.6%) (q) 0%	RR 1.30 (0.87 to 1.95)	119 more per 1000 (from 51 fewer to 376 more) (r) -	⊕⊕OO LOW	CRITICAL
Medical follow-up visits within 90 days irrespective of recommendation (follow-up mean 28 days; assessed by treating physicians and asthma educators contacted to confirm attendance)												

1[3]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[4]	None	55/109 (50.5%) (s)	41/110 (37.3%) (t) 0%	RR 1.37 (1.01 to 1.85)	138 more per 1000 (from 4 more to 317 more) (u) -	⊕⊕OO LOW	CRITICAL
Unscheduled care visits - ≥ 1 acute care visit (follow-up mean 28 days; assessed by confirming with hospital records)												
1[3]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[4]	None	10/107 (9.3%) (v)	8/110 (7.3%) (w) 0%	RR 1.27 (0.52 to 3.10)	20 more per 1000 (from 35 fewer to 153 more) (x) -	⊕⊕OO LOW	CRITICAL
Asthma control - Rescue beta-2 agonist (albuterol) use over last 14 days (follow-up mean 28 days; assessed with dose counter)												
1[3]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[4]	None	58/103 (56.3%) (y)	65/106 (61.3%) (z) 0%	RR 0.92 (0.73 to 1.15)	49 fewer per 1000 (from 166 fewer to 92 more) (aa) -	⊕⊕OO LOW	CRITICAL
Asthma control - asthma quiz (follow-up mean 28 days; assessed with: Asthma quiz for kids score <2[7])												
1[3]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[4]	None	57/99 (57.6%) (bb)	41/99 (41.4%) (cc) 0%	RR 1.36 (1.04 to 1.86)	149 more per 1000 (from 17 more to 356 more) (dd) -	⊕⊕OO LOW	CRITICAL
Quality of Life of the child (follow-up mean 28 days; measured with: 23-item Paediatric Asthma Quality of Life Questionnaire on a scale of 1 (worst) to 7 (best); Better indicated by higher values)												
1[3]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[4]	none	109	110	-	MD 0.26 higher (0.15 lower to 0.68 higher)	⊕⊕OO LOW	IMPORTANT
Quality of Life of the caregiver (follow-up mean 28 days; measured with: Juniper's 13-item Paediatric Asthma Caregiver's Quality of Life Questionnaire on a scale of 1 (worst) to 7 (best); Better indicated by higher values)												
1[3]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[4]	None	109	110	-	MD 0.19 higher (0.20 lower to 0.58 higher)	⊕⊕OO LOW	IMPORTANT
Personalised written self-management plan and self-treatment instructions[9]												
Asthma control - Percentage of successfully treated weeks per patient (follow-up mean 2 years; assessed with: use of modified Borg scale ranging from 0 (no dyspnoea) to 10 (maximally severe dyspnoea)[8])												

1[9]	randomised trials	serious[10]	no serious inconsistency	no serious indirectness	serious[2]	None	81/105 (77.1%) (ee)	74/103 (71.8%) (ff) 0%	RR 1.07 (0.92 to 1.26)	50 more per 1000 (from 57 fewer to 187 more) (gg) -	⊕⊕OO LOW	CRITICAL
Asthma control (follow-up mean 2 years)												
1[9]	randomised trials	serious[10]	no serious inconsistency	no serious indirectness	serious[2]	none	81	74	No significant differences found between the groups for the following outcomes assessing asthma control: - Changes in post-bronchodilator FEV_1 (800 micrograms salbutamol once daily through spacer) - Changes in reversibility of FEV_1 as percentage of the predicted value - Changes in concentration of histamine provoking a fall in FEV_1 of 20% or more		⊕⊕OO LOW	CRITICAL
Asthma control - lost activity days (follow-up mean 2 years; measured with: mean number of limited activity days (recorded by participants in their diaries); Better indicated by lower values)												
1[9]	randomised trials	serious[10]	no serious inconsistency	no serious indirectness	serious[2]	none	110	104	-	MD 2.70 lower (4.25 to 1.15 lower)[11]	⊕⊕OO LOW	CRITICAL
Number of short courses of oral prednisolone and antibiotics (follow-up mean 2 years; measured from patient records)												
1[9]	randomised trials	serious[10]	no serious inconsistency	no serious indirectness	serious[2]	none	110	104	No significant difference in the number of antibiotics between the two groups. The self-management group had a significantly higher number of courses of oral prednisolone than the usual care group, Mann Whitney U test, p=0.015.		⊕⊕OO LOW	CRITICAL
Number of GP diagnosed exacerbations (follow-up mean 2 years; measured by using the presence of two out of three criteria – increased asthma symptoms, fall in peak flow below 80% of predicted value, and increased use of bronchodilators)												
1[9]	randomised trials	serious[10]	no serious inconsistency	no serious indirectness	serious[2]	none	110	104	No significant difference in the number of GP diagnosed exacerbations between the two groups.		⊕⊕OO LOW	CRITICAL
Asthma specific Quality of Life (follow-up mean 2 years; measured by Asthma Quality of Life Questionnaire)												
1[9]	randomised	serious[10]	no serious	no serious	serious[2]	none	110	104	Based on repeated measurements analysis,		⊕⊕OO	IMPORTANT

	trials		inconsistency	indirectness					the estimated increase in overall asthma quality of life score was 0.10 points per visit in the usual care group and 0.21 points per visit in the self-management group, P=0.055. There was a significant change between groups only in the emotions domain (0.02 points per visit in the usual care group, 0.20 points per visit in the self-management group, p=0.006).	LOW	

[1] Agrawal 2005
[2] Small study size
[3] Ducharme 2011
[4] Small study size and wide confidence intervals
[5] Unadjusted analysis data
[6] Adjusted analysis as reported in the study favoured the written action plan
[7] A score of 0 is best, 6 is worst, and 2 is defined as the cut-off for poor control
[8] A week in which acceptable asthma control in terms of perceived dyspnoea was maintained.
[9] Thoonen 2003
[10] Selection, attrition bias
[11] Adjusted analysis

GRADE profile 21: Blood pressure self-management

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Self-management**	**Usual care**	**Relative (95% CI)**	**Absolute**		
Patient self-monitoring of blood pressure and dose adjustment as agreed with their GP												

Change in mean systolic blood pressure at 6 months (follow-up mean 12 months; measured with: mmHg ; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	234	246	-	MD 3.7 higher (0.8 to 6.6 higher)[3]	⊕⊕⊕O MODERATE	CRITICAL
Change in mean systolic blood pressure at 12 months (follow-up mean 12 months; measured with: mmHg ; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	234	246	-	MD 5.4 higher (2.4 to 8.5 higher)[3]	⊕⊕⊕O MODERATE	CRITICAL
Change in Mean primary care consultations during the year (follow-up mean 12 months; measured with: mean attendance; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	234	246	-	MD 0.3 lower (0.72 lower to 0.12 higher)	⊕⊕⊕O MODERATE	CRITICAL
Patient experience (follow-up mean 12 months; measured with: taped and transcribed semi-structured interviews; Better indicated by lower values)												
1[1,4]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	23	0	Patients were confident about self-monitoring. Some patients lacked the confidence to increase medicines without re-consulting with their GP. Patients were more comfortable with titrating their medicine if their blood pressure reading were substantially above target. Many planned to continue self-monitoring after the study finished and report home readings to their GP, but a few wished to continue with self-management plan.	⊕⊕⊕O MODERATE	CRITICAL
Frequent symptoms or side-effects (follow-up mean 12 months; measured with: Questionnaires - NARRATIVE; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	234	246	The intervention group was not associated with increased anxiety or frequency of most side effects. However, the frequency of leg swelling was significantly higher in the intervention group than in the control group (increase in prescriptions for calcium channel blockers in intervention group).		⊕⊕⊕O MODERATE	IMPORTANT
Quality of Life at 6 months (follow-up mean 12 months; measured with: EQ-5D; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	234	246	-	MD 0.011 higher (0.023 lower to 0.045 higher)	⊕⊕⊕O MODERATE	IMPORTANT
Quality of Life at 12 months (follow-up mean 12 months; measured with: EQ-5D; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	234	246	-	MD 0.027 higher (0.004 lower to 0.065 higher)	⊕⊕⊕O MODERATE	IMPORTANT

[1] McManus 2010
[2] Attrition bias
[3] Adjusted analysis for sex, general practice, baseline systolic blood pressure more than 150mmHg, and diabetes and chronic kidney disease status
[4] Outcome reported in a paper by Jones 2012

GRADE profile 22: COPD self-management

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Self-management	Usual care	Relative (95% CI)	Absolute		
Patient self-management plan to manage COPD and exacerbations with steroids and antibiotics												
Healthcare utilisation (follow-up mean 12 months; assessed with: Emergency department attendances)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	9/84 (10.7%) (hh)	11/70 (15.7%) (ii) 0%	RR 0.68 (0.3 to 1.55)[3]	50 fewer per 1000 (from 110 fewer to 86 more) (jj) -	⊕⊕⊕O MODERATE	CRITICAL
Healthcare utilisation (follow-up mean 12 months; assessed with: hospital admissions)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	7/84 (8.3%) (kk)	6/70 (8.6%) (ll) 0%	RR 0.97 (0.34 to 2.76)[3]	3 fewer per 1000 (from 57 fewer to 151 more) (mm) -	⊕⊕⊕O MODERATE	CRITICAL
Healthcare utilisation (follow-up mean 12 months; assessed with: GP visits)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	35/84 (41.7%) (nn)	27/70 (38.6%) (oo) 0%	RR 1.08 (0.73 to 1.59)[3]	31 more per 1000 (from 104 fewer to 228 more) (pp) -	⊕⊕⊕O MODERATE	CRITICAL
Healthcare utilisation (follow-up mean 12 months; assessed with: Antibiotic courses)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	48/84 (57.1%)	36/70 (51.4%)	RR 1.11 (0.83 to 1.49)[3]	57 more per 1000 (from 87 fewer to 252 more)	⊕⊕⊕O	CRITICAL

							(qq)	(rr) 0%		(ss) -	MODERATE	
Healthcare utilisation (follow-up mean 12 months; assessed with: steroid courses)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	6/84 (7.1%)	4/70 (5.7%)	RR 1.25 (0.37 to 4.25)[3]	14 more per 1000 (from 36 fewer to 186 more)	⊕⊕⊕O MODERATE	CRITICAL
							(tt)	(uu) 0%		(vv) -		
Hospital related anxiety (follow-up mean 12 months; measured with: Hospital related depression and anxiety scale; range of scores: 0-21; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	84	70	-	MD 0.14 higher (0 to 1.63 higher)	⊕⊕⊕O MODERATE	CRITICAL
Hospital related depression (follow-up mean 12 months; measured with: Hospital related depression and anxiety scale; range of scores: 0-21; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	84	70	-	MD 0.28 higher (0.57 lower to 1.13 higher)	⊕⊕⊕O MODERATE	CRITICAL
COPD self-management interview - (follow-up mean 12 months; measured with: 30 minute structured interview, maximum score of 26 in each of the 3 situations; range of scores: 0-21)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	84	70	Higher scores for the intervention group compared with controls in all 3 situations (well, early exacerbation and severe exacerbation) indicated better self-management knowledge and capacity to act (actions) for all stages of COPD action plan at 12 months		⊕⊕⊕O MODERATE	CRITICAL
Health related quality of life (follow-up mean 12 months; measured with: St Georges Respiratory Questionnaire; range of scores: 0-21; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	None	84	70	-	MD 1.27 higher (3.16 lower to 5.7 higher)[4]	⊕⊕⊕O MODERATE	IMPORTANT

[1] McGeoch 2006
[2] selection and performance bias
[3] Study not powered to detect small differences in emergency department attendances, hospital admissions, GP visits, antibiotic courses and steroid courses
[4] Total mean score used from questionnaire (addition of symptoms, activity and impacts scores)

GRADE profile 23: Diabetes self-monitoring

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Self-management	Usual care	Relative (95% CI)	Absolute		
Self-monitoring of blood glucose and following of guidelines for self-adjustment of diet and GP adjustment of antidiabetic medicines												
Glycated haemoglobin (HbA_{1c}) level at end point (follow-up mean 6 months; measured with: Blood glucose monitoring device and capillary assays done at a laboratory; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	345	344	-	MD 0.30 lower (0.60 lower to 0.00 higher)[4]	⊕⊕OO LOW	CRITICAL
Hypoglycaemic events (follow-up mean 6 months; measured with: capillary blood glucose < 3millimoles/litre; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	345	344	78 patients reported at least one episode of hypoglycaemia (symptomatic or asymptomatic) during the study; 53 (10.4%) patients in the self-management group and 25 (5.2%) patients in usual care group. These proportions statistically different (P = 0.003) due to the difference between groups solely for asymptomatic hypoglycaemia (P = 0.001)		⊕⊕OO LOW	CRITICAL
Mean change in systolic blood pressure (follow-up mean 6 months; measured with: mmHg; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	345	344	-	MD 1.52 higher (0.82 lower to 3.86 higher)[4]	⊕⊕OO LOW	CRITICAL

[1] Guerci B et al 2003
[2] Selection bias and attrition bias potential
[3] Number of participants left for data collection was less than 234 participants/group, study required at least 234 participants/group to detect difference of 0.05% HbA_{1c}
[4] Data available for 181 participants in self-management group, 205 participants in usual care group taking into account of the attrition figures reported in the study

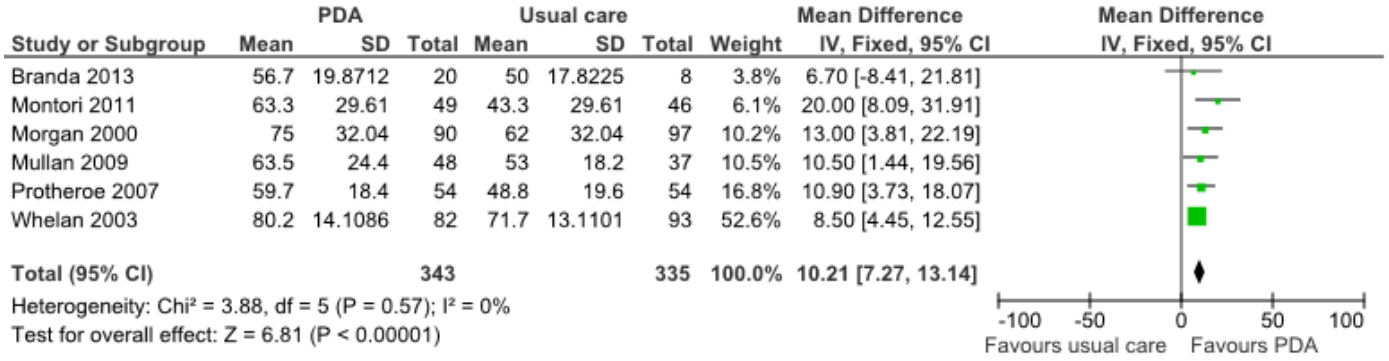
D.2.6 Patient decision aids used in consultations about medicines

GRADE profile 24: Patient decision aid compared with usual care – patient knowledge

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Patient decision aid	Usual care	Relative (95% CI)	Absolute		
Patient knowledge (follow-up 1st; range of scores: 0-100; Better indicated by higher values)												
6[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	343	335	-	MD 10.21 higher (7.27 to 13.14 higher)	⊕⊕⊕⊕ HIGH	CRITICAL

[1] Branda 2013, Montori 2011, Morgan 2000, Mullan 2009, Protheroe 2007, Whelan 2003. 8 RCTs (Hamann 2006, Leighl 2011, Mann 2010, Mathers 2012, Sheridan 2014, Thomson 2007, Vuorma 2003, Weymiller 2007) presented data that could not be included in the pooled outcome

Forest plot 2: Patient decision aid compared with usual care – patient knowledge



GRADE profile 25: Patient decision aid compared with other intervention – patient knowledge

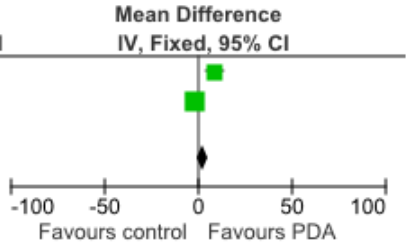
Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Patient decision aid	Other intervention	Relative (95% CI)	Absolute		
Patient knowledge (follow-up 1st; range of scores: 0-100; Better indicated by higher values)												
2[1]	randomised trials	no serious risk of bias	serious[2]	no serious indirectness	no serious imprecision	none	484	289	-	MD 2.60 higher (0.54 lower to 5.75 higher)	⊕⊕⊕O MODERATE	CRITICAL

[1] Raynes-Greenow 2010, Schapira 2007. 1 RCT (Lalonde 2006) presented data that could not be included in the pooled outcome
[2] Widely differing estimates of the treatment effect across pooled studies

Forest plot 3: Patient decision aid compared with other intervention – patient knowledge

	PDA			Other intervention				Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% CI
Raynes-Greenow 2010	65.1	29.5	395	56.5	27.4	201	43.4%	8.60 [3.82, 13.38]
Schapira 2007	75.5	14.2415	89	77.5	14.159	88	56.6%	-2.00 [-6.18, 2.18]
Total (95% CI)			**484**			**289**	**100.0%**	**2.60 [-0.54, 5.75]**

Heterogeneity: Chi² = 10.71, df = 1 (P = 0.001); I² = 91%
Test for overall effect: Z = 1.62 (P = 0.11)



GRADE profile 26: Patient decision aid compared with usual care – decisional conflict outcomes

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Patient decision aid	Usual care	Relative (95% CI)	Absolute		
Decisional conflict scale – total score (1st follow-up; range of scores: 0-100; Better indicated by lower values)												
7[1]	randomised trials	no serious risk of bias	serious[2]	no serious indirectness	no serious imprecision	none	486	445	-	MD 6.41 lower (8.22 to 4.60 lower)	⊕⊕⊕O MODERATE	CRITICAL
Decisional conflict scale – uncertainty subscore (1st follow-up; range of scores: 0-100; Better indicated by lower values)												
3[3]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	240	223	-	MD 8.33 lower (12.25 to 4.41 lower)	⊕⊕⊕⊕ HIGH	CRITICAL
Decisional conflict scale – informed subscore (1st follow-up; range of scores: 0-100; Better indicated by lower values)												
3[4]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	217	185	-	MD 6.35 lower (9.58 to 3.13 lower)	⊕⊕⊕⊕ HIGH	CRITICAL
Decisional conflict scale – values clarity subscore (1st follow-up; range of scores: 0-100; Better indicated by lower values)												
1[5]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[6]	none	89	78	-	MD 10.00 lower (14.97 to 5.03 lower)	⊕⊕⊕O MODERATE	CRITICAL
Decisional conflict scale – support subscore (1st follow-up; range of scores: 0-100; Better indicated by lower values)												
2[7]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[6]	none	169	148	-	MD 3.89 lower (6.99 to 0.80 lower)	⊕⊕⊕O MODERATE	CRITICAL
Decisional conflict scale – effective decision-making subscore (1st follow-up; range of scores: 0-100; Better indicated by lower values)												
3[8]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	240	233	-	MD 6.84 lower (9.21 to 4.47 lower)	⊕⊕⊕⊕ HIGH	CRITICAL

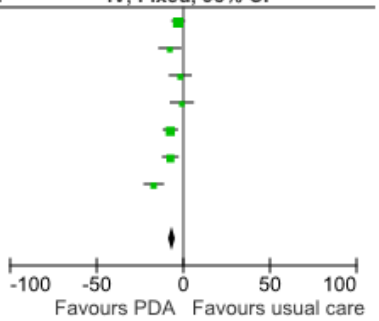
[1] Mann 2010, Mathers 2012, Montori 2011, Mullan 2009, Murray 2011[a], Murray 2001[b], Protheroe 2007. 5 RCTs (Leighl 2011, Oakley 2006, Sheridan 2014, Thomson 2007, Weymiller 2007) presented data that could not be included in the pooled outcome
[2] Substantial heterogeneity between studies
[3] Mathers 2012, Murray 2011[a], Murray 2001[b]. 1 RCT (Weymiller 2007) presented data that could not be included in the pooled outcome
[4] Mann 2010, Mathers 2012, Mullan 2009. 2 RCTs (Thomson 2007, Weymiller 2007) presented data that could not be included in the pooled outcome
[5] Mathers 2012. 2 RCTs (Thomson 2007, Weymiller 2007) presented data that could not be included in the analysis

[6] Small sample size
[7] Mann 2010, Mathers 2012. 2 RCTs (Branda 2013, Weymiller 2007) presented data that could not be included in the pooled outcome
[8] Mathers 2012, Murray 2011[a], Murray 2001[b]. 2 RCTs (Branda 2013, Weymiller 2007) presented data that could not be included in the pooled outcome

Forest plot 4: Patient decision aid compared with usual care – decisional conflict (total score)

	PDA			Usual care				Mean Difference	Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% CI	IV, Fixed, 95% CI
Mann 2010	25.5	11.14	80	28.5	11.14	70	25.6%	-3.00 [-6.57, 0.57]	
Mathers 2012	17.4	12.6	89	25.2	25.2	78	8.6%	-7.80 [-13.97, -1.63]	
Montori 2011	14.4	15.2942	49	16.2	15.2942	46	8.6%	-1.80 [-7.95, 4.35]	
Mullan 2009	14.1	17.89	48	14.95	12.68	37	7.7%	-0.85 [-7.35, 5.65]	
Murray 2001a	37.5	12.5	94	45	15	96	21.3%	-7.50 [-11.42, -3.58]	
Murray 2001b	32.5	10	57	40	12.5	49	17.2%	-7.50 [-11.86, -3.14]	
Protheroe 2007	23.4	14.3	69	40.5	18.3	69	10.9%	-17.10 [-22.58, -11.62]	
Total (95% CI)			**486**			**445**	**100.0%**	**-6.41 [-8.22, -4.60]**	

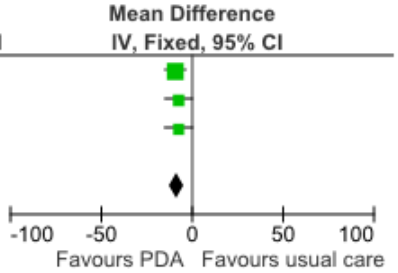
Heterogeneity: Chi² = 23.81, df = 6 (P = 0.0006); I² = 75%
Test for overall effect: Z = 6.95 (P < 0.00001)



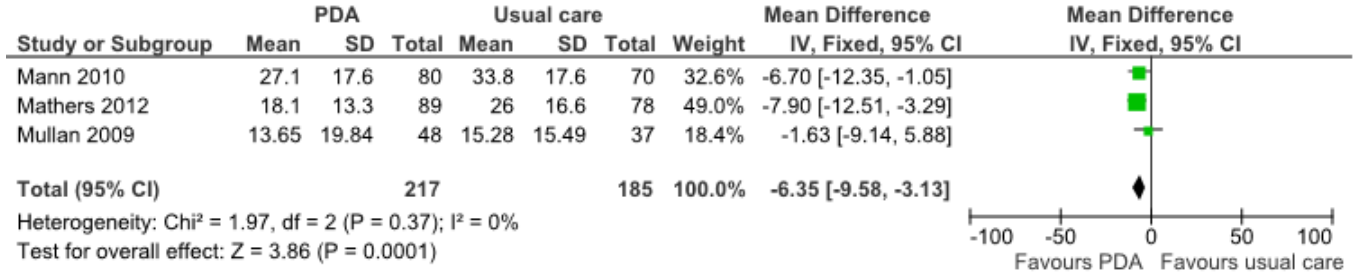
Forest plot 5: Patient decision aid compared with usual care – decisional conflict (uncertainty subscore)

	PDA			Usual care				Mean Difference	Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% CI	IV, Fixed, 95% CI
Mathers 2012	20.1	16.6	89	29.4	20.8	78	46.2%	-9.30 [-15.06, -3.54]	
Murray 2001a	52.5	25	94	60	27.5	96	27.5%	-7.50 [-14.97, -0.03]	
Murray 2001b	35	20	57	42.5	20	49	26.3%	-7.50 [-15.14, 0.14]	
Total (95% CI)			**240**			**223**	**100.0%**	**-8.33 [-12.25, -4.41]**	

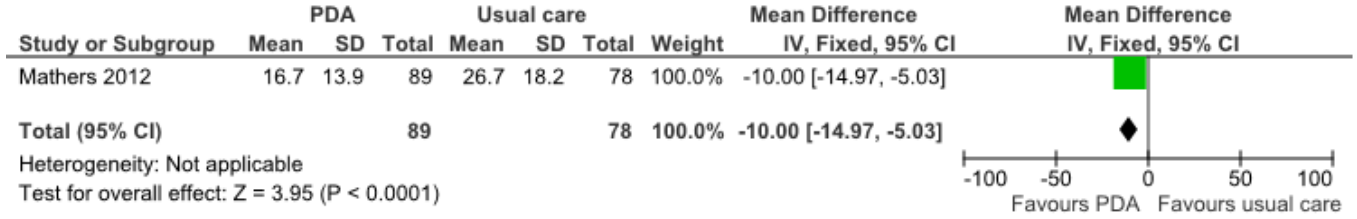
Heterogeneity: Chi² = 0.20, df = 2 (P = 0.90); I² = 0%
Test for overall effect: Z = 4.17 (P < 0.0001)



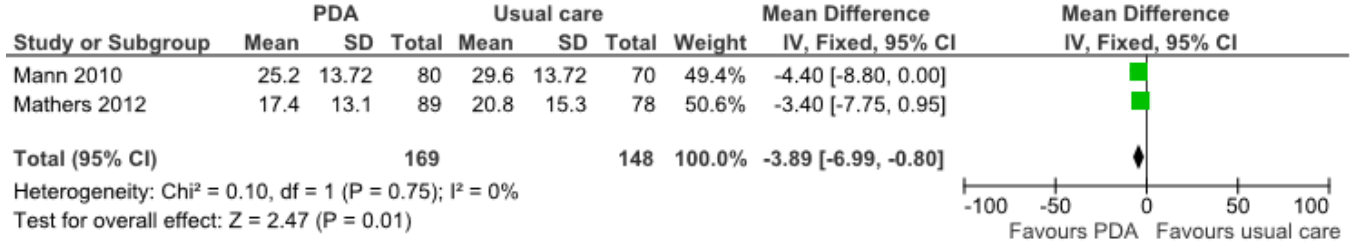
Forest plot 6: Patient decision aid compared with usual care – decisional conflict (informed subscore)



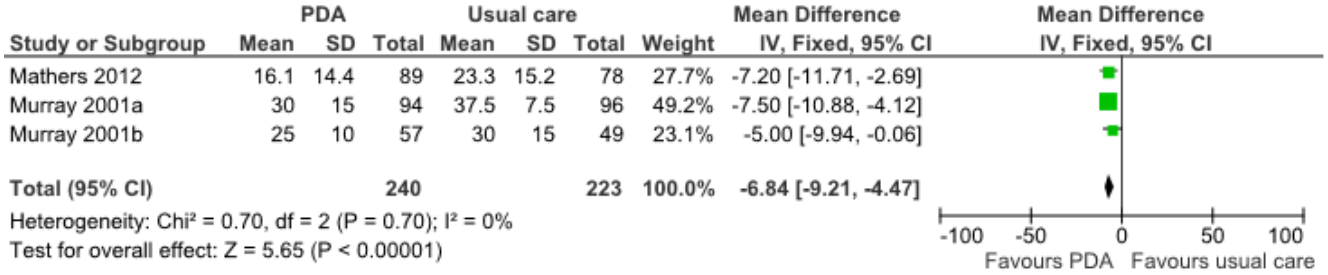
Forest plot 7: Patient decision aid compared with usual care – decisional conflict (values clarity subscore)



Forest plot 8: Patient decision aid compared with usual care – decisional conflict (support subscore)



Forest plot 9: Patient decision aid compared with usual care – decisional conflict (effective decision-making subscore)



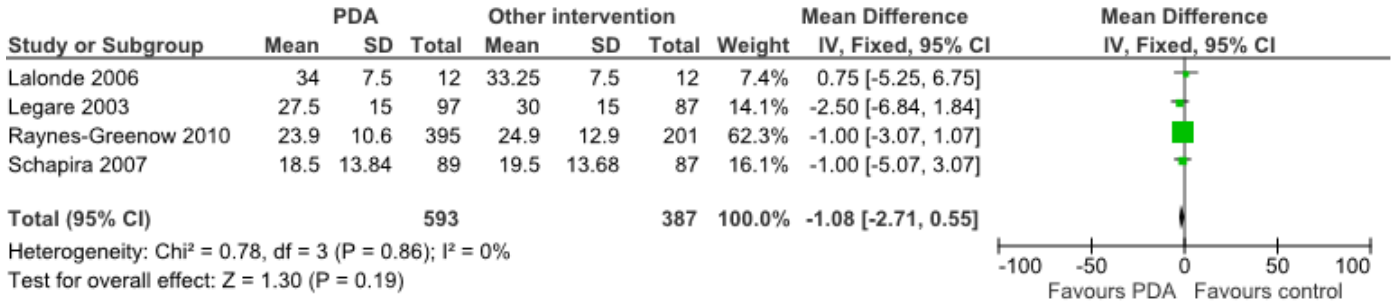
GRADE profile 27: Patient decision aid compared with other intervention – decisional conflict outcomes

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Patient decision aid	Other intervention	Relative (95% CI)	Absolute		
Decisional conflict scale – total score (1st follow-up; range of scores: 0-100; Better indicated by lower values)												
4[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	593	388	-	MD 1.08 lower (2.71 lower to 0.55 higher)	⊕⊕⊕⊕ HIGH	CRITICAL
Decisional conflict scale – uncertainty subscore (1st follow-up; range of scores: 0-100; Better indicated by lower values)												
2[2]	randomised trials	serious[3,4]	no serious inconsistency	no serious indirectness	serious[5]	none	101	99	-	MD 3.34 lower (7.69 lower to 1.02 higher)	⊕⊕OO LOW	CRITICAL
Decisional conflict scale – informed subscore (1st follow-up; range of scores: 0-100; Better indicated by lower values)												
1[6]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[7]	none	12	12	-	MD 7.00 higher (2.12 lower to 16.12 higher)	⊕⊕OO LOW	CRITICAL
Decisional conflict scale – values clarity subscore (1st follow-up; range of scores: 0-100; Better indicated by lower values)												
1[6]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[7]	none	12	12	-	MD 2.00 higher (7.54 lower to 11.54 higher)	⊕⊕OO LOW	CRITICAL
Decisional conflict scale – support subscore (1st follow-up; range of scores: 0-100; Better indicated by lower values)												
1[6]	randomised trials	serious[3]	no serious inconsistency	no serious indirectness	serious[7]	none	12	12	-	MD 1.50 higher (8.93 lower to 11.93 higher)	⊕⊕OO LOW	CRITICAL
Decisional conflict scale – effective decision-making subscore (1st follow-up; range of scores: 0-100; Better indicated by lower values)												
2[2]	randomised trials	serious[3,4]	no serious inconsistency	no serious indirectness	serious[5]	none	101	99	-	MD 0.38 lower (3.93 lower to 3.17 higher)	⊕⊕OO LOW	CRITICAL

[1] Raynes-Greenow 2010, Lalonde 2006, Légaré 2003, Schapira 2007. 1 RCT (Deschamps 2004) presented data that could not be included in the pooled outcome
[2] Lalonde 2006, Schapira 2007

[3] Blinding, allocation concealment and reasons for attrition not described in Lalonde 2006.
[4] No blinding and reasons for attrition not described in Schapira 2007
[5] Small number of participants in pooled studies
[6] Lalonde 2006
[7] Very small sample size

Forest plot 10: Patient decision aid compared with other intervention – decisional conflict (total score)



GRADE profile 28: Patient decision aid compared with usual care – participation in decision-making outcomes

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Patient decision aid	Usual care	Relative (95% CI)	Absolute		
Patient controlled decision-making (1st follow-up)												
4[1]	randomised trials	no serious risk of bias	serious[2]	no serious indirectness	no serious imprecision	none	235/377 (62.3%)	191/359 (53.2%)	RR 1.20 (1.07 to 1.35)	106 more per 1000 (from 37 more to 186 more)	⊕⊕⊕O MODERATE	CRITICAL
Shared decision-making (1st follow-up)												
5[3]	randomised trials	no serious risk of bias	serious[4]	no serious indirectness	no serious imprecision	none	184/456 (40.4%)	205/440 (46.6%)	RR 0.85 (0.75 to 0.97)	70 fewer per 1000 (from 14 fewer to 116 fewer)	⊕⊕⊕O MODERATE	CRITICAL
Health professional controlled decision-making (1st follow-up)												
5[5]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[6]	none	30/457 (6.6%)	48/450 (10.7%)	RR 0.60 (0.39 to 0.93)	43 fewer per 1000 (from 7 fewer to 65 fewer)	⊕⊕⊕O MODERATE	CRITICAL
Participation in decision-making (measured with: OPTION scale score[7]; 1st follow-up; Better indicated by higher values)												
3[8]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[9]	none	108	86	-	MD 22.09 higher (17.23 to 26.94 higher)	⊕⊕⊕O MODERATE	CRITICAL

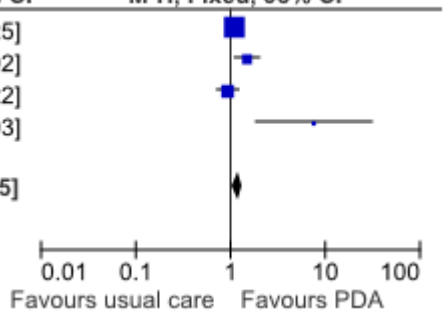
[1] Kasper 2008, Mathers 2012, Murray 2001a, Murray 2001b

[2] Substantial heterogeneity between studies. Result not significant when random effects model used in analysis
[3] Kasper 2008, Mathers 2012, Murray 2001a, Murray 2001b, Sheridan 2014
[4] Moderate heterogeneity between studies. Result not significant when random effects model used in analysis
[5] Kasper 2008, Mathers 2012, Murray 2001a, Murray 2001b, Whelan 2003
[6] Very wide 95% confidence intervals across all pooled studies
[7] OPTION scale measures patient involvement in decision-making during consultations
[8] Branda 2013, Montori 2011, Mullan 2009
[9] Small number of participants in the pooled studies

Forest plot 11: Patient decision aid compared with usual care – patient controlled decision-making

	PDA		Usual care			Risk Ratio	Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI	M-H, Fixed, 95% CI
Kasper 2008	109	134	103	139	52.7%	1.10 [0.97, 1.25]	
Mathers 2012	59	92	33	77	18.7%	1.50 [1.11, 2.02]	
Murray 2001a	49	94	53	95	27.5%	0.93 [0.72, 1.22]	
Murray 2001b	18	57	2	48	1.1%	7.58 [1.85, 31.03]	
Total (95% CI)		**377**		**359**	**100.0%**	**1.20 [1.07, 1.35]**	
Total events	235		191				

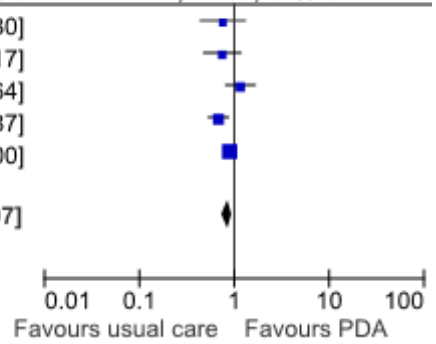
Heterogeneity: Chi² = 14.01, df = 3 (P = 0.003); I² = 79%
Test for overall effect: Z = 3.06 (P = 0.002)



Forest plot 12: Patient decision aid compared with usual care – shared decision-making

	PDA		Usual care			Risk Ratio	Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI	M-H, Fixed, 95% CI
Kasper 2008	19	134	26	139	12.1%	0.76 [0.44, 1.30]	
Mathers 2012	25	92	28	77	14.5%	0.75 [0.48, 1.17]	
Murray 2001a	40	94	36	98	16.8%	1.16 [0.82, 1.64]	
Murray 2001b	34	57	42	48	21.7%	0.68 [0.54, 0.87]	
Sheridan 2014	66	79	73	78	34.9%	0.89 [0.80, 1.00]	
Total (95% CI)		**456**		**440**	**100.0%**	**0.85 [0.75, 0.97]**	
Total events	184		205				

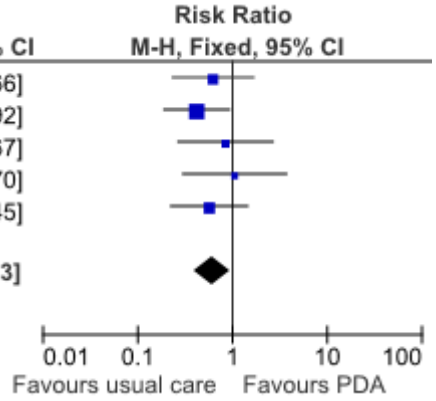
Heterogeneity: Chi² = 7.44, df = 4 (P = 0.11); I² = 46%
Test for overall effect: Z = 2.45 (P = 0.01)



Forest plot 13: Patient decision aid compared with usual care – health professional controlled decision-making

Study or Subgroup	PDA Events	PDA Total	Usual care Events	Usual care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Kasper 2008	6	134	10	139	20.1%	0.62 [0.23, 1.66]
Mathers 2012	8	92	16	77	35.7%	0.42 [0.19, 0.92]
Murray 2001a	5	94	6	95	12.2%	0.84 [0.27, 2.67]
Murray 2001b	5	57	4	48	8.9%	1.05 [0.30, 3.70]
Whelan 2003	6	80	12	91	23.0%	0.57 [0.22, 1.45]
Total (95% CI)		**457**		**450**	**100.0%**	**0.60 [0.39, 0.93]**
Total events	30		48			

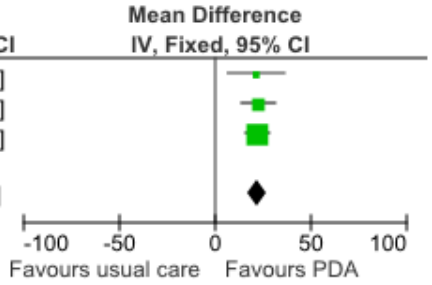
Heterogeneity: Chi² = 1.91, df = 4 (P = 0.75); I² = 0%
Test for overall effect: Z = 2.28 (P = 0.02)



Forest plot 14: Patient decision aid compared with usual care – patient involvement (OPTION scale score)

Study or Subgroup	PDA Mean	PDA SD	PDA Total	Usual care Mean	Usual care SD	Usual care Total	Weight	Mean Difference IV, Fixed, 95% CI
Branda 2013	49.7	20.5244	22	28.3	25.6733	17	10.6%	21.40 [6.48, 36.32]
Montori 2011	49.8	18.926	38	27.3	18.926	32	29.8%	22.50 [13.60, 31.40]
Mullan 2009	49.7	17.74	48	27.7	11.75	37	59.6%	22.00 [15.71, 28.29]
Total (95% CI)			**108**			**86**	**100.0%**	**22.09 [17.23, 26.94]**

Heterogeneity: Chi² = 0.02, df = 2 (P = 0.99); I² = 0%
Test for overall effect: Z = 8.92 (P < 0.00001)



GRADE profile 29: Patient decision aid compared with other intervention – participation in decision-making outcomes

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Patient decision aid	Other intervention	Relative (95% CI)	Absolute		
Patient controlled decision-making (1st follow-up)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	303/395 (76.7%)	162/201 (80.6%)	RR 0.95 (0.87 to 1.04)	40 fewer per 1000 (from 105 fewer to 32 more)	⊕⊕⊕⊕ HIGH	CRITICAL
Shared decision-making (1st follow-up)												

1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	87/395 (22%)	36/201 (17.9%)	RR 1.23 (0.87 to 1.74)	41 more per 1000 (from 23 fewer to 133 more)	⊕⊕⊕⊕ HIGH	CRITICAL
Health professional controlled decision-making (1st follow-up)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2]	none	5/395 (1.3%)	3/201 (1.5%)	RR 0.85 (0.2 to 3.51)	2 fewer per 1000 (from 12 fewer to 37 more)	⊕⊕⊕O MODERATE	CRITICAL

[1] Raynes-Greenow 2010. 1 RCT (Deschamps 2004) presented data that could not be included in the analysis
[2] Very small numbers of events; wide 95% confidence interval

GRADE profile 30: Patient decision aid compared with usual care – patient satisfaction outcomes

Quality assessment							Effects	Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**			
Patient satisfaction with decision-making process (1st follow-up)									
2[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	No significant difference between patient decision aid and usual care group in 1 RCT (Morgan 2000). Significantly increased patient satisfaction in the patient decision aid group in 1 RCT (Whelan 2003)	⊕⊕OO LOW	CRITICAL
Patient satisfaction with decision (1st follow-up)									
1[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	serious[3]	none	No significant difference between patient decision aid and usual care group	⊕⊕OO LOW	CRITICAL
Patient satisfaction with opportunities to participate in decision-making (patient decision aid versus usual care; 1st follow-up)									
1[6]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	No significant difference between patient decision aid and usual care group (OR 1.24, 95%CI 0.91 to 1.69)[7]	⊕⊕⊕⊕ HIGH	CRITICAL
Patient satisfaction with opportunities to participate in decision-making (patient decision aid plus structured interview versus usual care; 1st follow-up)									
1[6]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	Patients in the PDA group were significantly more satisfied with the opportunities they had been given to participate in decision-making (OR 1.49, 95%CI 1.11 to 2.01)[7]	⊕⊕⊕⊕ HIGH	CRITICAL
Overall patient satisfaction with treatment (patient decision aid versus usual care; 1st follow-up)									
1[6]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	No significant difference between patient decision aid and usual care group (OR 1.16, 95%CI 0.85 to 1.60)[7]	⊕⊕⊕⊕ HIGH	CRITICAL
Overall patient satisfaction with treatment (patient decision aid plus structured interview versus usual care; 1st follow-up)									
1[6]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	Patients in the PDA group were significantly more satisfied with the overall results of their treatment (OR 1.44, 95%CI 1.03 to 2.01)[7]	⊕⊕⊕⊕ HIGH	CRITICAL
Overall patient satisfaction with treatment (1st follow-up; measured with: ZUF8 score (8-item questionnaire)									
1[8]	randomised trials	serious[9]	no serious inconsistency	no serious indirectness	serious[3]	none	No significant difference between patient decision aid and usual care group	⊕⊕OO LOW	CRITICAL
Patient satisfaction with treatment outcome (follow-up 12 months)									
1[10]	randomised	no serious risk of	no serious	no serious	serious[3]	none	No significant difference between patient decision aid	⊕⊕⊕O	CRITICAL

	trials	bias	inconsistency	indirectness			and usual care group	MODERATE	
Patient satisfaction with knowledge transfer (1st follow-up)									
2[11]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[3]	none	No significant difference between patient decision aid and usual care group (2 RCTs)	⊕⊕⊕O MODERATE	CRITICAL
Patient satisfaction with communication with healthcare personnel (follow-up 3 months)									
1[12]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[3]	none	No significant difference between patient decision aid and usual care group	⊕⊕⊕O MODERATE	CRITICAL
Patient satisfaction with the consultation (1st follow-up)									
1[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	serious[3]	none	No significant difference between patient decision aid and usual care group	⊕⊕OO LOW	CRITICAL

[1] Morgan 2000, Whelan 2003
[2] Patients and researchers unblinded in Morgan 2000, Randomisation unclear, unblinded and reasons for attrition not reported in Whelan 2003
[3] Small sample size
[4] Leighl 2011
[5] Patients not blinded and not clear how outcome was objectively measured
[6] Kennedy 2002
[7] OR, adjusted odds ratio
[8] Hamann 2006
[9] Randomisation and allocation concealment unclear. Reasons for attrition not stated. Unclear risk of detection bias
[10] Vuorma 2004
[11] Branda 2013, Montori 2011
[12] Vuorma 2003

GRADE profile 31: Patient decision aid compared with other intervention – patient satisfaction outcomes

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Patient decision aid**	**Other intervention**	**Relative (95% CI)**	**Absolute**		
Patient satisfaction with decision (1st follow-up; measured with: SWD Cronbach alpha 6-item scale[1]; range of scores: 0-100; Better indicated by higher values)												
2[2]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	480	286	-	MD 0.51 higher (1.01 lower to 2.03 higher)	⊕⊕⊕⊕ HIGH	CRITICAL
Patient satisfaction with decision-making process												
1[3]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	serious[5]	none	No significant difference between patient decision aid and usual care group				⊕⊕OO LOW	CRITICAL
Overall patient satisfaction with treatment (1st follow-up)												
1[6]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	PDA only	PDA + structured interview	OR 1.16 (0.85 to 1.6)[7]	-	⊕⊕⊕⊕ HIGH	CRITICAL
Patient satisfaction with opportunities participate in decision-making (1st follow-up)												
1[6]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	PDA only	PDA + structured interview	OR 1.24 (0.91 to 1.69)[7]	-	⊕⊕⊕⊕ HIGH	CRITICAL

Patient satisfaction with preparation for decision-making (1st follow-up; range of scores: 0-100; Better indicated by higher values)												
1[8]	randomised trials	serious[9]	no serious inconsistency	no serious indirectness	serious[5]	none	48	42	-	MD 2.50 higher (3.49 lower to 8.49 higher)	⊕⊕OO LOW	CRITICAL

[1] Scores out of 6 converted to percentage for analysis
[2] Raynes-Greenow 2010, Schapira 2007
[3] Lalonde 2006
[4] Blinding, allocation concealment and reasons for attrition not described in Lalonde 2006
[5] Small sample size
[6] Kennedy 2002
[7] Adjusted odds ratio
[8] Deschamps 2004
[9] Randomisation, allocation concealment and blinding unclear

GRADE profile 32: Patient decision aid compared with usual care – medicines adherence

Quality assessment							Effects	Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**			
Medicines adherence (follow-up range 3–18 months)									
8[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	No significant difference between patient decision aid and usual care group in 5 RCTs[4]. Significantly increased medicines adherence in the patient decision aid group in 2 RCTs[5]. Significantly reduced medicines adherence in the patient decision aid group in 1 RCT[6]	⊕⊕OO LOW	CRITICAL

[1] Branda 2013, Hamann 2007, Mann 2010, Montori 2011, Mullan 2009, Oakley 2006, Sheridan 2011, Weymiller 2007
[2] Includes low quality studies; outcome measured differently across studies, or unclear; variation in medicines used across studies
[3] Small number of participants in studies; varying lengths of follow-up
[4] Branda 2013, Hamann 2007, Mann 2010, Oakley 2006, Weymiller 2007
[5] Montori 2011, Sheridan 2011
[6] Mullan 2009

GRADE profile 33: Patient decision aid compared with other intervention – medicines adherence

Quality assessment							Effects	Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**			
Medicines adherence (1st follow-up)									
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	No significant difference between patient decision aid and other intervention group (pharmacist consultation)	⊕⊕OO LOW	CRITICAL

[1] Deschamps 2004
[2] Randomisation, allocation concealment and blinding unclear
[3] Small sample size

GRADE profile 34: Patient decision aid compared with usual care – patient-oriented clinical outcomes

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Patient decision aid	Usual care	Relative (95% CI)	Absolute		
General health status (follow-up range 3–24 months; measured with: SF-36 questionnaire in 4 studies[1])												
6[2]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[3]	none	No significant difference between patient decision aid and usual care group in all 6 RCTs				⊕⊕⊕O MODERATE	IMPORTANT
Hysterectomy rates (follow-up range 12–24 months; patient decision aid versus usual care)												
2[4]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	196/388 (50.5%)	182/375 (48.5%)	RR 1.04 (0.90 to 1.20)	19 more per 1000 (from 49 fewer to 97 more)	⊕⊕⊕⊕ HIGH	IMPORTANT
Hysterectomy rates (follow-up range 2 years; patient decision aid plus structured interview versus usual care)												
1[5]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	81/212 (38.2%)	94/196 (48%)	RR 0.80 (0.64 to 1.00)	96 fewer per 1000 (from 173 fewer to 0 more)	⊕⊕⊕⊕ HIGH	IMPORTANT
Menorrhagia quality of life (measured with: MenQol; follow-up 9 months)												
1[6]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[7]	none	No significant difference between patient decision aid and usual care group				⊕⊕⊕O MODERATE	IMPORTANT
Menorrhagia specific utility scale score (follow-up 6 months)												
1[8]	randomised trials	serious[9]	no serious inconsistency	no serious indirectness	serious[7]	none	Menorrhagia specific utility scale score significantly improved in the patient decision aid group, compared with usual care				⊕⊕OO LOW	IMPORTANT
Cancer therapy quality of life (measured with: FACT-G; follow-up 4 weeks)												
1[10]	randomised trials	serious[11]	no serious inconsistency	no serious indirectness	serious[7]	none	No significant difference between patient decision aid and usual care group				⊕⊕OO LOW	IMPORTANT
Prostatectomy or referral for prostatectomy (follow-up 9 months)												
1[12]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[7]	none	No significant difference between patient decision aid and usual care group				⊕⊕⊕O MODERATE	IMPORTANT

[1] Measure of general health status not reported in Mullan 2009. Measured by RAND-36 in Vuorma 2004
[2] Kennedy 2002, Morgan 2000, Mullan 2009, Murray 2001[a], Murray 2001[b], Vuorma 2004
[3] Small number of participants in studies; varying lengths of follow-up
[4] Kennedy 2002, Vuorma 2003
[5] Kennedy 2002
[6] Murray 2001[a]
[7] Small number of participants in the study
[8] Protheroe 2007
[9] Allocation concealment and blinding unclear
[10] Leighl 2011
[11] Patients not blinded and not clear how outcome was objectively measured
[12] Murray 2001[b]

GRADE profile 35: Patient decision aid compared with other intervention – patient-oriented clinical outcomes

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Patient decision aid	Other intervention	Relative (95% CI)	Absolute		
Hysterectomy rates (follow-up 2 years)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	PDA: 81/212 (38.2%)	PDA + interview: 98/204 (48%)	RR 0.80 (0.64 to 0.99)	96 fewer per 1000 (from 5 fewer to 173 fewer)	⊕⊕⊕⊕ HIGH	IMPORTANT
Labour and birth outcomes												
1[2]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	No significant difference between patient decision aid and other intervention group				⊕⊕⊕⊕ HIGH	IMPORTANT

[1] Kennedy 2002
[2] Raynes-Greenow 2010

D.2.7 Clinical decision support

GRADE profile 36: Mortality

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Decision support	Usual care	Relative (95% CI)	Absolute		
30-day mortality rate (follow-up mean 21 months)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	12/199 (6%)	13/225 (5.8%)	RR 1.04 (0.49 to 2.23)	2 more per 1000 (from 29 fewer to 71 more)	⊕⊕⊕⊕ HIGH	CRITICAL
								0%		-		
In hospital mortality (follow-up mean 21 months)												
1[2]	randomised	no serious	no serious	no serious	serious[3]	none	2/30	5/30	RR 0.40 (0.08	100 fewer per 1000 (from	⊕⊕⊕O	CRITICAL

	trials	risk of bias	inconsistency	indirectness			(6.7%)[4]	(16.7%)[4]	to 1.9)	153 fewer to 150 more)	MODERATE	
								0%		-		

[1] Boustani 2012
[2] Khan 2013
[3] Small study size
[4] Number of events calculated based on percentages given in the study

GRADE profile 37: Clinical outcomes as reported in the study

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Decision support	Usual care	Relative (95% CI)	Absolute		
Estimated percentage blood pressure control (follow-up mean 2 years; 4 comparators - reminder control, decision support, patient behavioural intervention and combined decision support plus patient behavioural intervention)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None			There were no significant differences in the amount of change in blood pressure control in each of the intervention groups (decision support, patient behavioural intervention and combined decision support plus patient behavioural intervention) as compared to the reminder control group. In the decision support group there was a non-significant reduction in blood pressure control.		⊕⊕⊕⊕ HIGH	CRITICAL
Maintenance blood pressure control (follow-up mean 6 months)												
1[2]	randomised trials	Serious[3]	no serious inconsistency	no serious indirectness	no serious imprecision	None		-	The decision support group diabetes patients had significantly better maintenance of systolic blood pressure control (80.2% vs 75.1%, P=0.03) and non-significant better maintenance of diastolic blood pressure control (85.6% vs 81.7%, P=0.07)		⊕⊕⊕O MODERATE	CRITICAL
Change in HbA1c (improvement) (follow-up mean 6 months)												
1[2]	randomised trials	Serious[3]	no serious inconsistency	no serious indirectness	no serious imprecision	None	1194	1362	-	intervention effect 0.26 lower (0.06 to 0.47 lower)[3]	⊕⊕⊕O MODERATE	CRITICAL
Change in HbA1c level (follow-up mean 18 months; Better indicated by lower values)												
1[5]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None	365	332	-	MD 0.52 lower (0.7 to 0.34 lower)	⊕⊕⊕⊕ HIGH	CRITICAL
Change in low-density lipoprotein cholesterol (LDL-C) levels (follow-up mean 6 months)												

1[2]	randomised trials	Serious[3]	no serious inconsistency	no serious indirectness	no serious imprecision	None	1194	1362	-	There was no significant difference between the decision support and usual care groups for the mean change in LDL C (P=0.62) and for the proportion remaining in control for LDL-C values (P=0.53)[6]	⊕⊕⊕O MODERATE	CRITICAL

[1] Bosworth 2009
[2] O'Connor 2011
[3] Method of randomisation not clear
[4] Measured in percentages
[5] Saenz 2011
[6] Study not clearly stated total numbers of patients in each group for analysis

GRADE profile 38: Healthcare utilisation

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Decision support**	**Usual care**	**Relative (95% CI)**	**Absolute**		
Length of stay in ICU (follow-up mean 21 months; Better indicated by lower values)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2]	None	30	30	-	MD 1.70 higher (2.98 lower to 6.38 higher)	⊕⊕⊕O MODERATE	CRITICAL
30-day revisit rates to study clinics associated with acute respiratory infections (follow-up mean 7 months)												
1[3]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	no serious imprecision	None	2765/11954 (23.1%)	2566/10007 (25.6%)	RR 0.90 (0.86 to 0.95)[5]	26 fewer per 1000 (from 13 fewer to 36 fewer)	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Length of stay in hospital (follow-up mean 21 months; Better indicated by lower values)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2]	None	30	30	-	MD 2.30 higher (3.66 lower to 8.26 higher)	⊕⊕⊕O MODERATE	CRITICAL
Percentage of patients readmitted within 30 days of discharge (follow-up mean 21 months)												
1[6]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None	37/199 (18.6%)	37/225 (16.4%)	RR 1.13 (0.75 to 1.71)	21 more per 1000 (from 41 fewer to 117 more)	⊕⊕⊕⊕ HIGH	CRITICAL
								0%		-		
Mean length of hospital stay (follow-up mean 21 months; Better indicated by lower values)												
1[6]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None	199	225	-	MD 0.90 higher (0.35 lower to 2.15 higher)	⊕⊕⊕⊕ HIGH	CRITICAL
Proportion of patients visiting the emergency department (follow-up mean 1 years)												
1[7]	randomised	serious[4]	no serious	no serious	no serious	none	4/586	2/398	RR 1.36 (0.25 to	2 more per 1000 (from 4 fewer to	⊕⊕⊕O	CRITICAL

	trials		inconsistency	indirectness	imprecision		(0.68%)	(0.5%)	7.38)	32 more)	MODERATE	
								0%		-		
Proportion of patients visiting outpatient clinics (follow-up mean 1 years)												
1[7]	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	no serious imprecision	None	45/586 (7.7%)	45/398 (11.3%)	RR 0.68 (0.46 to 1.01)	36 fewer per 1000 (from 61 fewer to 1 more)	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Number of primary care visits over the 24 months (follow-up mean 2 years; 4 comparators - reminder control, decision support, patient behavioural intervention and combined decision support plus patient behavioural intervention)												
1[8]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None			The number of primary care visits over the 24 months was similar between the 4 groups. The mean number ranged from 7.1 for the combined group to 7.7 for the remainder control group (P=0.52). Health care use figure not reported for decision support group		⊕⊕⊕⊕ HIGH	CRITICAL

[1] Khan 2013
[2] Small study size
[3] Linder 2012
[4] Method of randomisation not described in the study
[5] Calculated using Z-test in review manager. Published study reports no significant difference, P=0.32 using chi-squared test.
[6] Boustani 2012
[7] McGinn 2013
[8] Bosworth 2009

GRADE profile 39: Sub-optimal prescribing

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Decision support**	**Usual care**	**Relative (95% CI)**	**Absolute**		
Proportion of children with persistent asthma with at least 1 prescription for a controller medication (follow-up mean 1 years)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	None	-	-	There was a statistically significant increase in controller-medication prescriptions in the decision support urban practices compared with usual care urban practices (7% vs 1%, respectively; P=0.006). There was no significant difference seen in the suburban practice setting between decision support and usual care group for this outcome		⊕⊕⊕O MODERATE	IMPORTANT
Antimicrobial use (proportion of all acute respiratory infections (ARI) visits that generated an antibiotic prescription regardless of diagnosis (follow-up mean 6 months)												
1[3]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	5929/14934 (39.7%)[4]	2303/5007 (46%)[4]	Clinicians in the usual care group prescribed antibiotics for 46% of all ARI visits, whereas clinicians in the decision support group prescribed antibiotics for 39.7% of visits (p=0.84) – no significant difference (adjusted for clinician		⊕⊕⊕O MODERATE	IMPORTANT
								0%				

									clustering).			
Proportion of high risk patients with a low density lipoprotein –cholesterol (L DL-C) ≥130mg/dl who were prescribed lipid lowering medicines (follow-up mean 1 years)												
1[5]	randomised trials	serious[6]	no serious inconsistency	no serious indirectness	no serious imprecision	None	18714/26696 (70.1%)	23521/37454 (62.8%)	RR 1.12 (1.1 to 1.13)	75 more per 1000 (from 63 more to 82 more)	⊕⊕⊕O MODERATE	IMPORTANT
								0%		-		
Proportion of patients screened and treated according to the 2001 NCEP ATP III Cholesterol Management Guidelines to their LDL and non-HDL cholesterol goals within 1 year of the intervention, usual care had a personalised digital assistant (follow-up mean 1 years).												
1[7]	randomised trials	serious[6]	no serious inconsistency	no serious indirectness	no serious imprecision	None	-	-	There was no statistically significant difference between the groups who had decision support and those that did not over time in screening or guideline-appropriate treatment		⊕⊕⊕O MODERATE	IMPORTANT
Order to discontinue use of anticholinergics (follow-up mean 21 months)												
1[8]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[9]	None	6/9 (66.7%)[10]	4/11 (36.4%)[10]	RR 1.83 (0.74 to 4.55)	302 more per 1000 (from 95 fewer to 1000 more)	⊕⊕⊕O MODERATE	IMPORTANT
								0%		-		
Proportions of alerts that led to an appropriate final order of medicine (follow-up mean 12 months)												
1[11]	randomised trials	serious[6]	no serious inconsistency	no serious indirectness	no serious imprecision	None	62.8%	52.1%	RR 1.2 (1 to 1.4)	-	⊕⊕⊕O MODERATE	IMPORTANT
										-		
Rates of captured opportunities for influenza vaccination (follow-up mean 18 months)												
1[12]	randomised trials	very serious[2,6]	no serious inconsistency	no serious indirectness	no serious imprecision	none	-	-	Difference in rate of improvement (%), 0.6 (-1.9 to 2.5)[13]	-	⊕⊕OO LOW	IMPORTANT
								0%		-		
Proportion of prescriptions for hypnotic medicines (that were heavily marketed medicines) (follow-up mean 1 year)												
1[14]	randomised trials	serious[6]	no serious inconsistency	no serious indirectness	serious[9]	none	-	-	RR 0.74 (0.57 to 0.96)[15]	-	⊕⊕OO LOW	IMPORTANT
								0%		-		
Proportion of patients who received guideline concordant care[16] (follow-up mean 1 years)												
1[17]	randomised trials	very serious[2,6]	no serious inconsistency	no serious indirectness	no serious imprecision	none	564/2222 (25.4%)	675/3012 (22.4%)	OR 1.194 (1.005 to 1.419)	32 more per 1000 (from 1 more to 67 more)	⊕⊕OO LOW	IMPORTANT
								0%		-		
Antibiotic prescribing rate for acute respiratory infections visits (follow-up mean 7 months)												
1[18]	randomised trials	serious[19]	no serious inconsistency	no serious indirectness	no serious imprecision	none	39%	43%	OR 0.8 (0.6 to 1.2)	-	⊕⊕⊕O MODERATE	IMPORTANT
								0%		-		
Changes in provider patterns of ordering antibiotics (follow-up mean 1 years)												
1[20]	randomised trials	serious[19]	no serious inconsistency	no serious indirectness	no serious imprecision	None	171/586 (29.2%)	153/398 (38.4%)	RR 0.74 (0.6 to 0.92)[13]	100 fewer per 1000 (from 31 fewer to 154 fewer)	⊕⊕⊕O MODERATE	IMPORTANT
								0%		-		
Proportions of "desired responses" (not reordering the alert-triggering drug within 10 minutes after alert firing) (follow-up mean 6 months; assessed with: number of alerts)												
1[21]	randomised trials	very serious[2,6]	no serious inconsistency	no serious indirectness	serious[9]	None	111/194 (57.2%)	20/148 (13.5%)	OR 0.12 (0.045 to 0.33)[13]	117 fewer per 1000 (from 86 fewer to 128 fewer)	⊕OOO VERY LOW	IMPORTANT
								0%		-		
Proportion of targets medicines that were excessively overdosed (follow-up mean 2 years)												

1[22]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None	31/73 (42.5%)	34/46 (73.9%)	RR 0.57 (0.42 to 0.79)	318 fewer per 1000 (from 155 fewer to 429 fewer)	⊕⊕⊕⊕ HIGH	IMPORTANT
								0%		-		

[1] Bell 2010
[2] Method of randomisation not described by the author
[3] Bourgeois 2010
[4] percentage of total visits
[5] Chen 2009
[6] Attrition data not reported
[7] Eaton 2011
[8] Khan b2013
[9] Small study size
[10] number of events calculated based on percentages given in the study
[11] Field TS 2009
[12] Fiks AG 2009
[13] Adjusted analysis
[14] Fortuna 2009 - this study had 2 comparators with the decision support intervention, for the purpose of the analysis data has been used from usual care group only to compare the intervention. The additional comparator, decision support plus education has not been included for analysis.
[15] a ratio of the risk ratios was used to compare the adjusted risk ratios between the intervention group and usual care group.
[16] Defined as patients having their traditional non-steroidal anti-inflammatory discontinued, switch to a lower risk medicines, having gastroprotective medicine or both.
[17] Gill 2011
[18] Linder 2012
[19] Method of randomisation not described in the study
[20] McGinn 2013
[21] Strom 2010
[22] Terrell 2010

GRADE profile 40: Medicines-related problems

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Decision support**	**Usual care/other comparator as specified**	**Relative (95% CI)**	**Absolute**		
Discontinuation of potentially inappropriate anticholinergic medicines (entire hospital stay) (follow-up mean 21 months)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	23/47 (48.9%)[2]	15/48 (31.3%)[2]	RR 1.57 (0.94 to 2.61)	178 more per 1000 (from 19 fewer to 503 more)	⊕⊕⊕⊕ HIGH	IMPORTANT
								0%		-		
Change in percentage of prescriptions of teratogenic medicines (follow-up mean 19 months)												
1[3]	randomised trials	very serious[4,5]	no serious inconsistency	no serious indirectness	no serious imprecision	none	simple decision support	No decision support (after withdrawal of multifaceted decision support)	RR 1.06 (0.97 to 1.17)	8 more per 1000 (from 4 fewer to 23 more)	⊕⊕OO LOW	IMPORTANT

							683/4745 (14.4%)[6]	857/6330 (13.5%)				
								0%		-		
Injury risk from psychoactive medicines (follow-up mean 22 months; Better indicated by lower values)												
1[8]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	2887	2741	-	MD 0.18 lower (0.27 to 0.09 lower)	⊕⊕⊕⊕ HIGH	IMPORTANT
Proportion of emergency department visits by seniors that resulted in one or more prescriptions for an inappropriate medication (follow-up mean 31 months)												
1[9]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	no serious imprecision	none	69/2647 (2.6%)[10]	99/2515 (3.9%)[10]	OR 0.55 (0.34 to 0.89)[11]	17 fewer per 1000 (from 4 fewer to 26 fewer)	⊕⊕⊕O MODERATE	IMPORTANT

[1] Boustani 2012
[2] Denominator was the number of orders eligible for discontinuation
[3] Schwarz 2012
[4] Method of randomisation not clear in the study
[5] Attrition data not reported for each group
[6] percentage with potentially teratogenic prescription, denominator is the number of encounters
[7] Multifaceted decision support was withdrawn and there was no decision support used, therefore reverted back to usual care.
[8] Tamblyn 2012
[9] Terrell 2009
[10] number of visits with inappropriate medicines prescription/number of visits
[11] Odds of intervention physicians prescribing an inappropriate medicines versus control physicians

D.2.8 Medicines-related models of organisational and cross-sector working

Grade table 41: Collaborative care model for care of older people

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Collaborative care	Usual care	Relative (95% CI)	Absolute		
Clinical outcomes - change in residents behaviour (follow-up mean 3 months; measured with: Nursing Home Behaviour Problem Scale (NHBPS); Better indicated by lower values)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2]	none	54	50	-	MD 2.70 lower (14.65 lower to 9.25 higher)	⊕⊕⊕O MODERATE	CRITICAL
Medicines-related outcomes -MAI (follow-up mean 3 months; measured with: mean change in Medication Appropriateness Index score; Better indicated by lower values)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2]	none	54	50	-	MD 3.69 higher (1.12 to 6.26 higher)	⊕⊕⊕O MODERATE	IMPORTANT

[1] Crotty 2004 (2)
[2] Small study size

Grade table 42: Collaborative care model for chronic disease management

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Collaborative care	Usual care	Relative (95% CI)	Absolute		
Clinical outcome - overall quality of chronic disease management (follow-up mean 14.9 months) **measured with: chronic disease management quality of care (CDM QOC) composite score based on 12 indicator manoeuvres for 4 chronic diseases (diabetes, coronary artery disease, congestive heart failure, and chronic obstructive pulmonary disease) was developed to measure adherence to guidelines at study start and study end; Better indicated by higher values)**												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	74	78	-	Absolute difference (%) 9.1 higher (3.7 to 14.4 higher)	⊕⊕OO LOW	CRITICAL
Patient-reported outcomes - care giver burden score out of 88 (follow-up mean 14.9 months; measured with: Questionnaire; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	74	78	-	Absolute difference 5.0 higher (1.4 to 8.6 higher)	⊕⊕OO LOW	CRITICAL
Health and social care utilisation - emergency department visits (follow-up mean 14.9 months; measured with: self-reported questionnaire; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	74	78	-	Absolute difference (%) 4.0 lower (16.4 lower to 8.4 higher)	⊕⊕OO LOW	CRITICAL
Health and social care utilisation - hospital admissions (follow-up mean 14.9 months; measured with: self-reported questionnaire; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	74	78	-	Absolute difference (%) 0 higher (11.1 lower to 11.1 higher)	⊕⊕OO LOW	CRITICAL
Health and social care related QoL - physical component score (follow-up mean 14.9 months; measured with: Short Form-36; range of scores: 0-100; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	74	78	-	Absolute difference 1.6 higher (0.8 lower to 4.1 higher)	⊕⊕OO LOW	IMPORTANT
Health and social care related QoL - mental component score (follow-up mean 14.9 months; measured with: Short Form-36; range of scores: 0-100; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	74	78	-	Absolute difference 1.1 lower (3.7 lower to 1.6	⊕⊕OO LOW	IMPORTANT

										higher)		
Health and social care related QoL (follow-up mean 14.9 months; measured with: Self-assessed poor or fair health; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	74	78	-	Absolute difference (%) 0.1 higher (12.8 lower to 13.1 higher)	⊕⊕OO LOW	IMPORTANT
Health and social care related QoL - instrumental activities of daily living (IADL) (follow-up mean 14.9 months; measured with: IADL score; range of scores: 0-31; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	74	78	-	Absolute difference 0.3 lower (1.1 lower to 10.5 higher)	⊕⊕OO LOW	IMPORTANT

[1] Hogg 2009
[2] Performance and attrition bias
[3] Small study size

Grade table 43: Collaborative care model for management of diabetes and hypertension

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Collaborative care**	**Usual care**	**Relative (95% CI)**	**Absolute**		
Clinical outcomes - Mean difference in systolic blood pressure difference (follow-up median 12.8 months; measured with: target blood pressure, systolic <130mmHg, diastolic <80mmHg as reported in the study; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	133	106	-	MD 7.3 lower (12.8 lower to 1.7 higher)	⊕⊕OO LOW	CRITICAL
Clinical outcomes - mean difference in HbA1c level (follow-up median 12.8 months; measured with: target HbA1c level <7.0% as reported in the study; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	133	106	-	MD 0.33 lower (0.80 lower to 0.13 higher)	⊕⊕OO LOW	CRITICAL
Patient-reported outcomes - medicines adherence (follow-up median 12.8 months; assessed with: self-reported)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	51/133 (38.3%)	45/106 (42.5%)	OR 10.8 (0.5 to 1.4)	464 more per 1000 (from 155 fewer to 84 more)	⊕⊕OO	CRITICAL

								0%		-	LOW	
Patient-reported outcomes - competence scores (follow-up median 12.8 months; assessed with: perceived competence scale)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	22/133 (16.5%)	15/106 (14.2%)	OR 1.6 (0.9 to 2.4)	67 more per 1000 (from 12 fewer to 142 more)	⊕⊕OO LOW	CRITICAL
								0%		-		
Health and social care utilisation - emergency care visits (follow-up median 12.8 months; assessed with: medical record review)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	51/133 (38.3%)	45/106 (42.5%)	OR 0.4 (0.2 to 0.7)	197 fewer per 1000 (from 84 fewer to 296 fewer)	⊕⊕OO LOW	CRITICAL
								0%		-		
Health and social care utilisation - primary care visits (follow-up median 12.8 months; assessed with: medical record review)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	51/133 (38.3%)	45/106 (42.5%)	OR 0.9 (0.2 to 1.5)	26 fewer per 1000 (from 296 fewer to 101 more)	⊕⊕OO LOW	CRITICAL
								0%		-		
Health and social care utilisation hospitalisations (follow-up median 12.8 months; assessed with: medical record review)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	23/133 (17.3%)	23/106 (21.7%)	OR 0.8 (0.4 to 1.4)	36 fewer per 1000 (from 117 fewer to 63 more)	⊕⊕OO LOW	CRITICAL
								0%		-		
Medicines-related outcomes - adverse drug event (follow-up median 12.8 months; measured with: medical record review; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	133[4]	106[4]	Most adverse events were similar between the groups with no significant difference in hypoglycaemia, hypotension, decrease in eGFR or elevated AST or ALT level. More than 50% of patients in the intervention group reported no falls or light-headedness, compared with 37% in the usual care group (P = 0.006).		⊕⊕OO LOW	IMPORTANT

[1] Edelman 2010
[2] Selection bias
[3] Small study size
[4] number of events not reported in study

ALT - alanine aminotransferase; AST- aspartate aminotransferase; eGFR - estimated glomerular filtration rate

Grade table 44: Professional-led (pharmacist) care model for hypertension

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Collaborative care	Usual care	Relative (95% CI)	Absolute		
Patient-reported outcomes - adherence to medicines (follow-up mean 9 months; measured with: Questionnaire)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2]	None	101	78	There was no significant difference in medicines adherence (92% in the control group vs 94% in the intervention group p=0.369).		⊕⊕⊕O MODERATE	CRITICAL
Clinical outcome - Control of blood pressure (follow-up mean 9 months; assessed with: Percentage of patients with blood pressure controlled as defined by the 7th Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure guidelines (JNC-7))												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2]	None	90/101 (89.1%)	41/78 (52.6%)	OR 8.9 (3.8 to 20.7)[3]	382 more per 1000 (from 282 more to 433 more)	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Medicines-related outcomes - mean number of anti-hypertensives (follow-up mean 9 months)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2]	None	101	78	-	mean 0.50 higher/lower (0.22 to 0.79 higher/lower)[4]	⊕⊕⊕O MODERATE	IMPORTANT

[1] Carter 2008
[2] Small study size
[3] adjusted figure reported in study
[4] in practice the number of medicines may increase or decrease depending on the needs of the patient

Grade table 45: Professional-led (pharmacist) care model for diabetes

Quality assessment							No of patients		Effect		Quality	Importance
No of	Design	Risk of	Inconsistency	Indirectness	Imprecision	Other	Professional	Usual	Relative	Absolute		

studies		bias				considerations	led - pharmacist	care	(95% CI)			
Clinical - Diabetes outcomes (follow-up mean 12 months; measured with: HbA_{1c} (%); Better indicated by lower values)												
3[1]	randomised trials	serious[2,3]	no serious inconsistency	no serious indirectness	No serious imprecision	None	230	248	-	MD 1.21 lower (1.44 to 0.98 lower)	⊕⊕OO LOW	CRITICAL
Clinical - Diabetes outcomes (follow-up mean 12 months; measured with: HbA_{1c})												
1[4]	randomised trials	Serious[3]	no serious inconsistency	no serious indirectness	serious[5]	None	52	51		Overall median (IQR) Intervention (n=52) -1.50 (-0.03 to -2.68) Control (n=51) -0.40 (0.50 to -2.10) P= 0.06	⊕⊕⊕O MODERATE	CRITICAL
Clinical - Diabetes outcomes (follow-up mean 12 months; measured with: HbA_{1c} (%); Better indicated by lower values)												
1[6]	randomised trials	serious[2,3]	no serious inconsistency	no serious indirectness	serious[5]	None	99	95	-	Rate ratio 0.8 lower (1.7 lower to 0 higher)	⊕⊕OO LOW	CRITICAL
Clinical - Diabetes outcomes (follow-up mean 6 months; measured with: HbA_{1c} (%); Better indicated by lower values)												
2[7]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[5]	None	202	186	-	MD 0.18 lower (0.47 lower to 0.11 higher)	⊕⊕OO LOW	CRITICAL
Secondary clinical outcomes - Blood pressure, systolic (follow-up mean 12 months; measured with: systolic mm Hg; Better indicated by lower values)												
2[8]	randomised trials	serious[2,3]	no serious inconsistency	no serious indirectness	No serious imprecision	None	189	209	-	MD 4.31 lower (6.88 to 1.75 lower)	⊕⊕OO LOW	CRITICAL
Secondary clinical outcomes - Blood pressure, systolic (follow-up mean 6 months; measured with: systolic mm Hg; Better indicated by lower values)												
2[7]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[5]	None	164	171	-	MD 6.42 lower (8.66 to 4.17 lower)	⊕⊕OO LOW	CRITICAL
Secondary clinical outcomes - Blood pressure, systolic (follow-up mean 12 months; measured with: systolic mm Hg; Better indicated by lower values)												
1[6]	randomised	serious[2,3]	no serious	no serious	serious[5]	None	99	95	-	Difference 9 lower (16 to 3 lower)	⊕⊕OO	CRITICAL

	trials		inconsistency	indirectness							LOW	
Secondary clinical outcomes – Cholesterol (follow-up mean 12 months; measured with: Low density lipoprotein C (LDL C) mmol/L ; Better indicated by lower values)												
1[9]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[5]	None	117	117	-	MD 0.57 lower (0.78 to 0.36 lower)	⊕⊕⊕O MODERATE	CRITICAL
Secondary clinical outcomes – Cholesterol (follow-up mean 12 months; measured with: Low density lipoprotein C, (mg/dL); Better indicated by lower values)												
1[10]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[5]	None	72	92	-	MD 11.40 lower (19.95 to 2.85 lower)	⊕⊕OO LOW	CRITICAL
Secondary clinical outcomes - Cholesterol (follow-up mean 6 months; measured with: serum cholesterol (mmol/L); Better indicated by lower values)												
2[7]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[5]	None	189	177	-	MD 0.36 lower (2.59 lower to 1.86 higher)	⊕⊕OO LOW	CRITICAL
Secondary clinical outcomes - Cholesterol (follow-up mean 12 months; measured with: Total cholesterol, (mg/dL); Better indicated by lower values)												
1[6]	randomised trials	serious[2,3]	no serious inconsistency	no serious indirectness	serious[5]	None	99	95	-	Difference 15 lower (35 lower to 4 higher)	⊕⊕OO LOW	CRITICAL
Health and social care utilisation - General medicines visits (follow-up mean 12 months)												
1[6]	randomised trials	serious[2,3]	no serious inconsistency	no serious indirectness	serious[5]	None	2.0[12]	1.9[12]		Rate ratio 1.1 (0.9 to 1.3)	⊕⊕OO LOW	CRITICAL
Health and social care utilisation - hospitalisations (follow-up mean 12 months)												
1[6]	randomised trials	serious[2,3]	no serious inconsistency	no serious indirectness	serious[5]	None	0.2[12]	0.2[12]		Rate ratio 1.1 (0.6 to 2.0)	⊕⊕OO LOW	CRITICAL
Health and social care utilisation - urgent care visits (follow-up mean 12 months)												
1[6]	randomised trials	serious[2,3]	no serious inconsistency	no serious indirectness	serious[5]	None	0.2[12]	0.2[12]		Rate ratio 0.8 (0.4 to 1.6)	⊕⊕OO LOW	CRITICAL
Health and social care utilisation - emergency department visits (follow-up mean 12 months)												
1[6]	randomised trials	serious[2,3]	no serious inconsistency	no serious indirectness	serious[5]	None	0.4[12]	0.5[12]		Rate ratio 0.8 (0.5 to 1.4)	⊕⊕OO LOW	CRITICAL

Patient-reported outcomes - Diabetes knowledge (follow-up mean 12 months; assessed with: Test assessing patients knowledge of their diabetes medicines)												
1[9]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[5,13]	None	55/117 (47%)	75/117 (64.1%)	RR 0.73 (0.58 to 0.93)	173 fewer per 1000 (from 45 fewer to 269 fewer)	⊕⊕OO LOW	CRITICAL
								0%		-		
Patient-reported outcomes -medicines adherence (follow-up mean 12 months; assessed with: Self-reported questionnaire)												
1[9]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[5,13]	None	95/117 (81.2%)	75/117 (64.1%)	RR 1.27 (1.08 to 1.49)	173 more per 1000 (from 51 more to 314 more)	⊕⊕OO LOW	CRITICAL
								0%		-		
Patient-reported outcomes - non adherence to medicines (follow-up mean 6 months; assessed with: Self-reported questionnaire)												
1[14]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[5,13]	None	22/77 (28.6%)	51/79 (64.6%)	RR 0.44 (0.30 to 0.65)	362 fewer per 1000 (from 226 fewer to 452 fewer)	⊕⊕OO LOW	CRITICAL
								0%		-		
Patient reported outcomes - Diabetes treatment satisfaction (follow-up mean 12 months; assessed with: Using scale developed by authors)												
1[6]	randomised trials	serious[2,3]	no serious inconsistency	no serious indirectness	serious[5]	None	8/99 (8.1%)	4/95 (4.2%)	difference 3 (1 to 6)	84 more per 1000 (from 0 more to 211 more)	⊕⊕OO LOW	CRITICAL
								0%		-		
Patient reported outcomes - Diabetes knowledge (follow-up mean 12 months; assessed with: Using scale developed by authors)												
1[6]	randomised trials	serious[2,3]	no serious inconsistency	no serious indirectness	Serious[5]	None	27/99 (27.3%)	13/95 (13.7%)	difference 14 (9 to 20)	1000 more per 1000 (from 1000 more to 1000 more)	⊕⊕OO LOW	CRITICAL
Medicines-related outcomes – medicines use (follow-up mean 12 months; measured with: Number of medicines taken)												
1[10]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[5]	None	72	92		MD 1.10 lower/higher (0.15 to 2.05 lower/higher)[11]	⊕⊕OO LOW	IMPORTANT
Medicines-related outcomes - number of medicines (follow-up mean 6 months; measured with: number of medicines taken)												
1[14]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[5,13]	None	77	79	There was no significant difference between the two groups		⊕⊕OO LOW	IMPORTANT

Medicines-related outcomes - mean number of glucose lowering medicines (follow-up mean 6 months; measured with: number of medicines)											
1[15]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[5]	None	142	137	The mean number of glucose-lowering medicines taken increased from 1.8 at baseline to 2.0 in the intervention group with no change in the control group, (p=0.04)	⊕⊕OO LOW	IMPORTANT
Sub-optimal medicines use - Aspirin use (follow-up mean 12 months)											
1[6]	randomised trials	serious[2,3]	no serious inconsistency	no serious indirectness	serious[5]	None	87/96 (90.6%)	54/93 (58.1%)	RR 1.56 (1.30 to 1.88)	325 more per 1000 (from 174 more to 511 more)	⊕⊕OO LOW	IMPORTANT
								0%		Intervention patients had a median of three new medicines added to their regimen by the disease management team and 4 titrations or adjustments to existing medicines. Statin use was also included as part of the analysis but was not originally reported as an outcome measure. At 12 months follow up the rate was 47% (44/93) in control group and 48% (47/99) in intervention group (p=0.98).medicines.		
Health and social care related QoL - SF 36 (follow-up mean 12 months; measured with: SF - 36 questionnaire)											
1[9]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[5]	None	117	117	Intervention group patients' quality of life scores improved over time (P <0.001), whereas those of control group patients remained relatively constant.		⊕⊕⊕O MODERATE	IMPORTANT
Health and Social care related QoL - EQ-5D (follow-up mean 6 months; measured with: EQ-5D - utility score; range of scores: -0.06-1.0; Better indicated by higher values)											
1[15]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[5]	None	143	137	-	MD 0.02 lower (0.06 lower to 0.02 higher)	⊕⊕OO LOW	IMPORTANT
Health and Social care related QoL - EQ-5D (follow-up mean 6 months; measured with: EQ-5D - health state; range of scores: 1-100; Better indicated by higher values)											
1[15]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[5]	None	142	137	-	MD 4.20 higher (0.24 lower to 8.64 higher)	⊕⊕OO LOW	IMPORTANT

[1] Al Mazroui 2009, Choe 2005, Jacobs 2012
[2] Selection bias
[3] Detection bias
[4] Jameson 2010
[5] Small study size
[6] Rothman 2005
[7] Jareb 2012, Krass 2007
[8] Al Mazroui 2009, Jacobs 2012

[9] Al Mazroui 2009
[10] Jacobs 2012
[11] in practice the number of medicines may increase or decrease depending on the needs of the patient
[12] Rate of event
[13] Methods to measure outcomes not validated
[14] Jareb 2012
[15] Krass 2007

Grade table 46: Professional-led (pharmacist) care model for hypertension

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Professional led - pharmacist	Usual care	Relative (95% CI)	Absolute		
Clinical outcome - Blood pressure goal attainment <140/90 mmHg (follow-up mean 12 months)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2,3]	none	88/142 (62%)	57/130 (43.8%)	RR 1.41 (1.12 to 1.78)	180 more per 1000 (from 53 more to 342 more)	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Clinical outcome - proportion of patients attaining their target blood pressure goal (follow-up mean 6 months)												
1[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	serious[2]	none	54.1%	35.4	RR 1.5 (1.2 to 1.9)	-	⊕⊕OO LOW	CRITICAL
								0%		-		
Patient-reported outcomes - self-management (follow-up mean 12 months; measured with: Hypertension related knowledge scores – self-administered questionnaire; Better indicated by higher values)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2,3]	none	142	130	-	MD 0.40 lower (0.82 lower to 0.02 higher)	⊕⊕⊕O MODERATE	CRITICAL
Patient-reported outcomes – adherence to medicines (follow-up mean 12 months; assessed with: self-administered questionnaire)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2,3]	none	95/142 (66.9%)	90/130 (69.2%)	RR 0.97 (0.82 to 1.14)	21 fewer per 1000 (from 125 fewer to 97 more)	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Patient-reported outcomes – adherence to medicines (follow-up mean 6 months; measured with: mean medication possession adherence score; Better indicated by higher values)												

1[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	serious[2]	none	162	164	There was no difference in the mean medication possession ratio adherence score over the 6-month study period (0.86 versus 0.87; P=0.93).	⊕⊕OO LOW	CRITICAL
Health and social care utilisation (follow-up mean 12 months; measured with: hypertension-related visits to primary care provider/pharmacy, mean visits/patient; Better indicated by lower values)											
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2,3]	none	142	130	-	MD 2.70 higher (2.11 to 3.29 higher)	⊕⊕⊕O MODERATE	CRITICAL
Health and social care utilisation - clinic visits (follow-up mean 6 months; Better indicated by lower values)											
1[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	serious[2]	none	162	164	-	MD 0.20 higher (0.32 lower to 0.72 higher)	⊕⊕OO LOW	CRITICAL
Health and social care utilisation - emergency department visits (follow-up mean 6 months; Better indicated by lower values)											
1[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	serious[2]	none	162	164	-	MD 0.01 lower (0.06 lower to 0.04 higher)	⊕⊕OO LOW	CRITICAL
Health and social care utilisation - hospitalisations (follow-up mean 6 months; Better indicated by lower values)											
1[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	serious[2]	none	162	164	-	MD 0.01 lower (0.05 lower to 0.03 higher)	⊕⊕OO LOW	CRITICAL
Medicines-related outcomes (follow-up mean 12 months; measured with: Number of antihypertensive medicines per patient)											
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2,3]	none	142	130	-	MD 20.30 lower/higher (0.03 to 0.57 lower/higher)[6]	⊕⊕⊕O MODERATE	IMPORTANT
Medicines-related outcomes (follow-up mean 6 months; measured with: Change in medication intensity score from baseline to 6 months; Better indicated by lower values)											
1[4]	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	serious[2]	none	162	164	-	MD 1.20 higher (0.95 to 1.45 higher)[6]	⊕⊕OO LOW	IMPORTANT
Health and social care-related QoL (follow-up mean 12 months; measured with: SF-36; general health domain: Better indicated by lower values)											
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2,3]	None	142	130	-	MD 2.0 lower (3.09 to 0.91 lower) There were no significant differences between groups with respect to subjects' quality of life at follow-	⊕⊕⊕O MODERATE	IMPORTANT

										up with the exception of the general health domain.		

[1] Hunt 2008
[2] Small study size
[3] Possibility of contamination between groups
[4] Magid 2013
[5] Attrition, performance bias
[6] in practice the number of medicines may increase or decrease depending on the needs of the patient

Grade table 47: Professional-led (pharmacist) care model for depression (6 months)

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Professional led - pharmacist	Usual care	Relative (95% CI)	Absolute		
Patient-reported outcomes - change in clinical outcomes (follow-up mean 6 months; measured with: BIDS - Brief Inventory for Depressive Symptoms [range 0-42]); ; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	54	24	-	MD 2.30 higher (1.55 lower to 6.15 higher)	⊕⊕OO LOW	CRITICAL
Patient-reported outcomes - change in functional outcomes (follow-up mean 6 months; measured with: WSDS - Work and Social Disability Scale (5-point scale used to assess the degree of disability ranging from absent to severe); Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	54	24	Functional outcomes indicated that 56% of the patients in the intervention group who returned the survey experienced an improvement in their condition and 67% of the control patients who returned a survey had the same benefit (p=0.357).		⊕⊕OO LOW	CRITICAL
Patient-reported outcomes -patient satisfaction (follow-up mean 6 months; measured with: Survey; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	54	24	Patients in the intervention group expressed greater satisfaction than did control patients with the personal nature of care, availability of providers, ability of providers to listen, explanation of why antidepressants were prescribed, explanation of how to take the antidepressants, and patient's overall satisfaction with the health maintenance organisation (p<0.05 for all measures, Wilcoxon scores of ranked sums)		⊕⊕OO LOW	CRITICAL
Patient-reported outcomes - medicines adherence (1) early phase (follow-up mean 6 months; assessed with: HEDIS - Health Plan Employer Data Information Set;[4])												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	54[5]	24/[5]	OR 2.11 (0.97 to 4.58)	-	⊕⊕OO LOW	CRITICAL
										-		
Patient-reported outcomes - medicines adherence (1) continuation phase (follow-up mean 6 months; assessed with: HEDIS - Health Plan Employer Data Information Set;[4])												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	54[5]	24[5]	OR 2.17 (1.04 to 4.51)	-	⊕⊕OO LOW	CRITICAL
										-		

Patient-reported outcomes - medicines adherence (2) (follow-up mean 6 months; measured with: medication possession ratio (MPR) at 6 months[6]; Better indicated by lower values)											
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	54	24	MPR was higher for the intervention group than for the control group at both 3 months (0.92 vs 0.89, p=0.48) and 6 months (0.83 vs 0.77, p=0.26), but the difference did not achieve statistical significance.	⊕⊕OO LOW	CRITICAL
Provider-reported outcomes - satisfaction (follow-up mean 6 months; measured with: Survey; Better indicated by lower values)											
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	None	54	24	Survey results returned by providers were very positive, conveying the physician's satisfaction with workflow, patient welfare, and the pharmacists' abilities Results of the provider satisfaction survey determined that primary care physicians were very pleased with the intervention and thought that the collaborative care model enabled them to increase productivity.	⊕⊕OO LOW	CRITICAL
Health and social care utilisation (follow-up mean 6 months; measured with: Assessed by mean number of visits/patient 12 months before and after; Better indicated by lower values)											
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	54	24	No significant differences seen between intervention and usual care for overall resource utilisation (primary care visits, emergency department visits and psychiatric services)	⊕⊕OO LOW	CRITICAL

[1] Finley 2003
[2] Selection and attrition bias
[3] Small study size
[4] Within the context of HEDIS specifications, subjects were assessed for compliance within the early treatment phase (defined as at least 84 days' supply of medicine during the first 114 days of treatment) and the continuation treatment phase (minimum of 180 treatment days during the 231-day study period).
[5] numbers with event not reported in study
[6] MPR was defined as the number of days' supply of medicine that the patient received during the 6-month study period, incorporating the quantity and strength of medicine as well as prescribing directions. The MPR values ranged from 0.167 (i.e., 1 month's supply during 6-month study period) to 1.0. For study purposes, full medicines adherence was defined as an MPR value of 0.83 or more during the 6-month follow-up period (i.e., minimum of 5 months' supply of antidepressant medicines dispensed).

Grade table 48: Professional-led (pharmacist) care model for depression (12 months)

Quality assessment	No of patients	Effect	Quality	Importance

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Professional led - pharmacist	Usual care	Relative (95% CI)	Absolute		
Clinical - depression symptoms (follow-up mean 12 months; measured with: SCL-20 - Hopkins Symptom Checklist; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	41	33	Both intervention and control groups clinically improved in depression symptoms, however, the number with a 50% or more decrease in SCL-20 score during the study period did not differ between groups ($\chi 2_1$= 0.75, p = 0.39).	⊕⊕OO LOW		CRITICAL
Patient-reported outcomes - medicines adherence (follow-up mean 12 months; measured with: Self-reported telephone interview; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	41	33	No significant difference between the groups on adherence to antidepressants (X^2_1 =0.01, P=0.91)	⊕⊕OO LOW		CRITICAL
Patient-reported outcomes - Patient satisfaction (follow-up mean 12 months; measured with: Questionnaire; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	41	33	There was no overall difference in satisfaction with depression care ($\chi 21$ = 1.75, p = 0.19) or overall health care (X^2_1 = 0.51, p = 0.48) between groups.	⊕⊕OO LOW		CRITICAL
Health and social care utilisation (follow-up mean 12 months; measured with: Self-reported visits; Better indicated by lower values)												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	41	33	No significant difference between treatment groups in the number of visits to all health care providers, including physicians, psychiatrists or psychologists, emergency rooms, counsellors or other mental health providers and alternative medicine ($\chi 21$ = 0.0003, p = 0.99)	⊕⊕OO LOW		CRITICAL

[1] Capoccia 2004
[2] Potential for selection and performance bias
[3] Small study size

Grade table 49: Professional-led (pharmacist) care model for hyperlipidaemia

Quality assessment	No of patients	Effect	Quality	Importance

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Professional led - pharmacist	Usual care	Relative (95% CI)	Absolute		
Clinical outcome - cholesterol (follow-up mean 12 months; measured with: Low density lipoprotein C, LDL-C (mmol/L))												
1[1]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[3]	none	58	60	The percentage of subjects attaining LDL-C goal at the end of the study was 43.1% in the intervention group compared with 16.7% in the control group (p=0.0023)		⊕⊕OO LOW	CRITICAL
Clinical outcome - cholesterol (follow-up mean 24 months; assessed with: percentage of patients at LDL-C level at target,<100mg/dL)												
1[4]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	1596/2047 (78%)	2458/4916 (50%)	RR 1.56 (1.50 to 1.62)	280 more per 1000 (from 250 more to 310 more)	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Secondary clinical outcome - HbA1c (follow-up mean 24 months; assessed with: percentage of patients at HbA1c level at target, < 7%)												
1[4]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	1043/2047 (51%)	2407/4916 (49%)	RR 1.04 (0.99 to 1.10)	20 more per 1000 (from 5 fewer to 49 more)	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		
Secondary clinical outcome - blood pressure (follow-up mean 24 months; assessed with: percentage of patients at target blood pressure < 130/80 mm Hg)												
1[4]	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	1125/2047 (55%)	2407/4916 (49%)	RR 1.32 (1.25 to 1.39)[5]	157 more per 1000 (from 122 more to 191 more)	⊕⊕⊕O MODERATE	CRITICAL
								0%		-		

[1] Lee 2009
[2] Selection bias
[3] Small study size
[4] Pape 2011

[5] Calculation by review manager when raw data entered reports significant difference, however the authors of the paper reports no significant difference, different tests used.to calculate this outcome.

Grade table 50: Professional-led (pharmacist) care model for care of older people

Quality assessment	No of patients	Effect	Quality	Importance

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Professional led - pharmacist	Usual care	Relative (95% CI)	Absolute		
Clinical outcomes - worsening pain (follow-up mean 8 weeks; assessed with: use of case notes)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[2,3]	none	56[4]	54[4] 0%	RR 0.55 (0.32 to 0.94)	- -	⊕⊕OO LOW	CRITICAL
Clinical outcomes - falls (follow-up mean 8 weeks; assessed with: use of case notes)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[2,3]	none	56[4]	54[4] 0%	RR 1.19 (0.71 to 1.99)	- -	⊕⊕OO LOW	CRITICAL
Clinical outcomes - worsening mobility (follow-up mean 8 weeks; assessed with: use of case notes)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[2,3]	none	56[4]	54[4] 0%	RR 0.39 (0.13 to 1.15)	- -	⊕⊕OO LOW	CRITICAL
Clinical outcomes - worsening behaviours (follow-up mean 8 weeks; assessed with: use of case notes)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[2,3]	none	56[4]	54[4] 0%	RR 0.52 (0.25 to 1.10)	- -	⊕⊕OO LOW	CRITICAL
Clinical outcomes - increased confusion (follow-up mean 8 weeks; assessed with: use of case notes)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[2,3]	none	56[4]	54[4] 0%	RR 0.59 (0.28 to 1.22)	- -	⊕⊕OO LOW	CRITICAL
Health and social care utilisation (follow-up mean 8 weeks; assessed with: Number of emergency department visits and hospital readmissions)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[2,3]	none	56[4]	54[4] 0%	RR 0.38 (0.15 to 0.99)	- -	⊕⊕OO LOW	CRITICAL
Medicines-related outcomes - change in MAI from baseline (follow-up mean 8 weeks; measured with: medicines appropriateness index (MAI); Better indicated by lower values)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[2]	none	44	44	-	MD 4.00 lower (6.74 to 1.26 lower)	⊕⊕⊕O MODERATE	IMPORTANT
Medicines-related outcomes - adverse drug events (follow-up mean 8 weeks; assessed with: percentage adverse drug events)												
1[1]	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[2,3]	none	44[4]	44[4]	RR 1.05 (0.66 to 1.68)	50 more per 1000 (from 340 fewer to 680 more)	⊕⊕OO	IMPORTANT

								0%		-	LOW	

[1] Crotty 2004 (1)
[2] Small study size
[3] reported as secondary outcome in the study that was not powered to detect difference
[4] numbers with event not reported in study

D.3 Medicines reconciliation algorithm

D.3.1 Patient moves into acute care setting (primary care to hospital setting)

1) On admission undertake medicines reconciliation within 24 hours

2) Follow the local medicines reconciliation standardised process (overseen by a pharmacist)

3) Speak to the patient whenever possible. Not all medicines prescribed may be being taken. Also, record medicines being taken that are not prescribed.

4) Use at least 2 of the most recent and reliable sources available.
Examples include:
- *Printout from the patient's medicines from the GP medical record*
- *Printout of the patient's repeat medicines list*
- *Medical notes from a previous hospital admission*
- *Containers of medicines that the patient has brought in (check with the patient that they have brought them all in)*

5) Record the date completed and the sources used

6) Record discrepancies and the reasons for these if able to find out (doses may have been intentionally amended)

7) Record where changes have been made to medicines after admission. *Examples include the reasons why:*
- *When a medicine has been stopped and the reason why*
- *When a medicine has been started and the reason why*
- *When a dose has been changed and the reason why*
- *When the frequency of the dose has changed and the reason why*
- *When the route of a medicine has been changed and the reason why*
- *Intended duration of treatment for medicines (for example antibiotics)*

The recommended minimum information about the medicines a patient is taking includes:
- *Complete patient details*
- *Presenting condition and co-morbidities*
- *List of all medicines the patient is taking*
- *Dose, frequency, formulation and route of all medicines*
- *Indication for those medicines intended to be stopped at the end of the course*
- *Known allergies to any medicines or their ingredients*
- *Any previous drug interactions*

Information should be clear and legible. This information should be available to the hospital within 24 hours (emergency admissions) or sooner (planned admissions).

This algorithm is based on information from the NPC document 'Medicines Reconciliation: A guide to implementation' (2008)

D.3.2 Patient moves into care setting (hospital setting to primary care [including social care])

1) When a patient moves into a non-acute setting undertake medicines reconciliation as soon as is practically possible, no more than 1 week after the discharge paperwork is received and before the next supply of medicines.

2) Follow the local medicines reconciliation standardised process (overseen by a pharmacist)

3) Speak to the patient whenever possible. Not all medicines prescribed may be being taken. Also record medicines being taken that are not prescribed.

4) Record the date completed and the source used

5) Record discrepancies and the reasons for these if able to find out (doses may have been intentionally amended)

6) Record where changes have been made to medicines after discharge. *Examples include the reasons why:*

- *When a medicine has been stopped and the reason why*
- *When a medicine has been started and the reason why*
- *When a dose has been changed and the reason why*
- *When the frequency of the dose has changed and the reason why*
- *When the route of a medicine has been changed and the reason why*
- *Intended duration of treatment for medicines (for example antibiotics)*

The recommended minimum information about the medicines a patient is taking includes:

- *Complete patient details*
- *The diagnosis, presenting condition and co-morbidities*
- *Procedures carried out*
- *List of all medicines the patient is taking on discharge from hospital*
- *Dose, frequency, formulation and route of all medicines*
- *Medicines stopped and started with reasons*
- *Course length where appropriate*
- *Known allergies to any medicines or their ingredients*
- *Any previous drug interactions*
- *Any additional patient information provided, for example anticoagulation record or steroid card.*

Information should be clear and legible. This information should be available to the hospital within 24 hours (emergency admissions) or sooner (planned admissions).

This algorithm is based on information from the NPC document 'Medicines Reconciliation: A guide to implementation' (2008)

Appendix E: Economic Evidence Tables

E.1.1 Identifying, reporting and learning from medicines-related patient safety incidents

Evidence Table 141 Avery *et al*., 2012

Avery, A. J., *et al*. (2012). "Erratum: A pharmacist led information technology intervention for medication errors (PINCER): A multicentre, cluster randomised, controlled trial and cost-effectiveness analysis (Lancet (2012) 379 (1310-19))." The Lancet 379(9833): 2242.				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA Study design: Simple probabilistic decision-analytic model **Approach to analysis**: Perspective: UK NHS Time horizon: 6 months Cycle length: NA Discounting: None	**Population**: Patients with high risk of potentially serious medication errors **Intervention**: Simple feedback plus pharmacist-led information technology complex intervention (PINCER) lasting 12 weeks **Control**: Simple feedback	**Total costs** (mean per practice): Intvn: 6 months = £1049.67; 12 months = £1096.09 Comp: 6 months = £92.84; 12 months = £139.26 Incremental (as reported in study): 6 months = £871.88; 12 months = £870.63 **Currency & cost year**: UK pounds; year NR **Cost components incorporated**: Costs of implementing interventions only	**Primary outcome measure**: Mean incremental errors: 6 months = -12.90; 12 months = -12.71 **Secondary outcome measures** (at 6 months): 1) History of peptic ulcer prescribed an NSAID without a PPI/history of peptic ulcer without a PPI Intvn: 0.03 Comp: 0.04 2) Asthma prescribed a β blocker/asthma Intvn: 0.02 Comp: 0.03 3) Aged ≥75 years receiving long-term ACE inhibitors or loop diuretics without urea and electrolyte monitoring in the previous 15 months/aged ≥75 years receiving long-term ACE inhibitors or diuretics Intvn: 0.05 Comp: 0.08	**ICER**: £65.60 per error avoided after 6 months; £66.53 per error avoided at 12 months Probability cost-effective: 95% (at threshold of £75 (£85) per error avoided at 6 (12) months) Analysis of uncertainty: - Excluded practices above, or below, two standard deviations away from the mean - Time horizon of 12 months
CCA, Cost-consequence analysis; NA, Not applicable; NR, Not reported; NSAID, Non-steroidal anti-inflammatory drug; PPI, proton pump inhibitors; ACE, angiotensin-converting-enzyme; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator				

Evidence Table 142 Flynn *et al*., 2002

Flynn, E. A., *et al*. (2002). "Comparison of methods for detecting medication errors in 36 hospitals and skilled-nursing facilities." AMERICAN JOURNAL OF HEALTH-SYSTEM PHARMACY 59(5): 436-446.				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA Study design: Comparative cost analysis **Approach to analysis**: Perspective: Unclear (US healthcare system) Time horizon: Not reported Cycle length: NA Discounting: None	**Population**: Sample of patients within hospitals or skilled-nursing facilities in Atlanta, Georgia **Intervention 1**: Incident report review to analyse and classify following observation period **Intervention 2**: Chart review on day following medicine administration session to identify medication errors **Intervention 3**: Direct observation to witness administration of medicines. Deviations between prescribers order and what was administered recorded as errors	**Total costs**: Average cost per dose checked: Incident report review: L.P.N = $6.19, R.N = $4.29, Technician = $2.61 Chart review: $0.67 Direct observation: $4.82 **Currency & cost year**: US dollars, NR **Cost components incorporated**: Labour cost	**Primary outcome measures**: Number of true errors confirmed by each method (% out of total error confirmed by research pharmacist): Incident report review: 1 (<1%) Chart review: 17 (4%) Direct observation: 300 (66%)	**ICER**: Incident report review: dominated Comparing direct observation with chart review: $0.015 per true error No analysis of uncertainty
CCA, Cost-consequence analysis; NA, not applicable; NR, not reported; LPN, licensed practical nurse; RN, registered nurse; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator				

Evidence Table 143 Hope *et al*., 2003

Hope C., Overhage M., Seger A., Teal E., Mills V., Fiskio J., Gandhi T., Bates D., Murray M. (2003) A tiered approach is more cost effective than traditional pharmacist-based review for classifying computer-detected signals as adverse drug events. Journal of Biomedical Informatics 36 (2003) 92–98				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA Study design: Comparative cost analysis **Approach to analysis**: Perspective: Unclear (US healthcare system) Time horizon: 4 months Cycle length: NA Discounting: NA	**Population**: Patients aged 18 years or older with an outpatient appointment at an ambulatory care clinic **Intervention**: Tiered system to review signals suggesting when medicine errors had occurred and if these resulted in an adverse drug event, or potential medical error (near miss) (Indiana) **Control**: Pharmacist review of signals (Boston)	**Total costs**: Intvn: $22,606 Comp: $44,580 **Currency & cost year**: US dollars, 2003 **Cost components incorporated**: Training cost, cost of tiered system	**Primary outcome measures**: Adverse drug events (ADE) identified: Intvn = 535; comp = 242 Medication errors (ME): Intvn = 562; comp = 104	**ICER** (ADE identified): Intervention dominates control ICER (ME) Intervention dominates control No analysis of uncertainty
CCA, Cost-consequence analysis; NA, not applicable; ; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator				

E.1.2 Medicines-related communication systems when patients move from one care setting to another

Evidence Table 144: Chinthammit *et al*., 2012

Chinthammit C, Armstrong EP and Warholak TL. A Cost-Effectiveness Evaluation of Hospital Discharge Counseling by Pharmacists. J Pharm Prac. 2012 25:201				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA Study design: Decision tree **Approach to analysis**: Perspective: US Healthcare system Time horizon: 1 month Discounting: Costs=none; Outcomes=none	**Population**: Patients being discharged from hospital **Comparator**: No intervention **Intervention**: Pharmacist discharge counselling including any of the following: a review of a patient's history, telephone counselling, education, and patient discharge interviews	**Mean cost per patient** - all patients (95% CI): Intvn: $25 ($19-33) Comp: $25 ($19-32) Mean cost per patient - high risk elderly patients (95% CI): Intvn: $21 ($16-27) Comp: $48 ($38-60) **Currency & cost year**: US dollars, 2010 **Cost components incorporated**: Intervention cost, cost of adverse drug events and resulting hospital care	**Primary outcome measure**: Patients discharged without suffering a subsequent adverse drug event (effectiveness): Mean effectiveness per patient - all patients (95% CI): Intvn: 1.0 (1.0 - 1.0) Comp: 0.99 (0.99 - 0.99) Mean effectiveness per patient - high risk elderly patients (95% CI): Intvn: 1.0 (0.99 - 1.0) Comp: 0.98 (0.97-0.98)	**ICER** intvn compared to comparator (95% CI): ICER for all patients: Dominates (same cost, but more effective) ICER for high risk elderly: Dominates (lower cost and more effective) Probability cost-effective: 48% cost saving in all patients; 100% dominant in high risk elderly patients
CCA, Cost-consequence analysis; NA, not applicable; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator, CI, confidence interval				

Evidence Table 145: Karnon *et al*., 2009

Karnon J, Campbell F, Czoski-Marray C (2009) Model-based cost-effectiveness analysis of interventions aimed at preventing medication error at hospital admission (medicines reconciliation). Journal of Evaluation in Clinical Practice ISSN 1356-1294 **Supplemented by full report at: http://www.nice.org.uk/nicemedia/pdf/patientsafetymedssystematicreview.pdf**				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CUA Study design: Decision tree **Approach to analysis**: Perspective: UK NHS Time horizon: NR Discounting: Costs=none; Outcomes=none	**Population**: Patients admitted to hospital **Comparator**: No intervention **Intervention 5**: Current medication list faxed from the GP practice Other interventions are also considered, but these are outside the scope of this question	**Total costs** per 1000 prescription orders (95% CI): Intvn 5: £2,945 (£1,816 - £4,588) Comp: £4,092 (£2,072 - £6,758) **Currency & cost year**: UK pounds, year 2005 **Cost components incorporated**: Intervention costs, medical error costs	**Primary outcome measure:** Total QALYs lost per 1000 prescription orders (95% CI) Intvn 5: 1.0 (0.2 - 2.5) Comp: 3.0 (0.9 - 7.0) Other outcome measures per 1000 prescription orders (95% CI): PADEs Intvn 5: 0.9 (0.4-1.8) Comp: 2.8 (1.5-4.5)	**ICER** intvn compared to comparator (95% CI): ICER 5: Dominates (Dominates, ICER equals - £623 per QALY gained) Probability cost-effective: NR for this intervention Analysis of uncertainty: - Range of intervention and error costs: intervention is cost-effective - Range of medication errors, PADEs and total QALYs lost: all interventions cost-effective
CUA, Cost-utility analysis; NR, not reported; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator; PADE, preventable adverse drug event; QALY, quality adjusted life year; CI, confidence interval				

E.1.3 Medicines reconciliation

Evidence Table 146: Karnon *et al*., 2009

Karnon J, Campbell F, Czoski-Marray C (2009) Model-based cost-effectiveness analysis of interventions aimed at preventing medication error at hospital admission (medicines reconciliation). Journal of Evaluation in Clinical Practice ISSN 1356-1294
Supplemented by full report at: http://www.nice.org.uk/nicemedia/pdf/patientsafetymedssystematicreview.pdf

Study details	Population & interventions	Costs	Health outcomes	Cost effectiveness
Economic analysis: CUA Study design: Decision tree **Approach to analysis**: Perspective: UK NHS Time horizon: NR Discounting: Costs=none; Outcomes=none	**Population**: Patients admitted to hospital from a community setting Comparator: No intervention **Intervention 1:** Pharmacist led reconciliation **Intervention 2:** Standardised forms, pharmacy technicians, hospital policy **Intervention 3:** Nurses taking histories with standardised form **Intervention 4:** Computerised assessment and feedback by pharmacist Another intervention is also considered, however this is outside the scope of this review question.	**Total costs** per 1000 prescription orders (95% CI): Intvn 1: £2,987 (£1,565 - £5,229) Intvn 2: £3,543 (£2,029 - £5,632) Intvn 3: £4,433 (£2,106 - £8,525) Intvn 4: £4,325 (£2,752 – £6,445) Comp: £4,092 (£2,072 - £6,758) **Currency & cost year**: UK pounds, year 2005 **Cost components incorporated**: Intervention costs, medical error costs	**Primary outcome measure**: Total QALYs lost per 1000 prescription orders (95% CI): Intvn 1: 0.8 (0.2-2.2) Intvn 2: 1.5 (0.4-3.6) Intvn 3: 1.1 (0.3–2.9) Intvn 4: 1.3 (0.3-3.1) Comp: 3.0 (0.9-7.0) **Other outcome measures** per 1000 prescription orders (95% CI): PADEs Intvn 1: 0.7 (0.3-1.6) Intvn 2: 1.4 (0.7-2.4) Intvn 3: 1.1(0.5-2.0) Intvn 4: 1.2 (0.6-2.2) Comp: 2.8 (1.5-4.5)	**ICER** intvn compared to no intervention (95% CI): ICER 1: Dominates (Dominates - £1,177 per QALY gained) ICER 2: Dominates (Dominates - £1,695 per QALY gained) ICER 3: £184 per QALY (Dominates - £3,124 per QALY) ICER 4: £138 per QALY (Dominates - £623 per QALY) **Probability cost-effective**: 60% (at threshold of £10,000 per QALY gained) for intervention 1 **Analysis of uncertainty**: - Range of intervention and error costs: interventions are cost-effective - Range of medication errors, PADEs and total QALYs lost: interventions are cost-effective

CUA, Cost-utility analysis; NR, not reported; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator; PADE, preventable adverse drug event; QALY, quality adjusted life year; CI, confidence interval

E.1.4 Medication review

Evidence table 147: Bond *et al*., 2007

Bond CM, Fish A, Porteous TH, Reid JP, Scott A, Antonazzo E. A randomised controlled trial of the effects of note-based medication review by community pharmacists on prescribing of cardiovascular drugs in general practice (Structured abstract). International Journal of Pharmacy Practice. 2007;15(1):39-46.				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA **Study design**: comparative cost analysis **Approach to analysis:** Perspective: UK NHS Time horizon: 12 months Cycle length: NA Discounting: Costs=NA; Outcomes=NA	**Population**: Patients under 65 years old and receiving repeat medication for hypertension or angina registered with Grampian GP **Intervention:** Pharmacists provided with training and conducted a single review of patient medical records. They then provided recommendations (changes for action) to the patients' GP using a study referral form **Control:** Usual care from GP and community pharmacist	**Total costs** (mean per patient per 6 month period): **Intvn:** 12 to 6 months before: £78.41 6 to 0 months before: £89.05 0 to 6 months after: £137.29 6 to 12 months after: £92.96 **Control**: 12 to 6 months before: £69.49 6 to 0 months before: £77.11 0 to 6 months after: £98.71 6 to 12 months after: £88.18 **Currency & cost year:** 1999 UK pounds **Cost components incorporated:** Drug costs, pharmacists time costs	**Primary outcome measure**: Difference between proportions in control and interventions groups, in change pre and post interventions Patients with history of MI ordering an antiplatelet = 0.076 Visit to CVD outpatient department = -0.037 CVD related visit to GP = -0.018 CVD related home visit = -0.029 Other outcome measures: **Quality of Life**: No difference between the groups (EQ-5D)	**ICER**: Not reported, calculated as cost incurring as the intervention was £43.36 per patient more expensive and quality of life between the intervention and comparator were equal. No analysis of uncertainty
CCA, Cost-consequence analysis; NA, not applicable; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator, CVD, cardiovascular disease				

Evidence table 148: Desborough *et al*., 2010

Desborough JA, Sach T, Bhattacharya D, Holland RC, Wright DJ (2012) A cost-consequences analysis of an adherence focused pharmacist-led medication review service. Int J Pharm Pract. 20(1): 41-9.				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA **Study design**: Before and after costing and HRQOL calculations **Approach to analysis:** Perspective: UK NHS (largely secondary care) Time horizon: 6 months Cycle length: NA Discounting: Costs=none; Outcomes=none	**Population**: Patients over 65 years old, registered with a Norfolk GP, residing in their own home and referred to the service by anyone associated with their care that identified they were having difficulties managing their medication independently **Intervention**: Home visit by a pharmacist who determined problems with medication and decided on solutions. Medication review completed and recommendations made to patient's GP. Four weeks later, follow up contact to check recommendations had been implemented and problems resolved. **Control**: no intervention	**Total costs** (mean per patient): Before: £2,190 After: £1,883 **Currency & cost year**: UK pounds - 2005/06 **Cost components incorporated**: Intervention costs, hospital admission costs, ambulance costs, medication costs	**Primary outcome measure:** QALYs (mean per patient) Baseline: 0.417 6 weeks: 0.436 6 months: 0.432 Other outcome measures (mean): Medicines Adherence Report Scale (MARS) (out of maximum score of 25) Baseline: 22.25 6 weeks: 23.65 6 months: 23.65	**ICER**: Not reported, calculated as dominant Probability cost-effective: NR Other: Cost savings: £307 per assessed patient over 6 months. Slight reduction in HRQOL (but no control group). Analysis of uncertainty: - Resource use costs varied between upper and lower bounds - Subgroup analysis of elderly patients and inpatients - Range of cost savings of £253 to £525 per patient following two-way sensitivity analysis
CCA, Cost-consequence analysis; NA, not applicable; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator, HRQOL, Health related quality of life; NR, not reported				

Evidence table 149: Pacini *et al*., 2007

Pacini M., Smith R., Wilson E., Holland R. (2007) Home-Based Medication Review in Older People: Is it Cost Effective? 25 (2): 171-180				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CUA **Study design:** Cost calculations and ICER generation **Approach to analysis**: Perspective: UK NHS Time horizon: 6 months Discounting: Costs=NA; Outcomes=NA	**Population**: Patients over 80 years old, receiving 2 or more drugs and due for discharge to their own home **Intervention**: Two home visits by a pharmacist to educate them about their drugs, remove out-of-date drugs, inform GPs of drug reactions or interactions and inform the local pharmacist if an adherence aid was needed **Control**: Usual care	**Total costs** (mean per patient): Intvn: £986 Comp: £579 **Currency & cost year:** UK pounds - 2000 Cost components incorporated: Intervention costs, hospital admission costs, ambulance costs, primary care costs	**Primary outcome measure:** QALYs (mean change per patient) Intvn: -0.0494 Comp: -0.0569 Other outcome measures (mean): Life years (mean change per patient) Intvn: 0.4689 Comp: 0.4618	**ICER:** £54,454 per QALY Probability cost-effective: 25% at £30,000 threshold Other: ICER: £33,541 per LY Analysis of uncertainty (scenario analysis): - Cost of hospital stay: ICER £54,454 to £77,875 - Included costs (community/primary care): ICER £50,879 to £61,634 - Additional QOL data: ICER £33,082 to £54,454 - Intervention cost only: ICER £17,070 - No inclusion of ambulance costs: ICER £51,044
CUA, Cost-utility analysis; NA, not applicable; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator, QALY, quality adjusted life year				

Evidence table 150: Sellors *et al*., 2003

Sellors J., Kaczorowski J., Sellors C., *et al*. A randomized controlled trial of a pharmacist consultation program for family physicians and their elderly patients. Canadian Medical Association Journal. 2003; 169(1)				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA **Study design:** Cost calculations and SF-36 scores **Approach to analysis:** Perspective: Ontario, Canada healthcare system Time horizon: 5 months Discounting: Costs=NA; Outcomes=NA	**Population**: Patients aged 65 years or over, taking 5 or more medications, had been seen by their GP within 12 months, no evidence of cognitive impairment and could understand English **Intervention**: Structured medication assessment by a pharmacist . Pharmacist wrote letter to GP summarising medications, drug-related problems and recommended actions **Control**: Usual care	**Total costs** (mean per patient with all hospital stays included): Intvn: $1,894.10 Comp: $1,644.69 Total costs (only drug-related hospital stays included): Intvn: $1,281.27 Comp: $1,299.37 **Currency & cost year:** Canadian dollars - NR Cost components incorporated: Physician visits, clinic visits, tests, surgical procedures, emergency care, hospital admissions, other healthcare service use, time spent with pharmacists	**Primary outcome measure** (HRQOL measured with SF-36): Decline in mean scores for intervention and control group for all subscales. No significant differences between the groups	**ICER**: Not reported, calculated as cost-incurring. The intervention is $249 more expensive per patient and HRQOL is equal between the intervention and comparator. Analysis of uncertainty (scenario analysis) - Total costs considered with all hospital stays included and with only drug related hospital stays included
CCA, Cost-consequence analysis; NA, not applicable; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator, HRQOL, Health related quality of life; NR, not reported; SF-36, Short-form 36				

Evidence table 151: The Community Pharmacy Medicines Management Project Evaluation Team, 2007

The Community Pharmacy Medicines Management Project Evaluation Team. The MEDMAN study: a randomized controlled trial of community pharmacy-led medicines management for patients with coronary heart disease. Family practice advanced press. 2007; doi:10.1093/fampra/cml075				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CUA **Study design**: Cost calculations and utility scores **Approach to analysis:** Perspective: UK NHS Time horizon: 12 months Discounting: Costs=NA; Outcomes=NA	**Population**: Patients aged over 17 years with coronary heart disease **Intervention**: Medication management service - initial consultation informed by extracted medical data, recommendations (on therapy, medication compliance and lifestyle) sent to GP who returned annotated copies to pharmacists **Control**: Usual care from GP and community pharmacist	**Total costs** (median per patient): Intvn: Baseline = £852.4; Follow up = £970.5 Comp: Baseline = £737.8; Follow up = £835.2 Intervention cost £90 Currency & cost year: UK pounds - year NR Cost components incorporated: Cost of medicines, NHS costs (GP and hospital visits), cost of intervention	**Primary outcome measure** (median EQ5D utility score): Intvn: baseline = 0.73, follow up = 0.73 Comp: baseline = 0.73, follow up = 0.73 Other outcome measures: SF-36: No change Patient satisfaction: Intvn: baseline = 42.0, follow up = 46.0 Comp: baseline = 42.0, follow up = 43.0 Patient compliance: No change	**ICER**: Not reported, calculated as cost incurring. The intervention was £90 more expensive per patient and there was no difference in quality of life between the intervention and comparator. Analysis of uncertainty: None
CUA, Cost-utility analysis; NA, not applicable; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator; SF-36, Short-form 36				

Evidence table 152: Wallerstedt *et al*., 2012

Wallerstedt S., Bladh L., Ramsberg J. A cost-effectiveness analysis of an in-hospital clinical pharmacist service. BMJ Open. 2012; 2:e000329				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CUA **Study design:** Decision-theoretic model **Approach to analysis**: Perspective: Swedish healthcare system Time horizon: 6 months Discounting: Costs=NA; Outcomes=NA	**Population**: NR but characteristics are elderly patients (over 72 years), on four or more medicines being admitted to hospital **Intervention**: Medication review including feedback on prescribing to GP; drug treatment discussion with the patient at discharge; a medication report including a summary of the drug treatment changes during the hospital stay and a medication list, given to the patient and sent to the patient's general practitioner (GP) at discharge. **Control**: Usual care	**Total costs** (cost per patient over 6 month follow up): Intvn: Baseline = 10,912 euros Comp: Baseline = 9,290 euros **Currency & cost year**: Euros, year NR Cost components incorporated: Inpatient care, outpatient care, reimbursed drugs	**Primary outcome measure** (mean EQ5D utility score): Difference: 0.0051 unadjusted QALYs 0.0035 adjusted QALYs	**ICER**: 316,243 euros per unadjusted QALY ICER: 463,371 per adjusted QALY (QALY adjusted for baseline utility score) Probability cost-effective: 20% at 50,000 euro threshold **Analysis of uncertainty:** - For patients alive at 6 month follow up: 254,415 euros per QALY and 178,137 euros per adjusted QALY - For deceased patients: 80,601 euros saved per QALY - For patients with multiple imputation for missing data: cost of 166,566 euros per unadjusted QALY and 115,181 euros per adjusted QALY
CUA, Cost-utility analysis; NA, not applicable; NR, nor reported; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator; QALY, quality adjusted life year				

E.1.5 Self-management plans

Evidence Table 153: Connock *et al.*, 2007

Connock M, Stevens C, Fry-Smith A, Jowett S, Fitzmaurice D, Moore D, *et al.* Clinical effectiveness and cost-effectiveness of different models of managing long-term oral anticoagulation therapy: a systematic review and economic modelling. [Review] [95 refs]. Health Technology Assessment (Winchester, England).11(38):iii-iiv.				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CUA **Study design:** Markov model **Approach to analysis**: Perspective: UK NHS Time horizon: 10 years Discounting: Costs=3.5%; Outcomes=3.5%	**Population:** Patients requiring anticoagulation therapy monitoring **Intervention:** Patient self-management of international normalised ratio **Comparator:** Usual care	**Total costs (per 100 patients)**: Incremental NHS cost (at 10 years): £100,393 Cost for intervention and comparator are not reported separately **Currency & cost year:** Pounds (£), 2005 **Cost components incorporated:** Patient self-management costs, usual care monitoring costs, cost of acute events (minor and major haemorrhagic events, major thrombotic event, fatal stroke), ongoing costs for disabled patients	**Utility (per 100 patients):** Incremental utility (after 10 years): 1.577	**ICER**: £63,655 per QALY (at 10 years) **Probability cost-effective**: 44% at a threshold of £30,000/QALY (at 10 years) **Analysis of uncertainty:** - Results considered at 5 years and ICER = £122,365 per QALY - Data from all studies pooled and used in model (instead of just using data from Fitzmaurice, 2005). ICER = £19,617 per QALY after 10 years and £47,387 per QALY after 5 years
CUA, Cost-utility analysis; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator; QALY, quality adjusted life year				

Evidence Table 154: Jowett *et al.*, 2006

Jowett S, Bryan S, Murray E, McCahon D, Raftery J, Hobbs R and Fitzmaurice D. Patient self-management of anticoagulation therapy:a trial-based cost-effectiveness analysis. British Journal of Haematology (2006); 134, 632–639				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CUA **Study design:** Comparative cost analysis and incremental utility score used to generate ICER **Approach to analysis**: Perspective: UK NHS (societal perspective also considered, but this is not relevant to the current guidelines) Time horizon: 1 years Discounting: Costs=NA; Outcomes=NA	**Population:** Patients requiring anticoagulation therapy monitoring **Intervention:** Patient self-management of international normalised ratio **Comparator:** Usual care	**Total costs per patient (95% CI)**: Intvn: £416.76 (£393.95-£441.81) Control: £122.32 (£103.48-£143.90) **Currency & cost year:** Pounds (£), 2005 **Cost components incorporated:** Anticoagulation monitoring costs (patient self-management or usual care), adverse events	**Utility (per patient):** Intvn: 0.721 Control: 0.712 Using imputed data to overcome missing data.	**ICER**: £32,716 per QALY **Probability cost-effective**: 30% at a threshold of £20,000/QALY 46% at a threshold of £30,000/QALY **Analysis of uncertainty:** - 5 and 10 year timeframe considered: cost of PSM remained significantly higher than usual care; - Training costs excluded: cost of PSM remained significantly higher than usual care
CUA, Cost-utility analysis; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator; QALY, quality adjusted life year; NA, not applicable; PSM, patient self-management				

Evidence Table 155: Kaambwa *et al.*, 2013

Kaambwa B, Bryan S, Jowett S, Mant J, Bray EP, Hobbs FR, *et al.* Telemonitoring and self-management in the control of hypertension (TASMINH2): a cost-effectiveness analysis. European Journal of Preventive Cardiology. 2013 (1):epub.				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CUA **Study design:** Markov model **Approach to analysis**: Perspective: UK NHS Time horizon: 35 years (lifetime) Discounting: Costs=3.5%; Outcomes=3.5%	**Population:** Patients aged between 35 and 85 taking antihypertensive drugs **Intervention:** Self-management of antihypertensive drugs **Comparator:** Usual care	**Mean total costs (per male patient)**: Intvn: £7,090 Comp: £6,707 **Mean total costs (per female patient):** Intvn: £7,296 Comp: £6,720 **Currency & cost year:** Pounds (£), 2009/10 **Cost components incorporated:** Inpatient and outpatient visits, primary care consultations, drugs, equipment and training	**Mean total QALYs gained (per male patient):** Intvn: 9.16 Comp: 8.92 **Mean total QALYs gained (per female patient):** Intvn: 10.57 Comp: 10.46	**ICER (Men)**: £1,624 per QALY **ICER (women):** £4,923 per QALY **Probability cost-effective**: 99% cost-effective at £20,000 per QALY threshold for men and women **Analysis of uncertainty:** - Modelled a decline in effectiveness of 20% at 2, 5 and 15 years after the start of the intervention: No change in direction of results. For men this could go up to 36% without changing direction of results and for women £26%.
CUA, Cost-utility analysis; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator; QALY, quality adjusted life year; NA, not applicable;				

Evidence Table 156: Schermer *et al.*, 2002

Schermer TR, Thoonen BP, Van Den Boom G, Akkermans RP, Grol RP, Folgering HT, *et al.* Randomized controlled economic evaluation of asthma self-management in primary health care. American Journal of Respiratory & Critical Care Medicine. 2002;166(8):1062-72.				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CUA **Study design:** Costing calculations and QALY scores used to calculate ICER **Approach to analysis**: Perspective: Dutch healthcare system (societal perspective was also considered, which is not relevant to this guideline) Time horizon: 2 years Discounting: Costs=None; Outcomes=None	**Population:** Patients with asthma aged 16-60 years who were to be treated with inhaled steroids **Intervention:** Guided self-management of budesonide using peak flow meters **Comparator:** Usual care	**Mean total costs (per patient - direct costs (95%CI))**: Intvn: 809 euros (683-934 euros) Comp: 798 euros (682- 914 euros) **Currency & cost year:** Euros, 2000 **Cost components incorporated:** Drug and other intervention costs, healthcare resource use costs	**Average effect - QALYs (per patient (95%CI)):** Intvn: 0.039 (0.003-0.075) Comp: 0.024 (-0.022-0.071)	**ICER:** 13,267 euros per QALY (healthcare system perspective) **Probability cost-effective**: No probabilistic analysis on healthcare system perspective **Analysis of uncertainty:** - 33 euros per successfully treated week - Other sensitivity analysis related to a societal perspective (not relevant to this guideline)
CUA, Cost-utility analysis; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator; QALY, quality adjusted life year;				

E.1.6 Patient decision aids used in consultations about medicines

Evidence Table 157: Kennedy *et al*., 2002

Kennedy A, Sculpher M, Coulter A, Dwyer N, Rees M, Abrams K, Horsley S, Cowley D, Kidson C, Kirwin C, Naish C, Stirrat G. Effects of Decision Aids for Menorrhagia on Treatment Choices, Health Outcomes, and Costs: A Randomized Controlled Trial. JAMA. 2002;288(21):2701-2708

Study details	Population & interventions	Costs	Health outcomes	Cost effectiveness
Economic analysis: CCA **Study design:** Cost analysis and outcomes reported separately **Approach to analysis**: Perspective: UK NHS Time horizon: 2 years Discounting: Costs=NA; Outcomes=NA	**Population:** Women with uncomplicated menorrhagia **Intervention 1:** Information pack sent 6 weeks before specialist consultation **Intervention 2**: Information pack plus structured interview prior to consultation to clarify and elicit preferences **Comparator:** Usual care	**Total costs (per patient)**: Intvn 1: $2,047 (£1,346.71) Intvn 2: $1,593 (£1,048.03) Comp: $2,751 (£1,809.87) **Currency & cost year:** Pounds (£), 1999-2000 (converted to US $ for publication at rate of £1=$1.52) **Cost components incorporated:** Test costs, drug costs, surgery/procedure costs, inpatient and outpatient visits, family physician visits. Plus intervention costs ($21 for Intvn 1 and $27 for Intvn 2).	Primary outcome measure: **SF-36 scores:** No significant difference between any of the groups, except for the physical dimension between Intvn 2 and other 2 groups	**ICER 1** (Intvn 1 v. Comp): Dominant (£463.16 saved and equal QoL) **ICER 2** (Intvn 2 v. Comp): Dominant (£761.84 saved and improved QoL) **Probability cost-effective**: NR **Analysis of uncertainty:** - Scenario with unrelated health care costs excluded: No change in direction of results - Scenario with unrelated health care costs and all inpatient healthcare costs excluded: No change in direction of results

CCA, Cost-consequence analysis; NA, not applicable; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator, HRQOL, Health related quality of life; NR, not reported; QoL, Quality of Life

Evidence Table 158: Murray *et al*., 2001a

Murray E, Davis H, Tai SS, Coulter A, Gray A, Haines A. Randomized controlled trial of an interactive multimedia decision aid on hormone replacement therapy in primary care. BMJ 2001;323(7311):490-3				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA **Study design**: Cost analysis and outcomes reported separately **Approach to analysis:** Perspective: UK NHS Time horizon: 9 months Discounting: Costs=NA; Outcomes=NA	**Population:** Patients considering hormone replacement therapy **Intervention:** Patient decision aid consisting of an interactive multimedia programme with booklet and printed summary used at an interactive session prior to a follow-up consultation to discuss treatment decision **Comparator:** Normal clinical care	**Total costs (per patient (SD)):** Intvn = £306.50 (£42.80) Comp = £90.90 (£39.20) **Currency & cost year**: Pounds (£), 1999 **Cost components incorporated:** Consultations with doctor and specialist, medication cost, intervention cost	Primary outcome measure: **SF-36, EQ-5D and MenQol scores:** No significant changes in scores from baseline to final assessment between the two groups	**ICER**: Cost incurring (£215.50 more expensive per patient (95% CI: £203.10 to £228.00) and equal QoL) **Probability cost-effective**: NR **Analysis of uncertainty:** - Where the cost of the intervention is not included there is no significant cost differences between intervention and control patients
CCA, Cost-consequence analysis; NA, not applicable; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator; NR, not reported; QoL, Quality of Life; CI, confidence interval				

Evidence Table 159: Murray *et al*., 2001b

Murray E, Davis H, Tai SS, Coulter A, Gray A, Haines A. Randomised controlled trial of an interactive multimedia decision aid on benign prostatic hypertrophy in primary care. BMJ 2001;323(7311):493–6				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA **Study design**: Cost analysis and outcomes reported separately **Approach to analysis:** Perspective: UK NHS Time horizon: 9 months Discounting: Costs=NA; Outcomes=NA	**Population:** Patients with benign prostatic hypertrophy **Intervention:** Patient decision aid consisting of an interactive multimedia programme with booklet and printed summary used at an interactive session prior to a follow-up consultation to discuss treatment decision **Comparator:** Normal clinical care	**Total costs (per patient (SD)):** Intvn = £594.10 (£602.00) Comp = £188.80 (£300.40) **Currency & cost year**: Pounds (£), 1999 **Cost components incorporated:** consultations with doctor and specialist, medication cost, intervention cost, test costs	Primary outcome measure: **SF-36 and EQ-5D scores:** No difference between the two groups in the trend over time for either QoL measure	**ICER**: Cost incurring (£405.40 more expensive per patient (95% CI: £224.90 to £585.80) and equal QoL) **Probability cost-effective**: NR **Analysis of uncertainty:** - Where the cost of the intervention is not included, the intervention is £121.50 (95% CI: -£58.90 to £302.00) more expensive per patient
CCA, Cost-consequence analysis; NA, not applicable; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator; QoL, Quality of Life; CI, confidence interval				

E.1.7 Clinical decision support

Evidence Table 160: Gilmer *et al.*, 2012

Gilmer TP, O'Connor PJ, Sperl-Hillen JM, Rush WA, Johnson PE, Amundson GH, et al. Cost-effectiveness of an electronic medical record based clinical decision support system. Health Services Research. 2012;47(6):2137-58.				
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CUA **Study design:** Diabetes simulation model (UKPDS Outcomes Model) **Approach to analysis**: Perspective: US healthcare system Time horizon: 40 years (lifetime) Discounting: Costs=3%; Outcomes=3%	**Population:** Patients with diabetes **Intervention:** Diabetes Wizard - electronic medical record based clinical decision support **Comparator:** Usual care	**Total costs (per patient)**: Intvn: $52,395 Comp: $51,592 **Currency & cost year:** US dollars ($), 2009 **Cost components incorporated:** Intervention costs, complication costs, annual diabetes costs	**Total QALYs (per patient):** Intvn: 10.32 QALYs Comp: 10.28 QALYs	**ICER**: $21,690 per QALY **Probability cost-effective**: 99% cost-effective at $50,000 per QALY threshold; 92% cost-effective at $25,000 per QALY threshold. **Analysis of uncertainty:** - One way analyses: model was sensitive to assumed changes in intervention effect (in base case assumed to be constant over lifetime). If effects only lasted 1 (2) years, ICER = $65,459 ($40,342) per QALY; - Two way analyses: Results changed as with one-way analyses. One year time horizon = intervention cost saving.
CUA, Cost-utility analysis; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator; QALY, quality adjusted life year; UKPDS, UK Prospective Diabetes Study				

E.1.8 Medicines-related models of organisational and cross-sector working

Evidence Table 161: Ghatnekar *et al*., 2013

Ghatnekar O, Bondesson A, Persson U, Eriksson T. Health economic evaluation of the Lund Integrated Medicines Management Model (LIMM) in elderly patients admitted to hospital. BMJ Open. 2013;3(1).

Study details	Population & interventions	Costs	Health outcomes	Cost effectiveness
Economic analysis: CUA **Study design:** Decision tree **Approach to analysis**: Perspective: Swedish healthcare system Time horizon: 3 months Discounting: Costs=NA; Outcomes=NA	**Population:** Elderly patients admitted to hospital **Comparator:** Standard care (including medicine reconciliation) **Intervention:** LIMM model - a systematic approach to individualise and optimise drug treatment through medication review and reconciliation by a MDT	**Total costs (per patient)**: Intvn: 290 euros (SE 210) Comp: 630 euros (SE 441) **Currency & cost year:** Euros, 2009 **Cost components incorporated:** Drug review costs, staff costs, inpatient stay cost	Primary outcome measure: **Total QALYs lost (per patient):** Intvn: 0.004 (SE 0.005) Comp: 0.009 (SE 0.011) Incremental QALY loss = -0.005 (SE 0.007)	ICER intvn compared to standard care: **ICER:** Dominant (0.005 QALY gained and 340 Euros saved) **Probability cost-effective**: 98% (at threshold of 0 euros per QALY gained) for intervention **Analysis of uncertainty:** - Hospitalisation cost: Intervention dominates - Probability of hospitalisation: Intervention dominates - Increase intervention time: Intervention dominates - Reducing labour cost: Intervention dominates

CUA, Cost-utility analysis; ICER, incremental cost effectiveness ratio; Intvn, intervention; Comp, comparator; QALY, quality adjusted life year; NA, Not applicable; SE, standard error

Evidence Table 162: Karnon *et al*., 2008

Karnon J, McIntosh A, Dean J, Bath P, Hutchinson A, Oakley J, et al. Modelling the expected net benefits of interventions to reduce the burden of medication errors. Journal of Health Services & Research Policy. 2008;13(2):85-91.

Study details	Population & interventions	Costs	Health outcomes	Cost effectiveness
Economic analysis: CBA **Study design**: Decision tree with Monte-Carlo simulation **Approach to analysis:** Perspective: UK NHS Time horizon: 5 years Discounting: Costs=NR; Outcomes=NR	**Population:** Patients admitted to hospital **Comparator:** Standard care - pharmacist covers two wards of about 30 patients over a morning to provide a basic level of pharmaceutical care and in the afternoons they have departmental commitments **Intervention:** Pharmacists joining ward rounds - senior pharmacist makes rounds with the residents, nurses and attending staff each morning, is present in the ward for consultation and assistance to the nursing staff during the rest of the morning and is available on call as necessary during the rest of the day	**Total costs (for a 400 bed hospital over a 5-year time horizon):** Comp = £0 Intvn = £0.21m-0.37m **Currency & cost year**: Pounds (£), 2006 **Cost components incorporated:** Cost of intervention (additional ward pharmacists)	**Primary outcome measure:** Annual costs of pADEs (95% CI) in 400-bed hospital over 5-year time horizon. Intvn: £11.711m (£2.854m-£27.835m) Comp: £17.754m (£4.4m-£42.095m) Calculated from incidence of pADEs (95% CI): Intvn = 286 (149-438) Comp = 432 (224-650)	**Net benefit** (ward pharmacists compared to baseline in 400-bed hospital over 5-year time horizon): Including treatment and health benefit costs Minimum intervention cost scenario = £27.256m (£5.673m-£69.52m) Maximum intervention cost scenario = £26.509m (£4.925m-£68.772m) **Probability cost-effective**: NR **Analysis of uncertainty**: CI above generated through Monte Carlo simulation (20,000 iterations) each time sampling a different set of input parameters Net benefit (including only treatment costs) Minimum intervention cost scenario = -£0.154m (-£0.601m to -£0.451) Maximum intervention cost scenario = -£0.901m (-£1.349m to -£0.296m)

CBA, Cost-benefit analysis; Intvn, intervention; Comp, comparator; QALY, quality adjusted life year; NA, Not applicable; CI, confidence interval; NR, not reported

Appendix F:

F.1 Medication review cost analysis

Summary

Simple costing calculations were carried out to provide the GDG with information around the cost per medication review undertaken dependent upon the healthcare professional delivering the review. These are displayed in Table 163. The length of time utilised for each medicine review was estimated by the GDG and various scenarios are displayed. Healthcare professional costs were sourced from the Personal Social Services Research Unit (PSSRU) (PSSRU, 2013).

A variety of cost options are displayed, which include salary costs only, PSSRU unit cost per healthcare professional and PSSRU unit cost per hour of healthcare professional contact with patients, for consideration by the GDG. It is important to note that an NHS and PSS perspective should be taken for all NICE guidance (NICE, 2012). The costs provided in Table 163 are limited in that they provide no information on the quality and impact of the review, nor the long term cost savings resulting from the review.

Table 163: Estimate of cost per medication review delivered

	Cost per medication review – salary cost only				Cost per medication review – unit cost (without qualification costs)				Cost per medication review – patient contact cost (without qualification costs)			
Health care provider:	**10 minutes**	**12 minutes**	**15 minutes**	**20 minutes**	**10 minutes**	**12 minutes**	**15 minutes**	**20 minutes**	**10 minutes**	**12 minutes**	**15 minutes**	**20 minutes**
Nurse (GP practice)	£2.72	£3.27	£4.09	£5.45	£6.67 (£5.67)	£8.00 (£6.80)	£10.00 (£8.50)	£13.33 (£11.33)	£8.67 (£7.33)	£10.40 (£8.80)	£13.00 (£11.00)	£17.33 (£14.67)
General practitioner	£9.82	£11.78	£14.73	£19.64	£24.50 (£20.33)	£29.40 (£24.40)	£36.75 (£30.50)	£49.00 (£40.67)	£38.33 (£32.00)	£46.00 (£38.40)	£57.50 (£48.00)	£76.67 (£64.00)
Hospital-based nurse (day ward)	£2.73	£3.28	£4.10	£5.47	£6.83 (£5.67)	£8.20 (£6.80)	£10.25 (£8.50)	£13.67 (£11.33)	£16.67 (£14.00)	£20.00 (£16.80)	£25.00 (£21.00)	£33.33 (£28.00)
Community pharmacist	£4.03	£4.84	£6.04	£8.06	£9.33 (£8.50)	£11.20 (£10.20)	£14.00 (£12.75)	£18.67 (£17.00)	£11.67 (£10.67)	£14.00 (£12.80)	£17.50 (£16.00)	£23.33 (£21.33)
Hospital pharmacist	£3.18	£3.82	£4.77	£6.36	£7.83 (£6.83)	£9.40 (£8.20)	£11.75 (£10.25)	£15.67 (£13.67)	£11.17 (£9.83)	£13.40 (£11.80)	£16.75 (£14.75)	£22.33 (£19.67)
Hospital based doctor: Consultant medical	£7.82	£9.38	£11.72	£15.63	£23.17 (£16.50)	£27.80 (£19.80)	£34.75 (£20.75)	£46.33 (£33.00)	NR*	NR*	NR*	NR*

*Direct patient contact time costs are not reported on PSSRU (2012/13) for hospital based doctor: consultant medical.

The studies included within the clinical and cost-effectiveness reviews were considered and information on the time taken to deliver the review extracted. Around two-thirds of the included studies did not report the time taken to carry out the medication review; and, those that did report this information indicated a wide variation in the time taken to carry out the intervention. This variation may result from differences in the scope of the intervention being delivered. Table 164 displays the time taken to undertake the review as reported in the literature. More information on the scope of the intervention in question is provided in Section 8.

Table 164: Time taken to undertake medication review

Study	Information on review	Average time taken
Bond *et al.* (2007)	Pharmacist review at GP surgery	1.5 hours
Burns *et al.* (2000)	Pharmacist review at GP surgery or nursing home	24.6 minutes
Hay *et al.* (2006)	Enhanced pharmacy review in GP surgery	1-2 hours
Holland *et al.* (2005)	Pharmacist review in the home	First visit: 61 minutes Second visit: 42 minutes Total = 1 hour 43 minutes spent with participants.
Holland *et al.* (2007)	Pharmacist review in the home	5 hours 53 minutes (or 3 hours 42 minutes without travel time): First visit = 72 minutes Second visit = 50 minutes Administration = 114 minutes Travel = 131 minutes
Pacini *et al.* (2007)	Pharmacist review in the home (two home visits, travel and administration time)	3-4 hours per patient (expected time taken)
Sorenson *et al.* (2004)	Pharmacist review in the home	30 minutes
Taylor *et al.* (2003)	Pharmacist review at a GP surgery	20 minutes
Villeneuve *et al.* (2010)	Pharmacist review and follow up to improve pharmacotherapy to reduce lipid levels.	Up to 2 hours 45 minutes (depending on adherence). Initial visit = 30 minutes
Zermansky *et al.* (2001)	Pharmacist review in their clinic	20 minutes

The GDG judged that the length of time reported within the published literature for medication reviews were generally far longer than would occur within the NHS. The GDG advised that in most cases reviews would take around 10-15 minutes and only those patients with complex conditions on large numbers of medication would take any longer. Those reviews reported in the literature to take longer than this tended to be home medication reviews with sometimes multiple follow up visits. A number of timeframes were

considered for the costing analysis, which ranged from 10 to 20 minutes per medication review.

The time cost of various healthcare professionals have been sourced from PSSRU and are displayed in Table 165 (PSSRU, 2013). For each healthcare professional three units costs are provided: cost per hour including salary costs only, unit cost per hour including overheads and unit cost per hour of patient contact time. The costs without qualification costs are show in brackets for information. The GDG advised the professions shown in Table A.2 may all undertake medication reviews. They also recognised that primary care pharmacists undertake medication reviews, however a unit cost for this profession could not be identified meaning primary care pharmacists were excluded from the simple costing analysis.

Table 165 Unit cost of healthcare provider time (cost per hour)

Healthcare provider	Salary only	Salary plus overheads and qualification costs (cost without qualification cost)	Salary plus overheads and qualification costs - patient contact time (cost without qualification cost)
Nurse (GP practice)	£16.35	£40 (£34)	£52 (£44)
General practitioner	£58.92	£147 (£122)	£230 (£192)
Hospital-based nurse (day ward)	£16.41	£41 (£34)	£100 (£84)
Community pharmacist	£24.18	£56 (51)	£70 (£64)
Hospital pharmacist	£19.09	£47 (£41)	£67 (£59)
Hospital based doctor: consultant medical	£46.89	£139 (£99)	NR*

*Direct patient contact time costs are not reported on PSSRU (2012/13) for hospital based doctor: consultant medical.

The time taken to deliver the medication review and the unit cost of various healthcare providers have been utilised to calculate the cost per medication review under various scenarios. These costs are shown in Table 166 and provide the GDG with illustrative examples around the cost per medication review. These costs have been provided as a tool to aid GDG discussions given the lack of published cost-effectiveness evidence relating to medication reviews undertaken by healthcare professionals other than pharmacists. The efficacy and long-term costs of medication review undertaken by various healthcare professionals is unknown.

Table 166: Estimate of cost per medication review delivered

	Cost per medication review – salary only				Cost per medication review – salary plus overheads and qualifications (without qualification costs)				Cost per medication review – salary plus overheads and qualifications: patient contact time (without qualification costs)			
Health care provider:	**10 minutes**	**12 minutes**	**15 minutes**	**20 minutes**	**10 minutes**	**12 minutes**	**15 minutes**	**20 minutes**	**10 minutes**	**12 minutes**	**15 minutes**	**20 minutes**
Nurse (GP practice)	£2.72	£3.27	£4.09	£5.45	£6.67 (£5.67)	£8.00 (£6.80)	£10.00 (£8.50)	£13.33 (£11.33)	£8.67 (£7.33)	£10.40 (£8.80)	£13.00 (£11.00)	£17.33 (£14.67)
General practitioner	£9.82	£11.78	£14.73	£19.64	£24.50 (£20.33)	£29.40 (£24.40)	£36.75 (£30.50)	£49.00 (£40.67)	£38.33 (£32.00)	£46.00 (£38.40)	£57.50 (£48.00)	£76.67 (£64.00)
Hospital-based nurse (day ward)	£2.73	£3.28	£4.10	£5.47	£6.83 (£5.67)	£8.20 (£6.80)	£10.25 (£8.50)	£13.67 (£11.33)	£16.67 (£14.00)	£20.00 (£16.80)	£25.00 (£21.00)	£33.33 (£28.00)
Community pharmacist	£4.03	£4.84	£6.04	£8.06	£9.33 (£8.50)	£11.20 (£10.20)	£14.00 (£12.75)	£18.67 (£17.00)	£11.67 (£10.67)	£14.00 (£12.80)	£17.50 (£16.00)	£23.33 (£21.33)
Hospital pharmacist	£3.18	£3.82	£4.77	£6.36	£7.83 (£6.83)	£9.40 (£8.20)	£11.75 (£10.25)	£15.67 (£13.67)	£11.17 (£9.83)	£13.40 (£11.80)	£16.75 (£14.75)	£22.33 (£19.67)

F.2 Full Health Economics Report

The full health economics report prepared by York Health Economics Consortium Ltd (YHEC) is in a separate file.