

National Institute for Health and Care Excellence

Surveillance programme

Surveillance proposal consultation document

Medicines adherence: involving patients in decisions about prescribed medicines and supporting adherence NICE guideline CG76 – 8-year surveillance review

Background information

Guideline issue date: January 2009

2-year surveillance review – no update.

6-year surveillance review – no update.

Surveillance proposal for consultation

We will not update the guideline at this time.

We will transfer the guideline to the [static list](#) because:

- No evidence was identified that would impact on the current guidance and no major ongoing studies or research have been identified as due to be published in the near future (that is, within the next 3-5 years).

Reason for the proposal

New evidence

We found 63 new studies in a search for systematic reviews and randomised controlled trials published between 18 December 2014 and 11 July 2016.

Evidence identified in previous surveillance was also considered. This included 52 studies identified by search.

From all sources, 115 studies were considered to be relevant to the guideline.

This included new evidence on patient involvement in decisions about medicines, supporting adherence and reviewing medicines, which supports current recommendations. We asked topic experts whether this new evidence would affect current recommendations on NICE guideline CG76. Generally, the topic experts thought that an update was not needed.

We did not find any new evidence on communication between health professionals.

Additionally, we did not identify any relevant ongoing research that is expected to publish results in the next 3–5 years.

No equalities issues were identified during the surveillance process.

Overall decision

After considering all the new evidence and views of topic experts, we decided not to update this guideline, and place NICE guideline CG76 on the static list.

Further information

See appendix A: summary of new evidence from surveillance below for further information.

For details of the process and update decisions that are available, see [ensuring that published guidelines are current and accurate](#) in 'Developing NICE guidelines: the manual'.

76 – 03 Is it possible to increase patient involvement in decisions about medicines?

Recommendations derived from this question

Increasing patient involvement

Patient involvement in the decision making process requires that healthcare professionals acknowledge patients' views about their condition and its treatment, and that both healthcare professional and patient have a role in making decisions about treatment. Simple interventions to increase patient involvement do not necessarily increase the overall length of consultation and may be justified by benefits, particularly over the course of a long term condition.

- 1.1.7 Offer all patients the opportunity to be involved in making decisions about prescribed medicines. Establish what level of involvement in decision-making the patient would like.
- 1.1.8 Discuss with the patient why they might benefit from the treatment. Clearly explain the disease or condition and how the medicine will influence this.
- 1.1.9 Explain the medical aims of the treatment to patients and openly discuss the pros and cons of proposed medicines. The discussion should be at the level preferred by the patient.
- 1.1.10 Clarify what the patient hopes the treatment will achieve.
- 1.1.11 Avoid making assumptions about patient preferences about treatment. Talk to the patient to find out their preferences, and note any non-verbal cues that may indicate you need to explore the patient's perspective further.
- 1.1.12 Healthcare professionals have a duty to help patients to make decisions about their treatment based on an understanding of the likely benefits and risks rather than on misconceptions.
- 1.1.13 Accept that patients may have different views from healthcare professionals about the balance of risks, benefits and side effects of medicines.
- 1.1.14 Be aware that increasing patient involvement may mean that the patient decides not to take or to stop taking a medicine. If in the healthcare professional's view this could have an adverse effect, then the information provided to the patient on risks and benefits and the patient's decision should be recorded.
- 1.1.15 Accept that the patient has the right to decide not to take a medicine, even if you do not agree with the decision, as long as the patient has the capacity to make an informed decision and has been provided with the information needed to make such a decision.
- 1.1.16 Assess the patient's capacity to make each decision using the principles in the [Mental Capacity Act](#) (2005). To lack capacity patients must: (a) have an impairment of or disturbance or malfunction of brain and mind, and (b) demonstrate lack of capacity to:
 - understand the information relevant to the decision
 - retain information for long enough to use it in the decision
 - use or weigh information as part of the process of making the decision
 - communicate the decision (whether by talking, using sign language or any other means).
- 1.1.17 If the patient has specific concerns, record a summary of the discussion, because this may be helpful in future consultations.
- 1.1.18 Encourage and support patients, families and carers to keep an up-to-date list of all medicines the patient is taking. The list should include the names and dosages of prescription and non-prescription medicines and herbal and nutritional supplements. If the patient has any allergic or adverse reactions to medicines, these should be noted.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

No relevant evidence was identified.

8-year surveillance summary

A systematic review¹ (13 studies) examined communication and decision-making in mental health-based samples, including bipolar disorder patients. Treatment adherence was one of the main outcomes. Four inter-related themes were identified:

- patient characteristics
- patient preferences
- quality of patient-clinician interactions
- influence of shared decision making (SDM) and patient-centred approach on patient outcomes.

People with bipolar disorder and other mental health disorders were found to have unmet decision-making needs, and desired greater involvement.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The new systematic review evidence is consistent with recommendation 1.1.7, to offer all patients the opportunity to be involved in making decisions about prescribed medicines.

New evidence is unlikely to impact on the guideline.

76 – 04 What tools are available to help elicit patients' beliefs about medicines?

Recommendations derived from this question

Understanding the patient's knowledge, beliefs and concerns about medicines

There is evidence that patients make decisions about medicines based on their understanding of their condition and the possible treatments, their view of their own need for the medicine and their concerns about the medicine.

- 1.1.19 Be aware that patients' concerns about medicines, and whether they believe they need them, affect how and whether they take their prescribed medicines.
- 1.1.20 Ask patients what they know, believe and understand about medicines before prescribing new treatments and when reviewing medicines.
- 1.1.21 Ask if the patient has any specific concerns about their medicines, whenever you prescribe, dispense or review medicines. These may include concerns about becoming dependent on medicines and concerns about adverse effects. Address these concerns.
- 1.1.22 Be aware that patients may wish to minimise how much medicine they take.
- 1.1.23 Be aware that patients may wish to discuss:
 - what will happen if they do not take the medicine suggested by their healthcare professional
 - non-pharmacological alternatives to medicines
 - how to reduce and stop medicines they may have been taking for a long time, particularly those known to be associated with withdrawal symptoms
 - how to fit taking the medicine into their daily routine

- how to make a choice between medicines if they believe they are taking too many medicines.

Surveillance decision

No new information was identified at any surveillance review.

76 – 05 What tools are available to help elicit patients' information needs about medicines?

Recommendations derived from this question

Providing information

Patients need information about their condition and possible treatments if they are to be involved in making informed decisions about medicines. The format and content of the information provided should meet the needs of individual patients.

- 1.1.24 Offer patients information about medicines before the medicines are prescribed.
- 1.1.25 Offer patients information that is relevant to their condition, possible treatments and personal circumstances, and that is easy to understand and free from jargon.
- 1.1.26 Check that patients have any information they wish about medicines when the medicines are dispensed.
- 1.1.27 Discuss information on medicines with the patient rather than just presenting it. The discussion should take into account what the patient understands and believes about the condition and treatment.
- 1.1.28 Do not assume that the patient information leaflets (PILs)^{*} that patients receive with their medicines will meet each patient's needs. Address concerns that patients may have after reading the standard PILs.
- 1.1.29 Patients differ in the type and amount of information they need and want. Therefore the provision of information should be individualised and is likely to include, but not be limited to:
 - what the medicine is
 - how the medicine is likely to affect their condition (that is, its benefits)
 - likely or significant adverse effects and what to do if they think they are experiencing them
 - how to use the medicine
 - what to do if they miss a dose
 - whether further courses of the medicine will be needed after the first prescription
 - how to get further supplies of medicines.
- 1.1.30 Be careful not to make assumptions about a patient's ability to understand the information provided. Check with the patient that they have understood the information. Information for patients should be clear and logical and, if possible, tailored to the needs of the individual patient.

^{*} Patient information leaflets (PILs) contain information for patients on how medicines should be used. It is a legal requirement that this information is included on the label or within the packaging of a medicine. Surveillance proposal consultation document September 2016 – Medicines adherence. (2009) NICE guideline CG76 6 of 49

- 1.1.31 Suggest where patients might find reliable information and support after the consultation: for example, by providing written information or directing them to other resources (for example, [NHS Choices](#)).
- 1.1.32 Provide inpatients with the same information as patients in other settings. Information should include:
- what the medicine is
 - how the medicine is likely to affect their condition (that is, its benefits)
 - likely or significant adverse effects and what to do if they think they are experiencing them
 - how to use the medicine
 - what to do if they miss a dose
 - whether further courses of the medicine will be needed after the first prescription
 - how to get further supply after discharge.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

No relevant evidence was identified.

8-year surveillance summary

A randomised controlled trial (RCT)² (n=262) found that clinician-patient communication improved adherence to psychoactive drugs in functional dyspepsia patients with psychological symptoms. The intervention consisted of explanations of both the psychological and gastrointestinal mechanisms of the generation of functional dyspepsia

symptoms and the effects of flupentixol-melitracen plus omeprazole treatment.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The new RCT evidence is consistent with recommendation 1.1.24, to offer patients information about medicines before the medicines are prescribed.

New evidence is unlikely to impact on the guideline.

76 – 06 Does shared understanding of the diagnosis (need for treatment/symptoms) increase shared decision making (SDM)?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-04 and 76-05

Surveillance decision

No new information was identified at any surveillance review.

76 – 07 How can a practitioner detect whether a patient agrees/disagrees with recommendation to take medicines?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-01 and 76-04.

Surveillance decision

No new information was identified at any surveillance review.

76 – 08 How can practitioners elicit patient's preferences for involvement in decisions about medicines?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-01 and 76-04.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

A systematic review³ (115 studies) examined patient preferences for shared decisions and found that patient role preferences varied across measures, time and patient population. A practice implication identified was that the role preference measure itself must be considered when interpreting patient responses to a measure or question about a patient's preference for decision roles.

8-year surveillance summary

No relevant evidence was identified.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The evidence from the previous surveillance review is consistent with CG76 recommendations in section 1.1 on patient involvement in decisions about medicines.

New evidence is unlikely to impact on the guideline.

76 – 09 What tools are available to support the patient in reaching an informed decision?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-05.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

A systematic review⁴ (118 RCTs) of decision aids for patients found that only a small fraction of the available decision aids were systematically developed and have been subject to systematic evaluation.

8-year surveillance summary

An RCT⁵ (n=225) found that the use of a patient decision aid (PDA) specific to type 2 diabetes resulted in significant improvements in knowledge, decisional conflict and decisional self-efficacy. Decisional conflict scores after PDA use were within the range that correlates with effective decision-making.

An RCT⁶ (n=117 clinicians, n=301 patients) of adults with moderate to severe depression considering treatment with an antidepressant found that the Depression Medication Choice decision aid significantly improved patients' decisional comfort, knowledge, satisfaction, and involvement. However, there was no significant difference in medicines adherence.

An RCT⁷ (n=500 nurses, 7919 patients) assessed the outcomes of a clinical decision support (CDS) intervention designed for home care patients with high medication regimen complexity. No statistically significant differences were found in the intention to treat analysis. Findings indicated that CDS use was limited, restricting the impact of the intervention overall.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The new and previous surveillance evidence on patient decision aids is inconclusive and is unlikely to impact on CG76, which does not make recommendations on specific decision aids. Further evaluation studies are required before specific decision aids can be recommended in the guideline.

New evidence is unlikely to impact on the guideline.

76 – 10 Information about medicines for patients in order to enhance SDM in regard to medicines?

Subquestion

What information about medicines should be provided for patients in order to enhance SDM in regard to medicines?

How can information about medicines be provided for patients in order to enhance SDM in regard to medicines?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-05.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

No relevant evidence was identified.

8-year surveillance summary

An RCT² (n=262) found that clinician-patient communication improved adherence to psychoactive drugs in functional dyspepsia patients with psychological symptoms. The intervention consisted of explanations of both the psychological and gastrointestinal mechanisms of the generation of functional dyspepsia symptoms and the effects of

flupentixol-melitracen plus omeprazole treatment.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The new RCT evidence is consistent with recommendation 1.1.24, to offer patients information about medicines before the medicines are prescribed.

New evidence is unlikely to impact on the guideline.

76 – 11 Which are the specific/practical barriers and facilitators for individuals to allow them to engage in shared decision making?

Subquestion

How can a health care professional (HCP) identify these barriers and facilitators?

Is there a way of doing this so intervention can be targeted?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-01 and 76-04.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

A systematic review⁸ (21 studies) aimed to identify barriers and enablers that may influence a patient's decision to cease a medication. The findings indicated that the decision to stop a medication by an individual is influenced by multiple competing barriers and enablers. The most common barrier/enabler identified was 'appropriateness' of cessation.

8-year surveillance summary

No relevant evidence was identified.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The evidence from previous surveillance was considered consistent with CG76 recommendations in section 1.1 on patient involvement in decisions about medicines.

New evidence is unlikely to impact on the guideline.

76 – 12 Do interventions to increase patient involvement increase length of the consultation?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-03

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

A systematic review⁹ (43 studies) examined interventions for providers to promote a patient centred approach to clinical consultations, including shared decision making. Pooled analysis of fewer than half of included studies with adequate data suggested moderate beneficial effects from interventions on the consultation process; and mixed effects on behaviour and patient satisfaction, with small positive effects on health status.

8-year surveillance summary

No relevant evidence was identified.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The evidence from previous surveillance was considered to be consistent with CG76 recommendations in section 1.1 on increasing patient involvement in decisions about medicines.

New evidence is unlikely to impact on the guideline.

76 – 13 What 'aspects' of consultation style increase patient involvement in decision-making?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-03.

Surveillance decision

No new information was identified at any surveillance review.

76 – 14 What are the skills and competencies required from HCPs to deliver interventions designed to increase SDM about medicines?

Recommendations derived from this question

1.1.6 Be aware that the consultation skills needed for increasing patient involvement can be improved.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

A systematic review¹⁰ (21 studies) evaluated the effectiveness of interventions to improve health professionals' adoption of shared decision making in routine clinical practice, as seen by patients. Only three of the 21 studies reported a clinically significant effect for the primary outcome that favoured the intervention. These interventions included educating health professionals about sharing decisions with patients and patient-mediated interventions, such as patient decision aids.

8-year surveillance summary

An RCT¹¹ (n=26 providers) assessed the effectiveness of one-hour communication skills training, based on motivational interviewing principles, in improving the quality of communication about medication adherence. Results showed that the intervention improved provider communication behaviours and increased dialogue regarding medication adherence.

An RCT¹² (n=25) found that GPs valued counselling training and support tools. Although

implementation was sometimes challenging, GPs reported increased frequency of use and confidence in applying adherence counselling skills, which persisted for 17 months over the study duration. Patients reported good GP empathy but no significant change in adherence barriers.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The new and previous surveillance evidence is consistent with CG76 recommendations in section 1.1 on increasing patient involvement in decisions about medicines. In particular recommendation 1.1.6 advises awareness that the consultation skills needed for increasing patient involvement can be improved. The evidence identified through surveillance is consistent with that recommendation.

New evidence is unlikely to impact on the guideline.

Supporting adherence

76 – 15 How common is non-adherence?

Subquestion

What is the correlation between increasing adherence and clinical benefit?

What are the main causes of non-adherence?

Is adherence worse in vulnerable groups, if so which ones?

Recommendations derived from this question

Assessing adherence

Patients do not always take their medicines exactly as prescribed, and healthcare professionals are often unaware of how patients take their medicines. The purpose of assessing adherence is not to monitor patients but rather to find out whether patients need more information and support.

- 1.2.1 Recognise that non-adherence is common and that most patients are non-adherent sometimes. Routinely assess adherence in a non-judgemental way whenever you prescribe, dispense and review medicines.
- 1.2.2 Consider assessing non-adherence by asking the patient if they have missed any doses of medicine recently. Make it easier for them to report non-adherence by:
 - asking the question in a way that does not apportion blame
 - explaining why you are asking the question
 - mentioning a specific time period such as 'in the past week'
 - asking about medicine-taking behaviours such as reducing the dose, stopping and starting medicines.
- 1.2.3 Consider using records of prescription re-ordering, pharmacy patient medication records and return of unused medicines to identify potential non-adherence and patients needing additional support.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

A study¹³ aimed to offer an indirect measure of patient welfare based on whether patients comply with the prescription they receive. They concluded that both the theoretical and empirical results suggest that, for comparable clinical efficacy and toxicity levels, a higher adherence level is associated with higher patient welfare, thus adding valuable information to conclusions drawn by a mere biostatistical analysis. Therefore, from the perspective of the patient, the adherence-enhancing drug must be favoured.

A study¹⁴ investigated the relationship between five-factor model personality factors (Conscientiousness, Neuroticism, Agreeableness, Extraversion, and Openness) and medication non-adherence among older participants during a six-year randomised placebo-controlled trial. The authors concluded that neuroticism was associated with medication non-adherence over 6 years of follow-up in a large sample of older RCT participants. Personality measurement in clinical and research settings might help to identify and guide interventions for older adults at risk for medication non-adherence.

In terms of factors causing non-adherence, several factors were identified such as population and disease characteristics, neuroticism, and people from different culturally and linguistically diverse (CALD) backgrounds but nothing new was identified that had not already been included in the guideline with recommendations already covering these areas.

6-year surveillance summary

A review of systematic reviews¹⁵ (51 reviews) on determinants of patient adherence identified 771 individual factor items, of which most were determinants of implementation, and only 47-determinants of persistence with medication. Factors with an unambiguous effect on adherence were further grouped into 8 clusters of socio-economic-related factors, 6 of healthcare team- and system-related factors, 6 of condition-related factors, 6 of therapy-related factors, and 14 of patient-related factors. The lack of standardised definitions and use of poor measurement methods resulted in many inconsistencies.

A systematic review¹⁶ (30 studies) found limited evidence of an absence of longitudinal association between psychosocial factors and non-adherence to chronic preventive

maintenance medication. The strength of evidence for the review's findings is limited by the low quality of included studies.

A systematic review¹⁷ found that depression is associated with poor adherence to medication across a range of chronic diseases. The association was similar across disease types but was not as strong among studies that used pharmacy records compared to self-report and electronic cap measures.

A systematic review¹⁸ (60 studies) examined the association of alcohol consumption with non-adherence to medications for four chronic diseases (HIV, diabetes, hypertension and depression). Most studies reported significant effect sizes of an association of alcohol consumption with non-adherence, and indicated an association, including 6 of the 7 highest quality studies.

8-year surveillance summary

No relevant evidence was identified.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

It was considered that the identified evidence at the 2 year review, on personality, population and disease characteristic factors, was consistent with the existing guideline recommendations.

The evidence at the 6 year surveillance review related to determinants of patient adherence, the association between psychosocial factors and non-adherence to chronic preventive medication, association between depression and non-adherence, and the association between alcohol consumption and non-adherence to medication for chronic diseases.

The evidence, although weakened by the variable quality of included studies, was considered consistent with the evidence included in the full guideline of NICE CG76 in section 5.3 Barriers and facilitators for individuals in medicines taking, and section 7 Assessment of adherence.

New evidence is unlikely to impact on the guideline.

76 – 16 What is the influence of side effects on adherence?

Recommendations derived from this question

- 1.1.13 Accept that patients may have different views from healthcare professionals about the balance of risks, benefits and side effects of medicines.

Surveillance decision

No new information was identified at any surveillance review.

76 – 17 Which are the specific/practical barriers and facilitators for individuals in medicine taking

Subquestion

How can Health care professionals (HCP) identify these barriers and facilitators?
Is there a way of doing this so intervention can be targeted?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-04 and 76-15.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

Cultural and linguistic diversity

A study¹⁹ evaluated the impact of interventions to improve medication adherence in people of culturally and linguistically diverse (CALD) backgrounds through a systematic review and meta-analysis. The authors concluded that relatively little high-quality work has been conducted on adherence-enhancing interventions for people of CALD backgrounds. Greater attention needs to be given to examining the needs of specific CALD population groups. Future researchers should consider rigorously testing interventions that take into account the enormous diversity and differences that exist within any particular CALD group.

It was considered that the identified evidence was consistent with the existing guideline recommendations.

6-year surveillance summary

Older adults with cognitive impairment

A systematic review²⁰ (10 studies) examined barriers to medication adherence in cognitively impaired older adults and interventions aimed at improving medication adherence. Unique barriers to adherence included understanding new directions, living alone, scheduling medication administration into the daily routine, using potentially inappropriate medications, and uncooperative patients. One study improved adherence through telephone and televideo reminders at each dosing interval. However, the results of the review are limited by reviewing only published articles, missing barriers or interventions due to lack of subgroup analysis, and study selection and extraction completed by 1 reviewer.

Health literacy

A systematic review²¹ found that there is a small statistically significant and positive association between health literacy and medication adherence.

A systematic review²² investigated the association between health literacy and non-adherence and identified factors that may influence that relationship. Factors that contribute to non-adherence were categorised

into patient related factors, including patient beliefs; medication related factors; logistical factors; and factors around the patient-provider relationship. Only a small proportion of studies that investigated the relationship between non-adherence and health literacy, found clear evidence of a relationship. Research on possible mechanisms relating health literacy to non-adherence suggest that disease and medication knowledge are not sufficient for addressing non-adherence while self-efficacy is an important factor.

8-year surveillance summary

Health literacy

A systematic review²³ (220 studies) found that health literacy was positively associated with medication and non-medication adherence, and that health literacy interventions increased both health literacy and adherence outcomes. Health literacy interventions had a greater effect on adherence in samples of lower income and of racial-ethnic minority patients than in non-minority and higher income samples, but the statistical significance of this was not reported.

Employment status

A systematic review²⁴ (28 studies) found a significant association between antiretroviral therapy adherence and employment status among people infected with human immunodeficiency virus (HIV). The association was significant for studies from low-income countries and high-income countries but not middle-income countries.

Other barriers

A secondary analysis of an RCT²⁵ (n=341) evaluated the prevalence and predictors of postdischarge primary nonadherence (not completing new prescriptions) in patients who received discharge medication counselling by a pharmacist. Patients who were living alone were less likely to adhere compared to those who were married or cohabitating. Patients who were discharged with greater than 10 medications were also more likely to demonstrate primary nonadherence, as were patients with lower incomes.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

on barriers and facilitators for individuals in medicine taking, which highlights the varied practical and perceptual barriers that exist.

Impact statement

The new and previous surveillance evidence is consistent with the evidence included in CG76

New evidence is unlikely to impact on the guideline.

76 – 18 How can HCP tailor information to specific patient groups – cognitive capacity, cultural groups?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-01 and 76-05.

Surveillance decision

No new information was identified at any surveillance review.

76 – 19 What are the needs of carers/families in affecting adherence?

Recommendations derived from this question

1.1.18 Encourage and support patients, families and carers to keep an up-to-date list of all medicines the patient is taking. The list should include the names and dosages of prescription and non-prescription medicines and herbal and nutritional supplements. If the patient has any allergic or adverse reactions to medicines, these should be noted.

Surveillance decision

No new information was identified at any surveillance review.

76 – 20 Is medicine taking altered by the purpose of medicine (i.e. symptomatic, preventive etc.)?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-15.

Surveillance decision

No new information was identified at any surveillance review.

76 – 21 How do patients' beliefs about medicines and HCP influence adherence?

Recommendations derived from this question

Interventions to increase adherence

- 1.2.4 If a patient is not taking their medicines, discuss with them whether this is because of beliefs and concerns or problems about the medicines (intentional non-adherence) or because of practical problems (unintentional non-adherence).

See also review question 76-04.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

A systematic review²⁶ (94 studies) assessed the Necessity-Concerns Framework model of beliefs and concerns in explaining non adherence to prescribed medicines. Across studies, higher adherence was associated with stronger perceptions of necessity of treatment and fewer concerns about treatment. These relationships remained significant when data were stratified by study size, the country in which the research was conducted and the type of adherence measure used.

8-year surveillance summary

No relevant evidence was identified.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The evidence identified at the previous surveillance was considered to be consistent with CG76 recommendation 1.1.19 which advises awareness that patients' concerns about medicines, and whether they believe they need them, affect how and whether they take their prescribed medicines.

New evidence is unlikely to change guideline recommendations.

76 – 22 How can HCP elicit patients' beliefs affecting non-adherence?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-21.

Surveillance decision

No new information was identified at any surveillance review.

76 – 23 Which interventions are effective in increasing adherence? (content of interventions, how delivered and who delivers them)

Recommendations derived from this question

Interventions to increase adherence

Patients may need support to help them make the most effective use of their medicines. This support may take the form of further information and discussion, or involve practical changes to the type of medicine or the regimen. Any interventions to support adherence should be considered on a case-by-case basis and should address the concerns and needs of individual patients.

- 1.2.4 If a patient is not taking their medicines, discuss with them whether this is because of beliefs and concerns or problems about the medicines (intentional non-adherence) or because of practical problems (unintentional non-adherence).
- 1.2.5 Be aware that although adherence can be improved, no specific intervention can be recommended for all patients. Tailor any intervention to increase adherence to the specific difficulties with adherence the patient is experiencing.
- 1.2.6 Find out what form of support the patient would prefer to increase their adherence to medicines. Together, you and your patient should consider options for support.
- 1.2.7 Address any beliefs and concerns that patients have that result in reduced adherence.
- 1.2.8 Because evidence supporting interventions to increase adherence is inconclusive, only use interventions to overcome practical problems associated with non-adherence if a specific need is identified. Target the intervention to the need. Interventions might include:
 - suggesting that patients record their medicine-taking
 - encouraging patients to monitor their condition
 - simplifying the dosing regimen
 - using alternative packaging for the medicine
 - using a multi-compartment medicines system.
- 1.2.9 Side effects can be a problem for some patients. If this is the case you should:
 - discuss how the patient would like to deal with side effects
 - discuss the benefits, side effects and long-term effects with the patient to allow them to make an informed choice
 - consider adjusting the dosage
 - consider switching to another medicine with a different risk of side effects
 - consider what other strategies might be used (for example, timing of medicines).
- 1.2.10 Ask patients if prescriptions charges are a problem for them. If they are, consider possible options to reduce costs.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

Cultural and linguistic specific interventions

A study¹⁹ evaluated the impact of interventions to improve medication adherence in people of culturally and linguistically diverse (CALD)

Surveillance proposal consultation document September 2016 – Medicines adherence. (2009) NICE guideline CG76

backgrounds through a systematic review and meta-analysis. The authors concluded that relatively little high-quality work has been conducted on adherence-enhancing interventions for people of CALD backgrounds.

Greater attention needs to be given to examining the needs of specific CALD population groups. An additional conclusion was that future researchers should consider rigorously testing interventions that take into account the enormous diversity and differences that exist within any particular CALD group.

Interventions for older adults

A study²⁷ explored the range and nature of medication adherence interventions tested with older adults. They concluded that gaps were noted in addressing memory aids and self-monitoring strategies; further development of interventions addressing medication and administration factors influencing adherence are also needed. Identified interventions are geared toward self-medicating patients and fail to address caregivers administering medications. Finally, interventions do little to address variations in patterns of adherence among older adults.

General interventions for adherence

A review²⁸ summarised the results of randomised controlled trials of interventions to help patients follow prescriptions for medications for medical problems, including mental disorders but not addictions. The authors concluded that for short-term treatments several quite simple interventions increased adherence and improved patient outcomes, but the effects were inconsistent from study to study with less than half of studies showing benefits. Current methods of improving adherence for chronic health problems are mostly complex and not very effective, so that the full benefits of treatment cannot be realised. No new intervention was identified to reduce non-adherence from the studies identified.

A study²⁹ looked at the existing reviews of adherence to interventions and identified the underlying theories for effective interventions. They concluded that there is a scarcity of comparative studies explicitly contrasting theoretical models or their components. The relative weight of these theories and the effective components in the interventions designed to improve adherence, were recommended for assessment in future studies.

6-year surveillance summary

Internet based interventions

A systematic review³⁰ (13 studies) investigated whether tailored internet interventions are

effective in improving medication adherence. Data synthesis revealed that there is evidence for the effectiveness of internet interventions in improving medication adherence: 5 studies (3 high-quality studies and 2 low-quality studies) showed a significant effect on adherence; 6 other studies (4 high-quality studies and 2 low-quality studies) reported a moderate effect on adherence; and 2 studies (1 high-quality study and 1 low-quality study) showed no effect on patients' adherence. However, most studies used self-reported measurements to assess adherence, which is generally perceived as a low-quality measurement. There was also large variation in the measured interval between baseline and follow-up measurements, which weakens the impact of the findings.

Social support

A systematic review³¹ (50 studies) evaluated the association between social support and medication adherence. A greater degree of practical support was most consistently associated with greater adherence to medication; evidence for structural or emotional support was weaker. However, most studies were limited in size and design, which precluded pooling of results and weakened the impact of the evidence.

A systematic review³² (79 studies) identified and compared the efficacy of strategies to improve implementation of prescribed drug dosing regimens and maintain long-term persistence. The evidence indicated that feedback to the patients of their recent dosing history and cognitive-educational interventions are potentially effective approaches to enhance patient adherence to medications. The statistical heterogeneity among the studies identified, and potential publication bias may limit the strength of the findings.

A systematic review³³ (26 studies) investigated cognitive-based behaviour change techniques as interventions to improve medication adherence. Cognitive-based behaviour change techniques were found to be effective. The most commonly used intervention was motivational interviewing, but other studies used techniques such as aiming to increase the patient's confidence and sense of self-efficacy, encouraging support-seeking behaviours and challenging negative thoughts. Interventions were most commonly delivered from community-based settings by routine healthcare providers such as general practitioners and nurses. Subgroup analyses

suggested that these interventions are amenable to use across different populations and in differing manners without loss of efficacy.

A systematic review³⁴ of cost effectiveness of medication adherence-enhancing interventions found that 4 of 14 included studies showed incremental cost-effectiveness ratios (ICERs) below the willingness-to-pay threshold. Few studies seemed to evaluate interventions that successfully changed adherence, indicating that proven-effective adherence programmes should be subjected to comprehensive economic evaluations.

A systematic review³⁵ (62 studies) assessed the effectiveness of patient, provider, and systems interventions or policy interventions in improving medication adherence for various chronic health conditions. The most consistent evidence of improvement in medication adherence was found for interventions that reduced out-of-pocket expenses or improved prescription drug coverage, case management, and educational interventions across clinical conditions.

A systematic review³⁶ (14 studies) found limited evidence for impact of approaches to optimise the continuity of care in medication management upon hospital admission. The evidence was weakened due to most studies having important methodological limitations and being underpowered to show significant benefits on clinical outcomes.

Nurse-led interventions

A systematic review³⁷ (10 studies) found that nurse-led interventions enhanced adherence to chronic medication. Counselling, given face-to-face, in groups or via electronic messages, was the intervention most frequently assessed as effective.

A systematic review³⁸ (13 studies) found that devices with dose-memory and combined dose-memory and dose-reminder functions were found to improve self-reported and electronically monitored treatment adherence in chronic conditions. The ability of the devices to provide dose-history information and active medication reminders was considered valuable in disease management by patients, caregivers, and HCPs. The devices were found to enhance patients' confidence in, and motivation to manage their medication and condition, and help reduce forgotten or incorrect medication dosing.

An updated systematic review³⁹ (182 studies, 109 new) of interventions for enhancing medication adherence found that effects were inconsistent from study to study, and only a minority of lowest risk of bias RCTs improved both adherence and clinical outcomes. The RCTs at lowest risk of bias generally involved complex interventions with multiple components, trying to overcome barriers to adherence by means of tailored ongoing support from allied health professionals such as pharmacists, who often delivered intense education, counselling (including motivational interviewing or cognitive behavioural therapy by professionals) or daily treatment support (or both), and sometimes additional support from family or peers.

An updated systematic review of systematic reviews⁴⁰ (75 reviews) of interventions to improve safe and effective medicines use by consumers was identified. For most outcomes, medicines self-monitoring and self-management programmes were found to be effective in improving medicines use, adherence, adverse events and clinical outcomes. However, some participants were unable to complete these interventions, suggesting they may not be suitable for everyone. Other interventions to improve adherence were simplified dosing regimens, interventions involving pharmacists in medicines management, such as medicines reviews and pharmaceutical care services. The limitations of the available literature due to the lack of evidence for important outcomes and important populations, such as people with multimorbidity, should also be considered in practice and policy decisions.

Prescribing and polypharmacy for older people

A systematic review⁴¹ (8 studies) found no effect of interventions to optimise prescribing for older people living in care homes on any of the primary outcomes of the review (adverse drug events, hospital admissions and mortality). There was some evidence that the interventions led to the identification and resolution of medication-related problems. There was evidence from two studies that medication appropriateness was improved. The evidence for an effect on medicine costs was equivocal.

An updated systematic review⁴² (12 studies, 2 new) found conflicting evidence on whether interventions to improve appropriate polypharmacy for older people, such as

pharmaceutical care, resulted in clinically significant improvement. However, the findings indicated benefit in terms of reducing inappropriate prescribing.

8-year surveillance summary

Electronic monitoring and dispensing

An RCT⁴³ (n=80) examined the effect of using an electronic monitoring drug dispensing device (EMD) to improve adherence and compliance. The EMD was found to increase compliance, defined as the degree to which patients follow medical advice and take their medications. However, this was not measured for the control group and therefore no statistical significance was reported. Adherence was not reported as an outcome, but patients were monitored for 1 year regarding outpatient follow-up visits, emergency hospitalisations, renal biopsies, rejection episodes, renal function, and blood concentration of medications. The number of missed doses varied significantly by weekday. Non-significant differences were found for the other outcomes.

Health education

An RCT⁴⁴ (n=682) examined a health education intervention for improving drug adherence in patients with overactive bladder (OAB). The intervention consisted of four education sections: understanding OAB disease, dietary control, bladder training and understanding anticholinergics. The intervention was not effective in increasing drug persistence in OAB patients on anticholinergics, defined as a gap of less than 30 days between successive prescription pills.

An RCT⁴⁵ (n=100) found that medication-specific education, comprising watching a video and receiving written information about the medication prescribed, did increase knowledge of the prescribed therapy but did not improve adherence or treatment outcome.

An RCT⁴⁶ (n=80) found that a patient information leaflet (apart from oral counselling), and instructions that were reinforced by a telephone call within 15 days of treatment onset led to significantly better adherence to treatment. This effect was only observed in the first month of treatment.

Shared decision making

A systematic review⁴⁷ (11 studies) found that for people with psychosis the implementation of shared treatment decision-making had small beneficial effects on indices of treatment-

related empowerment. However, the sample sizes of included studies were not reported in the abstract.

An RCT⁴⁸ (n=334) evaluated the efficacy of two different methods aimed at improving adherence and persistence through greater patient involvement, for patients with osteoporosis. The methods involved reminders and follow up educational meetings. There were no significant differences regarding medicines adherence from the additional interventions.

Social support

An RCT⁴⁹ (n=216) found that joining an online social support community did not improve adherence to preventer medication for asthma patients.

Two RCTs⁵⁰ (n=201 and n = 200) found that interventions based on social forces did not improve medication adherence versus control over a 3-month period for cardiovascular disease management among adults with diabetes. The different interventions involved weekly messages in which that participant's statin adherence was compared to that of other participants, weekly summaries of that participant's statin adherence, and a partner person to receive reports about that participant's adherence at various frequencies.

Directly observed therapy (DOT)

A systematic review⁵¹ (11 trials n=5662) investigated DOT to improve adherence by requiring health workers, community volunteers or family members to observe and record tuberculosis patients taking each dose. Results showed that DOT did not provide improve adherence in tuberculosis treatment.

Mobile telephone technology

An RCT⁵² (n=174) found that an interactive smartphone application patient support tool significantly improved patient-registered drug adherence among patients with myocardial infarction.

General interventions for adherence

An RCT⁵³ (n=66) found that eight individual interventional sessions accompanying routine treatment resulted in a significant improvement in medicines adherence in haemodialysis patients. The content of the sessions was not reported in the abstract, however.

A systematic review⁵⁴ (8 studies n=3336) found evidence that adherence interventions led to

modest improvements in adherence to smoking cessation medication through providing information and facilitating problem-solving, though the evidence for this was not strong and was limited in both quality and quantity.

A systematic review⁵⁵, (141 n=23,318) found significant improvements in patient-centred outcomes after medication adherence interventions. Of specific symptoms analysed (depression, anxiety, pain, energy/vitality, cardiovascular, and respiratory), only anxiety failed to show a significant improvement after medication adherence interventions. None of the interventions were described in the abstract, however.

A systematic review⁵⁶ (218 reports n=151,182 subjects) found that interventions targeted to healthcare providers significantly improved patient medication adherence. Interventions were more effective when they included multiple strategies. Specific interventions were not reported in the abstract, however.

A systematic review⁵⁷ (53 reports n=8243) found that interventions targeting individuals with medication adherence problems had modest but significant effects on medication-taking behaviour. The findings supported the use of behavioural strategies such as prompts and linking medications to habits to increase medication adherence in adults with adherence challenges. Face-to-face interventions were found to be of benefit for patients who have experienced past problems with medication adherence.

A systematic review⁵⁸ (16 studies n=10,706 patients) found that interventions to improve adherence to multiple cardiovascular medications in a coronary heart disease population significantly improved the odds of being adherent. There were no significant differences based on intervention type (complex vs simple), components categories and adherence method.

An economic evaluation⁵⁹ of strategies for improving adherence to antiepileptic drugs found support, based on the findings of a systematic review, for the cost effectiveness of a self-directed, implementation intention intervention for improving adherence. However, the authors emphasised that there is considerable uncertainty surrounding the clinical effectiveness of the intervention and recommended a substantive trial for a more definitive conclusion.

A systematic review⁶⁰ (18 studies) found that interventions improved medication adherence in bipolar disorder. However, limitations in intervention and study design and reporting prevented assessment of which elements of adherence support are most effective.

Pharmacist led interventions

An RCT⁶¹ (n = 532) investigated the effectiveness of a multifaceted pharmacist intervention in a hospital setting to improve medication adherence in hypertensive patients. Motivational interviewing was a key element of the intervention. The results showed a sustained improvement in medication adherence, but not in clinical outcomes.

An RCT⁶² (n=150) found that a home based, pharmacist-led patient education intervention resulted in a significant increase in the participants' levels of knowledge about type 2 diabetes mellitus and medication adherence in the home-based intervention group. Significantly lower glycated haemoglobin levels were also observed among the home-based intervention group following the intervention.

Nursing interventions

A secondary analysis of an RCT⁶³ (n=203) found that an emergency department-based nursing intervention did not result in any improvement in medication adherence 30 days after emergency room discharge. The intervention included one nurse patient encounter before discharge and two phone calls in the 10 days after discharge.

Caregiver interventions

An RCT⁶⁴ (n=369) found that automated feedback to caregivers of chronic heart failure patients significantly improved caregiving strain and depression, and also increased most caregivers engagement in self-care.

Topic expert feedback

Topic expert feedback at the previous surveillance review points indicated new developments in the following areas:

- There has been a growth in wireless technology to help monitor adherence and prompt medication taking. Several systems are currently available.
- There has been research in several areas regarding financial incentives for patients to take medication or comply with medication monitoring.

- Medicines optimisation since the development of guideline featured prominently and must be considered in the light of the key pharmacological and other interventions.

No evidence was cited for these areas.

A systematic review⁶⁵ (4 studies) was cited on the effectiveness of adherence therapy (including cognitive behavioural therapy, psycho-education, and motivational interviewing) on the medication adherence of patients with schizophrenia. The findings showed that adherence therapy did not appear to improve patients' medication adherence in comparison to treatment as usual or a control intervention. However, all the studies reviewed showed high-adherence ratings at baseline and further studies are needed to fully assess its effectiveness.

There was conflicting topic expert feedback relating to interventions at the current 8-year surveillance review. Some feedback indicated that small studies of various interventions were insufficient to impact on the guideline. Other feedback indicated that sufficient relevant studies have been published since the guideline to justify an update. Additional topic expert feedback indicated that emergent new technology approaches are likely to have different cost benefit profiles to traditional approaches, so that this area is probably worthwhile reviewing. However, no studies were cited.

Impact statement

CG76 recommendation 1.2.5 states that no specific intervention can be recommended for all patients. Recommendation 1.2.8 states that because evidence supporting interventions to increase adherence is inconclusive, interventions should only be used to overcome practical problems associated with non-adherence if a specific need is identified. Interventions should be targeted to the need.

The new and previous evidence identified through the surveillance is also inconclusive and therefore consistent with this recommendation. Interventions which could

potentially impact on CG76 with future high quality evidence are:

- caregiver interventions
- case management
- electronic monitoring drug dispensing device
- financial incentives
- practical social support
- improved prescription drug coverage
- educational and cognitive behaviour interventions
- devices with dose-memory and combined dose-memory and dose-reminder functions
- nurse-led and pharmacist-led interventions
- complex interventions with multiple components
- medicines self-monitoring and self-management programs
- shared decision making
- tailored Internet interventions
- wireless technology, including smartphone applications

The new evidence on directly observed therapy does not support its use in increasing adherence.

The evidence at the 6 year review on optimising prescribing and polypharmacy for older people was considered to be inconclusive and the research recommendation remains ongoing.

The new evidence is also relevant to [Medicines optimisation NICE guideline NG5](#) which includes a more detailed section on medicines review with specific reference to polypharmacy and older people (recommendation 1.4.1).

The areas highlighted by clinical feedback will continue to be monitored for new evidence at the next surveillance review point.

New evidence is unlikely to impact on the guideline.

76 – 24 Does change in dosing regime affect adherence?

Recommendations derived from this question

See 76-23 recommendation 1.2.8

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

A systematic review⁶⁶ (51 studies) on the effect of scheduled dosing frequency on medication adherence in patients with chronic diseases found that patients were more adherent with once-daily compared with more frequently scheduled medication regimens. The use of more stringent definitions of adherence magnified these findings.

A systematic review⁶⁷ (43 studies) assessed the impact of reduced frequency of oral therapies from multiple-dosing schedules to a once-daily (OD) dosing schedule on adherence, compliance, persistence, and associated economic impact. The overall results indicated that OD schedules were associated with higher adherence rates. From a health economic perspective, higher adherence rates with OD relative to multiple dosing in a number of conditions were consistently associated with corresponding lower costs of health care resource utilisation.

8-year surveillance summary

A systematic review⁶⁸ (7 studies) found that once weekly dosing was associated with better adherence levels and greater odds of being adherent compared with OD dosing in patients with osteoporosis.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The evidence identified at the current and previous surveillance reviews is consistent with CG76 recommendation 1.2.8 which states that simplifying the dosing regimen is one possible intervention to overcome practical problems associated with non-adherence if a specific need is identified.

New evidence is unlikely to impact on the guideline.

76 – 25 Do prescription costs/charges affect adherence/how do patients handle cost issues?

Recommendations derived from this question

1.2.10 Ask patients if prescriptions charges are a problem for them. If they are, consider possible options to reduce costs.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

A systematic review⁶⁹ (160 studies) assessed the relationship between patient cost sharing, medication adherence and outcomes. Of the articles that evaluated the relationship between changes in cost sharing and adherence, 85% showed that an increasing patient share of medication costs was significantly associated with a decrease in adherence. For articles that investigated the relationship between adherence and outcomes, the majority noted that increased adherence was associated with a statistically significant improvement in outcomes.

A systematic review and meta-analysis⁷⁰ (7 studies, n=199,996) found a significantly increased risk of non-adherence, measured by

objective measures, to medicines in publicly insured populations where co-payments for medicines are necessary.

8-year surveillance summary

No relevant evidence was identified.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The evidence identified at the 6 year review was considered to be consistent with CG76 recommendation 1.2.10 which advises asking patients if prescriptions charges are a problem for them and, if they are, to consider possible options to reduce costs.

New evidence is unlikely to impact on the guideline.

76 – 26 Does drug formulation/packaging affect adherence?

Recommendations derived from this question

1.2.8 Because evidence supporting interventions to increase adherence is inconclusive, only use interventions to overcome practical problems associated with non-adherence if a specific need is identified. Target the intervention to the need. Interventions might include:

- suggesting that patients record their medicine-taking
- encouraging patients to monitor their condition
- simplifying the dosing regimen
- using alternative packaging for the medicine
- using a multi-compartment medicines system.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

A systematic review⁷¹ (37 studies) investigated whether electronic medication packaging (EMP) devices are associated with improved adherence. Devices integrated into the care delivery system and designed to record dosing events were found to be most frequently associated with improved adherence, but

overall the evidence was inconclusive. From the included studies, 5 common EMP characteristics were identified: recorded dosing events and stored records of adherence, audiovisual reminders to cue dosing, digital displays, real-time monitoring, and feedback on adherence performance.

8-year surveillance summary

No relevant evidence was identified.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The evidence identified at the 6-year surveillance review was considered to be consistent with CG76 recommendation 1.2.8 which states that using alternative packaging for the medicine is one possible intervention to

overcome practical problems associated with non-adherence if a specific need is identified.

Further robust research is required on electronic medicine packaging devices before this specific category of packaging can be incorporated into CG76.

New evidence is unlikely to impact on the guideline.

76 – 27 Is there any evidence on interventions that aim to minimise side-effects in order to increase adherence?

Recommendations derived from this question

1.2.9 Side effects can be a problem for some patients. If this is the case you should:

- discuss how the patient would like to deal with side effects
- discuss the benefits, side effects and long-term effects with the patient to allow them to make an informed choice
- consider adjusting the dosage
- consider switching to another medicine with a different risk of side effects
- consider what other strategies might be used (for example, timing of medicines).

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

No relevant evidence was identified.

8-year surveillance summary

A systematic review⁷² (14 studies, n=31688) found that interventions involving behaviour change techniques were not effective in improving adherence to oral antidiabetic drugs, except for those helping patients to cope with side effects, which showed a significant effect. Techniques to cope with side effects involved:

- provision of information to patients about the side effects
- solutions for them such as alternative medications

- enabling the patient to contact his or her physician or pharmacist at short notice between visits in case of side effects.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The new evidence indicating that behavioural change techniques may help patients to cope with side effects is consistent with recommendation 1.2.9 to consider what other strategies might be used to address side effects.

New evidence is unlikely to impact on the guideline.

76 – 28 How does the way and amount of the information that is presented (e.g. pictorial vs. written form) affect adherence?

Recommendations derived from this question

- 1.1.3 Establish the most effective way of communicating with each patient and, if necessary, consider ways of making information accessible and understandable (for example, using pictures, symbols, large print, different languages, an interpreter or a patient advocate).

See also review question 76-05.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

A systematic review⁷³ (8 studies) examined the impact on decisions to start or continue medicines after providing information to patients about possible benefits or harms.

There was no significant impact of interventions on decisions about whether to start or continue medicines, although among those who received more information, knowledge was increased and decisional conflict was reduced.

8-year surveillance summary

No relevant evidence was identified.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The evidence identified at the previous surveillance review was considered to be consistent with CG76 recommendation 1.1.29 on providing information, which states that patients differ in the type and amount of information they need and want. Therefore the provision of information should be individualised.

New evidence is unlikely to impact on the guideline.

76 – 29 Do rewards affect adherence/what are they?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-23.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

A meta-analysis⁷⁴ (15 studies) of financial reinforcers for improving medication adherence

found that reinforcement interventions significantly improved adherence relative to control conditions. Interventions that were longer in duration, provided an average reinforcement of \$50 or more per week, and conducting reinforcement interventions at least

weekly resulted in larger effect sizes than those that were shorter, provided lower reinforcers, and reinforced patients less frequently.

8-year surveillance summary

An economic evaluation and cluster RCT⁷⁵ (n=138) found that offering a modest financial incentive to people with psychosis was cost-effective in promoting adherence to depot antipsychotic medication. Direct healthcare costs (including costs of the financial incentive) were unlikely to be increased by this intervention.

A secondary analysis⁷⁶ was conducted of an RCT which found improved adherence to anti-psychotic maintenance medication where patients were offered financial incentives. The secondary analysis found that improved adherence was associated with a more favourable quality of life. The sample size of the RCT was not reported in the abstract.

A pilot RCT⁷⁷ (n=29) found that reinforcing medication adherence via mobile phone technology and financial reinforcement resulted in significant improvement in medicine adherence. The intervention involved providing a mobile phone to self-record videos of adherence, for which patients earned rewards.

Topic expert feedback

Topic expert feedback indicated that there has been research in several areas regarding financial incentives for patients to take medication or comply with medication monitoring. However, no studies were cited.

Impact statement

CG76 does not make specific recommendations for or against financial incentives, but the evidence identified at the previous surveillance review on frequent, longer term financial reinforcers was considered to be consistent with the evidence included in CG76 section 8 on interventions to increase adherence. It was also limited in applicability to a UK context and therefore unlikely to impact.

The new evidence suggests that financial incentives may be clinically and cost effective in improving adherence, specifically to antipsychotics. However, the evidence is limited by small sample sizes and further research may be needed to establish a definite impact on the guideline recommendations.

New evidence is unlikely to impact on the guideline.

76 – 30 Do specific forms of therapy (e.g. CBT) affect adherence?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-23.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

No relevant evidence was identified.

8-year surveillance summary

Motivational interviewing (MI)

A systematic review⁷⁸ and 5 RCTs^{61,79-81} examined the effectiveness of motivational interviewing in improving medication adherence.

The systematic review (6 studies) assessed MI combined with cognitive behaviour therapies. It

found significant improvement in medication adherence following the combined interventions.

Three RCTs^{79, 80, 81} (n=386, n=114, n=154) all found MI improved medication adherence and covered various conditions, including secondary stroke prevention, schizophrenia spectrum disorders and older people with chronic diseases. Another RCT⁸² found that health coaching was effective in improving medication adherence in diabetes, hypertension, and/or hyperlipidaemia. However, health coaching was not defined in the abstract, and the sample size was not reported.

A Systematic review⁷² (14 studies) found that interventions involving behaviour change techniques were not effective in improving adherence to oral antidiabetic drugs, except for those helping patients to cope with side effects, which showed a significant effect.

Pharmacist-led interventions

An RCT⁸³ (n=400) found that pharmacist-led patient education improved knowledge, attitude, and practices among patients with diabetes mellitus. The intervention was most effective when patients were counselled both verbally and by distribution of a patient education leaflets at baseline and at monthly follow ups.

An RCT⁶¹ (n = 532) investigated the effectiveness of a multifaceted pharmacist intervention in a hospital setting to improve medication adherence in hypertensive patients. MI was a key element of the intervention. The results showed a sustained improvement in medication adherence.

Consultation liaison

A systematic review⁸⁴ (12 trials n= 2605) found that consultation liaison improved mental health for up to three months; and satisfaction and adherence for up to 12 months in people with mental disorders, particularly those who were depressed. Primary care providers were also more likely to provide adequate treatment and

prescribe pharmacological therapy for up to 12 months. However, overall trial quality was low and further research was recommended to verify the findings.

An RCT⁸⁵ (n=111) found that a behavioural and educational strategy addressing the patient's perceptions and knowledge about the anti-rejection drugs significantly improved the short-term adherence to immunosuppressive therapy in kidney transplant recipients.

Compliance therapy

A systematic review⁸⁶ found that 2 of 3 included RCTs showed a significant effect of compliance therapy in improving drug attitude in schizophrenia. However, the evidence was considered weak as the outcome was from three small and heterogeneous studies.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The new evidence on motivational interviewing indicates that that this intervention may be effective in increasing adherence. However, further research may be required to establish a definite impact on the guideline, due to the systematic review evidence comprising combined treatment with cognitive behaviour therapies. This means it is not possible to assess the constituent interventions in isolation, a difficulty noted by the guideline committee in the original guideline.

The new evidence on the following interventions is also inconclusive and therefore consistent with NICE guideline CG76 recommendation 1.2.8, which does not recommend any specific intervention:

- multifaceted pharmacist led interventions
- consultation liaison
- compliance therapy

New evidence is unlikely to impact on the guideline.

76 – 31 Is care planning important in affecting adherence? Do patient plans affect adherence?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-23.

Surveillance decision

No new information was identified at any surveillance review.

76 – 32 Would a contractual agreement between HCP and patient affect adherence?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-23

Surveillance decision

No new information was identified at any surveillance review.

76 – 33 Do reminders (and what types of reminders, text messaging etc.) help increase adherence? Are these more important before or after a review?

Recommendations derived from this question

1.2.8 Because evidence supporting interventions to increase adherence is inconclusive, only use interventions to overcome practical problems associated with non-adherence if a specific need is identified. Target the intervention to the need. Interventions might include:

- suggesting that patients record their medicine-taking
- encouraging patients to monitor their condition
- simplifying the dosing regimen
- using alternative packaging for the medicine
- using a multi-compartment medicines system.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

An updated systematic review⁸⁷ (12 studies, 4 new) of reminder packaging for improved adherence to self-administered long-term

medications found that reminder packaging increased the proportion of people taking their medications when measured by pill count; however, this effect was not large. Findings suggested that reminder packing for certain individuals could offer a simple method for improving the adherence to medications; further research is needed to improve the design and targeting of these devices before they could be considered for inclusion in CG76.

A systematic review⁸⁸ (4 studies) assessed the effects of mobile phone messaging applications designed to facilitate self-management of long-term illnesses, in terms of impact on health outcomes and patients' capacity to self-manage their condition. The results showed very limited evidence that in certain cases mobile phone messaging interventions may provide benefit in supporting the self-management of long-term illnesses. However, significant information gaps were identified regarding the long-term effects, acceptability, costs, and risks of such interventions.

A systematic review⁸⁹ (13 studies) of the effectiveness of interventions using electronic reminders found short term improved adherence to chronic medication in all but one study using SMS reminders, four studies using electronic reminder devices and one pager intervention. In addition, one high quality study using electronic reminder devices found subgroup effects, although the subgroups concerned were not stated.

A systematic review⁹⁰ (30 studies) found that drug reminder packaging had a significant effect on at least one adherence parameter in 17 studies (57%). The methodological quality was strong in five studies. Overall, the studies showed a positive effect of drug reminder packaging on adherence and clinical outcomes. However, poor reporting and important gaps like missing humanistic and economic outcomes and neglected safety issues limit the strength of the results.

A systematic review⁹¹ (13 studies, n=3276) found that SMS and telephone reminders could both significantly improve the follow up rate among patients with chronic diseases. Telephone reminders were more effective but had a higher risk of bias than SMS.

8-year surveillance summary

Telephone follow up

An RCT⁹² n=164 found that regular telephone follow-up improved adherence to oral drug

treatment for osteoporosis patients, especially those receiving care in a dedicated healthcare setting.

Combined reminder and educational interventions

An RCT⁹³ (n=852) examined an automated system of personalised, educational reminders sent to post-ST-elevation myocardial infarction patients and their GPs, urging long-term use of secondary-prevention medications.

Interventions were mailed at 1, 2, 5, 8, and 11 months after discharge. Medication adherence was statistically significantly better in the intervention group. However, the primary outcome of proportion of participants taking all 4-cardiovascular medication classes at 12 months, was non-significant.

An RCT⁴⁸ (n=334) evaluated the efficacy of two different methods aimed at improving adherence and persistence through greater patient involvement, for patients with osteoporosis. The methods involved reminders and follow up educational meetings. There were no significant differences regarding medicines adherence from the additional interventions.

Text Message reminders

In total, 3 systematic reviews^{94-95,97} and 4 RCTs^{96,98-100} examined the effects of text message reminders to improve medication adherence. One systematic review⁹⁴ (11 studies) found that combined text messaging and monitoring did not significantly improve medication adherence in people with type 2 diabetes. Another systematic review⁹⁷ (107 studies) found inconclusive evidence for the effectiveness of a range of mobile health technology interventions, of which text messaging was the most common, for medication adherence in chronic diseases. The third review⁹⁵ (16 studies n=2742) included a meta-analysis showing significant improvement in medication adherence for people with chronic diseases. All 3 systematic reviews recommended further research to establish more definitive evidence.

Two RCTs^{98, 99} (n=76, n=230) found that text messaging did not significantly improve medication adherence for patients with HIV and alcohol use disorders respectively. Another RCT⁹⁶ (n=105) of HIV- positive young adults aged 16-29 found a significant improvement in medication adherence. A cross sectional survey¹⁰⁰ included in an RCT found that

feedback of patients taking antipsychotic medication on SMS services was generally positive. Overall, people were quite satisfied despite considerable variation in their sociodemographic background and illness history.

Topic expert feedback

Topic expert feedback highlighted an evaluation study¹⁰¹ (n=200) that was undertaken of a passport-sized booklet intervention, 'My Medication Passport' designed by patients for patients to record details about their medicines. The Passport was launched in secondary care with the initial users being older people discharged home. The uptake subsequently spread to other (community) locations and other age groups. Of the participants recruited, 63% completed the structured telephone questionnaire and the intervention was positively evaluated; it provided an insight into how it is used by patients, what they are recording and how it can be an aid to dialogue about medicines with family, carers and healthcare professionals. Further development and spread is underway including an application for smartphones that will be subject to wider evaluation to include feedback from clinicians.

An RCT¹⁰² (n=303) of text messaging to patients taking blood pressure and/or lipid-

lowering medications to improve adherence was also highlighted. Texts were sent daily for 2 weeks, alternate days for 2 weeks and weekly thereafter for 22 weeks (6 months overall), using an automated computer programme. The results showed a significant improvement in treatment adherence.

Impact statement

The evidence identified at the 6 year review was considered to be inconclusive and therefore unlikely to impact on CG76 recommendation 1.2.8.

Further high quality research may be required on the 'my medication passport' intervention before it can be considered for inclusion in CG76 as a possible intervention.

The new evidence on the following interventions is also inconclusive and therefore consistent with recommendation 1.2.8:

- telephone follow up
- combined reminder and educational interventions
- text message reminders

New evidence is unlikely to impact on the guideline.

76 – 34 Does changing the name of medicines affect the way people take medicines?

Recommendations derived from this question

1.2.8 Because evidence supporting interventions to increase adherence is inconclusive, only use interventions to overcome practical problems associated with non-adherence if a specific need is identified. Target the intervention to the need. Interventions might include:

- suggesting that patients record their medicine-taking
- encouraging patients to monitor their condition
- simplifying the dosing regimen
- using alternative packaging for the medicine
- using a multi-compartment medicines system.

Surveillance decision

No new information was identified at any surveillance review.

76 – 35 Does being involved in self-monitoring (e.g. of own blood pressure) help adherence? Does case-management affect adherence (i.e. by one specific person)?

Recommendations derived from this question

1.2.8 Because evidence supporting interventions to increase adherence is inconclusive, only use interventions to overcome practical problems associated with non-adherence if a specific need is identified. Target the intervention to the need. Interventions might include:

- suggesting that patients record their medicine-taking
- encouraging patients to monitor their condition
- simplifying the dosing regimen
- using alternative packaging for the medicine
- using a multi-compartment medicines system.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

No relevant evidence was identified.

8-year surveillance summary

A systematic review¹⁰³ (28 studies, n=7021) found that self-monitoring of blood pressure (SMBP) resulted in a small but significant overall improvement in medication adherence in patients with hypertension. However, evidence for the effect of SMBP on lifestyle change and medication persistence was limited and not considered to be clinically significant.

A further RCT¹⁰⁴ (n=95) of patients with hypertension found that a wireless self-monitoring program did not significantly improve medication adherence, but did improve health behaviours and blood pressure control.

An RCT¹⁰⁵ (n=86) found that a nurse-delivered, self-care intervention improved medication adherence in patients with advanced heart failure. Further research was recommended to assess whether the intervention could improve clinical outcomes.

An RCT¹⁰⁶ (n=98) found that a diabetes remote monitoring and management system did not result in statistically significant changes from baseline to 6 months for self-reported

medication adherence or for most quality of life scores.

A post hoc analysis of an RCT¹⁰⁷ (n=18) found that improved blood pressure control was maintained 12 months after completion of a 3-month randomised controlled trial of a mobile health self-management pilot program to improve blood pressure and medication adherence in kidney transplant recipients.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The new evidence on self-monitoring of blood pressure suggests that it may be effective in improving medicines adherence among people with hypertension and in kidney transplant recipients. This is consistent with recommendation 1.2.8 to target the intervention to the need and to encourage patients to monitor their condition. The new evidence on nurse-delivered self-care interventions and wireless self-monitoring is insufficient to impact on the guideline, due to small sample sizes in the studies.

New evidence is unlikely to impact on the guideline.

76 – 36 Does effect of intervention differ according to which HCP delivers the intervention?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-23.

Surveillance decision

No new information was identified at any surveillance review.

76 – 37 What elements of the clinician-patient relationship influence adherence?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-01 and 76-03

Surveillance decision

No new information was identified at any surveillance review.

76 – 38 What is the role of the pharmacist or HCP in overcoming barriers to adherence?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-23.

See also review question 76-01.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

No relevant evidence was identified.

8-year surveillance summary

An RCT¹⁰⁸ (n=539) found that a physician-pharmacist collaborative management model increased medication intensification but did not result in any significant change in medication adherence.

An RCT⁶¹ (n = 532) investigated the effectiveness of a multifaceted pharmacist intervention in a hospital setting to improve medication adherence in hypertensive patients. Motivational interviewing was a key element of the intervention. The results showed a sustained improvement in medication adherence.

An RCT¹⁰⁹ (n=677) found that a telephone intervention, led by a pharmacist and tailored to the individuals' needs, significantly improved

medication adherence in patients with long-term conditions, using a mail-order pharmacy. The intervention comprised two tailored telephone consultations with a pharmacist, 4-6 weeks apart, plus a written summary of the discussion and a medicines reminder chart.

Further research was recommended to establish improvement in clinical outcomes.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The new evidence on pharmacist led interventions suggests that it may be effective in improving medicines adherence among patients with hypertension and long term conditions. This is consistent with recommendation 1.2.8 to target the intervention to the need. Further research may be needed on pharmacist-led interventions to establish more definitive evidence.

New evidence is unlikely to impact on the guideline.

76 – 39 What would impact adherence after the prescription is issued?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-23.

Surveillance decision

No new information was identified at any surveillance review.

Reviewing medicines

76 – 40 What is medication review?

Recommendations derived from this question

Reviewing medicines

Patients may use medicines long term. The initial decision to prescribe medicines, the patient's experience of using the medicines and the patient's needs for adherence support should be reviewed regularly. The patient's own list of medicines may be a useful aid in a medicines review.

- 1.3.1 Review patient knowledge, understanding and concerns about medicines, and a patient's view of their need for medicine at intervals agreed with the patient, because these may change over time. Offer repeat information and review to patients, especially when treating long-term conditions with multiple medicines.
- 1.3.2 Review at regular intervals the decision to prescribe medicines, according to patient choice and need.
- 1.3.3 Enquire about adherence when reviewing medicines. If non-adherence is identified, clarify possible causes and agree any action with the patient. Any plan should include a date for a follow-up review.
- 1.3.4 Be aware that patients sometimes evaluate prescribed medicines using their own criteria such as their understanding of their condition or the symptoms most troubling to them. They

may, for example, stop and start the medicine or alter the dose and check how this affects their symptoms. Ask the patient whether they have done this.

Surveillance decision

No new information was identified at any surveillance review.

76 – 41 What should be the content of medication reviews?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-40.

Surveillance decision

No new information was identified at any surveillance review.

76 – 42 When/how often and by whom should medication reviews be done?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-41

Surveillance decision

This review question should not be updated.

2-year surveillance summary

No relevant evidence was identified.

6-year surveillance summary

A systematic review¹¹⁰ (53 studies) examined the impact of fee-for-service pharmacist-led medication review on patient outcomes and quantified this according to the type of review undertaken, e.g. adherence support and clinical medication review. The majority of the studies (57.9%) showed improvement in medication adherence. Subgroup analysis showed that clinical medication review but not adherence support review reduced hospitalisation.

A systematic review¹¹¹ examined whether the delivery of a medication review by a physician, pharmacist or other healthcare professional improves the health outcomes of hospitalised adult patients compared to standard care. The findings showed no evidence of effect on all-

cause mortality and hospital readmissions, but a 36% relative reduction in emergency department contacts. However, the cost-effectiveness of this intervention is not known and due to the uncertainty of the estimates of mortality and readmissions and the short follow-up, important treatment effects may have been overlooked.

8-year surveillance summary

No relevant evidence was identified.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The evidence identified at the 6 year review was considered to be inconclusive and therefore unlikely to impact on CG76 recommendations 1.3.1-1.3.4 for medication review. Further research on effectiveness and

cost-effectiveness may be needed on when/how often and by whom medication reviews should be done, before a change to the recommendations is warranted.

New evidence is unlikely to impact on the guideline.

76 – 43 Does the use of multi-compartment medicine systems increase adherence to prescribed medicine?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-23.

Surveillance decision

No new information was identified at any surveillance review.

76 – 44 How can practitioners assess adherence?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-15.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

A study¹¹² assessed agreement among patient self-reporting, pharmacy refill, and electronic adherence measures and compared the sensitivity and specificity of different cut-off points for defining non-adherence. Median adherence was 84% for self-report, 86% for electronic, and 91% for prescription refill adherence measurement. Refill and electronic adherence demonstrated the best agreement among measures. The authors concluded that all measures provided similar estimates of overall adherence, although refill and electronic measures were in highest agreement. In selection of a measure, practitioners should consider population and disease characteristics, since measurement agreement could be influenced by these and other factors.

6-year surveillance summary

A systematic review¹¹³ identified self-report adherence measures currently available which are suitable for primary care and evaluated the

extent to which they met various criteria. Fifty eight measures were identified. While validation data were presented in support of the vast majority of self-reported measures, only a minority of measures reported data on reliability and time to complete. Few were designed to have the ability to be completed by or in conjunction with carers and few were able to distinguish between different types of non-adherence, which limited their ability to be used effectively in the continuous improvement of targeted adherence enhancing interventions. The data available suggested that patients find it easier to estimate general adherence than to report a specific number of doses missed. Visual analogue scales can be easier for patients than other types of scale but are not suitable for telephone administration.

A systematic review¹¹⁴ (60 studies) aimed to identify self-report medication adherence scales, assess how these scales measure adherence and explore how they have been

validated. Adherence scales were found to include items that either elicit information regarding the patient's medication-taking behaviour and/or attempts to identify barriers to good medication-taking behaviour or beliefs associated with adherence. The validation strategies employed depended on whether the focus of the scale was to measure medication-taking behaviour or identify barriers or beliefs.

8-year surveillance summary

An RCT¹⁵ (n=24 providers, n=100 patients) aimed to determine the effect of sharing electronically-measured adherence data with clinicians on the management of uncontrolled hypertension. At one visit per patient, clinicians in the intervention group received a report summarising electronically measured adherence to the BP regimen and recommended clinical actions. The proportion of visits with appropriate clinical management was higher in the intervention group. A higher proportion of adherent patients in the intervention group also had their regimen intensified, and a higher proportion of non-

adherent patients in the intervention group received adherence counselling.

Topic expert feedback

Topic expert feedback indicated that there is emergent new technology which aims objectively to measure medicine taking behaviour. This has emerged since publication of the original guideline, making a review worthwhile. However, no studies were cited.

Impact statement

The evidence from the previous surveillance reviews relating to self-report measures of adherence was considered to be inconclusive and unlikely to impact on CG76 recommendations 1.2.1-1.2.3 on assessing adherence. The new evidence on electronically-measured adherence data is also inconclusive, due to a small sample size, and is unlikely to impact on recommendations 1.2.1-1.2.3.

New evidence is unlikely to impact on the guideline.

76 – 45 What are the advantages and disadvantages of self-report in assessing patient's adherence?

Recommendations derived from this question

The same recommendations were derived from this question as in 76-15.

Surveillance decision

This review question should not be updated.

2-year surveillance summary

A study¹¹² assessed agreement among patient self-reporting, pharmacy refill, and electronic adherence measures and compared the sensitivity and specificity of different cut-off points for defining non-adherence. Median adherence was 84% for self-report, 86% for electronic, and 91% for prescription refill adherence measurement. Refill and electronic adherence demonstrated the best agreement among measures. The authors concluded that all measures provided similar estimates of overall adherence, although refill and electronic measures were in highest agreement. In selection of a measure, practitioners should consider population and disease characteristics, since measurement agreement could be influenced by these and other factors.

It was considered that the identified evidence was consistent with the existing guideline recommendations.

6-year surveillance summary

No relevant evidence was identified.

8-year surveillance summary

No relevant evidence was identified.

Topic expert feedback

No topic expert feedback was relevant to this evidence.

Impact statement

The evidence from previous surveillance reviews was considered to be consistent with CG76 recommendations. No new evidence was identified in the current review.

New evidence is unlikely to impact on the guideline.

Communication between healthcare professionals

76 – 46 What information regarding medicines should be provided for patients and practitioners when patients are discharged from secondary care?

Recommendations derived from this question

Patients may be under the care of healthcare professionals from different disciplines and specialties at the same time; responsibility for patients' care may be transferred between healthcare professionals, and medicines reviews may be carried out by healthcare professionals other than the prescriber. Therefore good communication between healthcare professionals is required to ensure that fragmentation of care does not occur.

1.4.1 Healthcare professionals involved in prescribing, dispensing or reviewing medicines should ensure that there are robust processes for communicating with other healthcare professionals involved in the patient's care.

1.4.2 This recommendation has been replaced by recommendations in section 1.2 in the NICE guideline on [medicines optimisation](#).

1.4.3 Healthcare professionals involved in reviewing medicines should inform the prescriber of the review and its outcome. This is particularly important if the review involves discussion of difficulties with adherence and further review is necessary.

See also 76-05 recommendations on providing information.

Surveillance decision

No new information was identified at any surveillance review.

Research recommendations

RR – 01 What are the most clinically effective and cost-effective methods for identifying and addressing the perceptual barriers (such as beliefs and concerns about medicines) that influence motivation to start and continue with treatment, and the practical barriers (such as limitations in personal capacity and resources), which limit an individuals' ability to implement intentions to adhere to medicines?

No new information was identified at any surveillance review.

Surveillance decision

This research recommendation will be considered again at the next surveillance.

RR – 02 What are the most clinically effective and cost-effective ways of communicating the potential benefits and risks of medicines to promote informed choice and optimal adherence?

New evidence was found on clinician-patient communication to improve adherence to psychoactive drugs in functional dyspepsia patients with psychological symptoms. This evidence was included under clinical question [76-05](#).

A randomised controlled trial (RCT)² (n=262) found that clinician-patient communication improved adherence to psychoactive drugs in functional dyspepsia patients with psychological symptoms. The intervention consisted of explanations of both the psychological and gastrointestinal mechanisms of the generation of functional dyspepsia symptoms and the effects of flupentixol-melitracen plus omeprazole treatment. The study did not include cost effectiveness data. No new information was identified at any surveillance review on cost effectiveness of communication methods relevant to the research recommendation, which remains ongoing.

Surveillance decision

This research recommendation will be considered again at the next surveillance.

RR – 03 How can practitioners and patients be supported to improve the quality of prescribing-related consultations and medicines reviews so that they facilitate informed choice and optimal adherence to medicines?

What are the effects of medicines reviews by healthcare professionals other than the prescriber on patients, prescribers and outcomes? How can the process of medicines review be enhanced or improved to address issues of informed choice and adherence?

New evidence was found showing the potential value of communication skills and counselling training for health professionals, and interventions to improve shared decision making. Further research may be needed to verify this evidence, which was included under question [76-14](#)

New evidence was identified relating to the effects of medicines reviews by healthcare professionals other than the prescriber on patients, prescribers and outcomes. Systematic review evidence, which was included under question [76-42](#) examined:

- The impact of fee-for-service pharmacist-led medication review on patient outcomes and quantified this according to the type of review undertaken. The majority of the studies showed improvement in medication adherence. Subgroup analysis showed that clinical medication review but not adherence support review reduced hospitalisation.
- Whether the delivery of a medication review by a physician, pharmacist or other healthcare professional improves the health outcomes of hospitalised adult patients compared to standard care. The findings showed no evidence of effect on all-cause mortality and hospital readmissions, but a relative reduction in emergency department contacts. However, the cost-effectiveness of this intervention is not known and due to the uncertainty of the estimates of mortality and readmissions and the short follow-up, important treatment effects may have been overlooked.

This evidence was considered to be inconclusive and the research recommendation therefore remains ongoing.

Surveillance decision

This research recommendation will be considered again at the next surveillance point.

RR – 04 How can we facilitate the open disclosure of medicine-taking behaviours within consultations relating to medicines prescribing and review? How can we equip health practitioners to respond appropriately and effectively?

No new information was identified at any surveillance review.

Surveillance decision

This research recommendation will be considered again at the next surveillance point.

RR – 05 What are the effects of non-prescriber medicine reviews (e.g. by pharmacists) on patients, prescribers and outcomes? How can the process of medicine review be enhanced or improved to address issues of informed choice and adherence?

No new information was identified at any surveillance review.

Surveillance decision

This research recommendation will be considered again at the next surveillance point.

RR – 06 What are the effects of social disadvantage and ethnicity on informed choice, shared decision making and adherence to prescribed medicines?

Evidence identified on CALD groups showed that relatively little high-quality work has been conducted on adherence-enhancing interventions for people of CALD backgrounds. Greater attention needs to be given to examining the needs of specific CALD population groups. Further research was recommended in this area.

New systematic review evidence indicated an association between antiretroviral therapy adherence and employment status among people infected with HIV.

Further research may be needed across other conditions to answer the research recommendation.

The evidence was included under question [76-17](#)

Surveillance decision

This research recommendation will be considered again at the next surveillance point.

RR – 07 How do the perceptions and life circumstances of different age groups (children, young adults, elderly people) influence informed choice, shared decision making and adherence. What are the implications for interventions to support these?

No new information was identified at any surveillance review.

Surveillance decision

This research recommendation will be considered again at the next surveillance point.

RR – 08 What are the particular barriers to medicines use for people with multiple pathologies (and their informal carers) and what interventions are required?

No new information was identified at any surveillance review.

Surveillance decision

This research recommendation will be considered again at the next surveillance point.

References

1. Fisher A, Manicavasagar V, Kiln F et al. (2016) Communication and decision-making in mental health: A systematic review focusing on Bipolar disorder. [Review]. *Patient Education & Counseling* 99:1106-1120.
2. Yan XJ, Li WT, Chen X et al. (21-4-2015) Effect of clinician-patient communication on compliance with flupentixol-melitracen in functional dyspepsia patients. *World Journal of Gastroenterology* 21:4652-4659.
3. Chewning B, Bylund CL, Shah B et al. (2012) Patient preferences for shared decisions: a systematic review. *Patient Education & Counseling* 86:9-18.
4. Lenz M, Buhse S, Kasper J et al. (2012) Decision aids for patients. *Deutsches Arzteblatt International* 109:401-408.
5. Bailey RA, Pfeifer M, Shillington AC et al. (2016) Effect of a patient decision aid (PDA) for type 2 diabetes on knowledge, decisional self-efficacy, and decisional conflict. *BMC Health Services Research* 16:10.
6. Leblanc A, Herrin J, Williams MD et al. (2015) Shared Decision Making for Antidepressants in Primary Care: A Cluster Randomized Trial. *JAMA Internal Medicine* 175:1761-1770.
7. McDonald MV, Feldman PH, Barron VY et al. (2016) Outcomes of clinical decision support (CDS) and correlates of CDS use for home care patients with high medication regimen complexity: A randomized trial. *SO: Journal of evaluation in clinical practice* 22:10-19.
8. Reeve E, To J, Hendrix I et al. (2013) Patient barriers to and enablers of deprescribing: a systematic review. *Drugs & Aging* 30:793-807.
9. Dwamena F, Holmes R, Gauden CM et al. (2012) Interventions for providers to promote a patient-centred approach in clinical consultations. *Cochrane Database of Systematic Reviews* .
10. Legare F, Turcotte S, Stacey D et al. (2012) Patients' perceptions of sharing in decisions: a systematic review of interventions to enhance shared decision making in routine clinical practice. *The Patient: Patient-Centered Outcomes Research* 5:1-19.
11. Beach MC, Roter DL, Saha S et al. (2015) Impact of a brief patient and provider intervention to improve the quality of communication about medication adherence among HIV patients. *SO: Patient education and counseling* 98:1078-1083.
12. Foster JM, Smith L, Usherwood T et al. (2016) General practitioner-delivered adherence counseling in asthma: Feasibility and usefulness of skills, training and support tools. *Journal of Asthma*.53 (3) (pp 311-320), 2016.Date of Publication: 15 Mar 2016. 311-320.
13. Lamiraud K and Geoffard P-Y. (2007) Therapeutic non-adherence: A rational behaviour revealing patient preferences? *Health Economics* 16:1185-1204.
14. Jerant A, Chapman B, Duberstein P et al. (2011) Personality and medication non-adherence among older adults enrolled in a six-year trial. *British Journal of Health Psychology* 16:1-69.
15. Kardas P, Lewek P, and Matyjaszczyk M. (2013) Determinants of patient adherence: a review of systematic reviews. *Frontiers in Pharmacology* 4:91.
16. Zwikker HE, van den Bemt BJ, Vriezekolk JE et al. (2014) Psychosocial predictors of non-adherence to chronic medication: systematic review of longitudinal studies. *Patient preference & adherence* 8:519-563.
17. Grenard JL, Munjas BA, Adams JL et al. (2011) Depression and medication adherence in the treatment of chronic diseases in the United States: a meta-analysis. *Journal of General Internal Medicine* 26:1175-1182.

18. Grodensky CA, Golin CE, Ochtera RD et al. (2012) Systematic review: effect of alcohol intake on adherence to outpatient medication regimens for chronic diseases. *Journal of Studies on Alcohol & Drugs* 73:899-910.
19. Manias E and Williams A. (2010) Medication adherence in people of culturally and linguistically diverse backgrounds: a meta-analysis. *Annals of Pharmacotherapy* 44:964-982.
20. Campbell NL, Boustani MA, Skopelja EN et al. (2012) Medication adherence in older adults with cognitive impairment: a systematic evidence-based review. [Review]. *American Journal of Geriatric Pharmacotherapy* 10:165-177.
21. Zhang NJ, Terry A, and McHorney CA. (2014) Impact of Health Literacy on Medication Adherence: A Systematic Review and Meta-analysis. *Annals of Pharmacotherapy* 48:741-751.
22. Ostini R and Kairuz T. (2014) Investigating the association between health literacy and non-adherence. *International Journal of Clinical Pharmacy* 36:36-44.
23. Miller TA. (2016) Health literacy and adherence to medical treatment in chronic and acute illness: A meta-analysis. [Review]. *Patient Education & Counseling* 99:1079-1086.
24. Nachega JB, Uthman OA, Peltzer K et al. (2015) Association between antiretroviral therapy adherence and employment status: Systematic review and meta-analysis. *Bulletin of the World Health Organization*.93 (1) (pp 29-41), 2015.Date of Publication: 2015. 29-41.
25. Wooldridge K, Schnipper JL, Goggins K et al. (2016) Refractory primary medication nonadherence: Prevalence and predictors after pharmacist counseling at hospital discharge. *Journal of Hospital Medicine*.11 (1) (pp 48-51), 2016.Date of Publication: 01 Jan 2016. 48-51.
26. Horne R, Chapman SC, Parham R et al. (2013) Understanding patients' adherence-related beliefs about medicines prescribed for long-term conditions: a meta-analytic review of the Necessity-Concerns Framework. *PLoS ONE [Electronic Resource]* 8:e80633.
27. Ruppar TM, Conn VS, and Russell CL. (2008) Medication adherence interventions for older adults: literature review. *Research and theory for nursing practice* 22:114-147.
28. Haynes RB, Ackloo E, Sahota N et al. (2008) Interventions for enhancing medication adherence. *Cochrane database of systematic reviews (Online)* CD000011.
29. van DS, Sluijs E, van DL et al. (2007) Patient adherence to medical treatment: a review of reviews. *BMC Health Services Research* 7.
30. Linn AJ, Vervloet M, van DL et al. (2011) Effects of eHealth interventions on medication adherence: a systematic review of the literature. *Journal of Medical Internet Research* 13:e103.
31. Scheurer D, Choudhry N, Swanton KA et al. (2012) Association between different types of social support and medication adherence. *American Journal of Managed Care* 18:e461-e467.
32. Demonceau J, Ruppar T, Kristanto P et al. (2013) Identification and assessment of adherence-enhancing interventions in studies assessing medication adherence through electronically compiled drug dosing histories: a systematic literature review and meta-analysis. *Drugs* 73:545-562.
33. Easthall C, Song F, and Bhattacharya D. (2013) A meta-analysis of cognitive-based behaviour change techniques as interventions to improve medication adherence.[Erratum appears in *BMJ Open*. 2014;4(7). doi: 10.1136/bmjopen-2013-002749corr1]. *BMJ Open* 3:2013.
34. Oberje EJ, de Kinderen RJ, Evers SM et al. (2013) Cost effectiveness of medication adherence-enhancing interventions: a systematic review of trial-based economic evaluations. *Pharmacoeconomics* 31:1155-1168.
35. Viswanathan M, Golin CE, Jones CD et al. (2012) Closing the quality gap: revisiting the state of the science (vol. 4: medication adherence interventions: comparative effectiveness). *Evidence Report/Technology Assessment* 1-685.

36. Spinewine A, Claeys C, Foulon V et al. (2013) Approaches for improving continuity of care in medication management: a systematic review. *International Journal for Quality in Health Care* 25:403-417.
37. Van Camp YP, Van RB, and Elseviers MM. (2013) Nurse-led interventions to enhance adherence to chronic medication: systematic review and meta-analysis of randomised controlled trials. *European Journal of Clinical Pharmacology* 69:761-770.
38. Hall RL, Willgoss T, Humphrey LJ et al. (2014) The effect of medical device dose-memory functions on patients' adherence to treatment, confidence, and disease self-management. *Patient preference & adherence* 8:775-788.
39. Nieuwlaat R, Wilczynski N, Navarro T et al. (2014) Interventions for enhancing medication adherence. *Cochrane Database of Systematic Reviews* .
40. Ryan R, Santesso N, Lowe D et al. (2014) Interventions to improve safe and effective medicines use by consumers: an overview of systematic reviews. *SO: Cochrane Database of Systematic Reviews* .
41. Alldred DP, Raynor DK, Hughes C et al. (2013) Interventions to optimise prescribing for older people in care homes. *Cochrane Database of Systematic Reviews* .
42. Patterson SM, Cadogan CA, Kerse N et al. (2014) Interventions to improve the appropriate use of polypharmacy for older people. *Cochrane Database of Systematic Reviews* .
43. Henriksson J, Tyden G, Hoijer J et al. (2016) A Prospective Randomized Trial on the Effect of Using an Electronic Monitoring Drug Dispensing Device to Improve Adherence and Compliance. *Transplantation* 100:203-209.
44. Sung HH, Han DH, Kim TH et al. (2015) Interventions do not enhance medication persistence and compliance in patients with overactive bladder: A 24 weeks, randomised, open-label, multi-center trial. *International Journal of Clinical Practice*.69 (11) (pp 1309-1315), 2015.Date of Publication: November 2015. 1309-1315.
45. Timmerman L, Stronks DL, Groeneweg G et al. (2016) The Value of Medication-Specific Education on Medication Adherence and Treatment Outcome in Patients with Chronic Pain: A Randomized Clinical Trial. *Pain Medicine* ,2016.
46. Navarrete-Dechent C, Curi-Tuma M, Nicklas C et al. (2015) Oral and written counseling is a useful instrument to improve short-term adherence to treatment in acne patients: a randomized controlled trial. *Dermatology Practical & Conceptual* 5:13-16.
47. Stovell D, Morrison AP, Panayiotou M et al. (2016) Shared treatment decision-making and empowerment-related outcomes in psychosis: systematic review and meta-analysis. [Review]. *British Journal of Psychiatry* 209:23-28.
48. Bianchi ML, Duca P, Vai S et al. (2015) Improving adherence to and persistence with oral therapy of osteoporosis. *Osteoporosis International* 26:1629-1638.
49. Koufopoulos JT, Conner MT, Gardner PH et al. (2016) A Web-Based and Mobile Health Social Support Intervention to Promote Adherence to Inhaled Asthma Medications: Randomized Controlled Trial. *Journal of Medical Internet Research* 18:e122.
50. Reese PP, Kessler JB, Doshi JA et al. (2016) Two Randomized Controlled Pilot Trials of Social Forces to Improve Statin Adherence among Patients with Diabetes. *Journal of General Internal Medicine*.31 (4) (pp 402-410), 2016.Date of Publication: 01 Apr 2016. 402-410.
51. Karumbi J and Garner P. (2015) Directly observed therapy for treating tuberculosis. [Review][Update of *Cochrane Database Syst Rev*. 2007;(4):CD003343; PMID: 17943789]. *Cochrane Database of Systematic Reviews* 5:CD003343.
52. Johnston N, Bodegard J, Jerstrom S et al. (2016) Effects of interactive patient smartphone support app on drug adherence and lifestyle changes in myocardial infarction patients: A

- randomized study. *American Heart Journal*.178 (pp 85-94), 2016.Date of Publication: 01 Aug 2016. -94.
53. Rafiee VL, Parvin N, and Mahmoodi SG. (1-7-2015) The effects of an individual, multistep intervention on adherence to treatment in hemodialysis patients. *Disability & Rehabilitation* 1-5.
 54. Hollands GJ, McDermott MS, Lindson-Hawley N et al. (2015) Interventions to increase adherence to medications for tobacco dependence. [Review]. *Cochrane Database of Systematic Reviews* 2:CD009164.
 55. Conn VS, Ruppap TM, Enriquez M et al. (2016) Patient-Centered Outcomes of Medication Adherence Interventions: Systematic Review and Meta-Analysis. *Value in Health*.19 (2) (pp 277-285), 2016.Date of Publication: 01 Mar 2016. 277-285.
 56. Conn VS, Ruppap TM, Enriquez M et al. (2015) Healthcare provider targeted interventions to improve medication adherence: Systematic review and meta-analysis. *International Journal of Clinical Practice*.69 (8) (pp 889-899), 2015.Date of Publication: 01 Aug 2015. 889-899.
 57. Conn VS, Ruppap TM, Enriquez M et al. (2016) Medication adherence interventions that target subjects with adherence problems: Systematic review and meta-analysis. [Review]. *Research In Social & Administrative Pharmacy* 12:218-246.
 58. Santo K, Kirkendall S, Laba T-L et al. (2016) Interventions to improve medication adherence in coronary disease patients: A systematic review and meta-analysis of randomised controlled trials. *European Journal of Preventive Cardiology*.23 (10) (pp 1065-1076), 2016.Date of Publication: 01 Jul 2016. 1065-1076.
 59. Plumpton CO, Brown I, Reuber M et al. (2015) Economic evaluation of a behavior-modifying intervention to enhance antiepileptic drug adherence. *Epilepsy & Behavior* 45:180-186.
 60. MacDonald L, Chapman S, Syrett M et al. (2016) Improving medication adherence in bipolar disorder: A systematic review and meta-analysis of 30 years of intervention trials. *Journal of Affective Disorders*.194 (pp 202-221), 2016.Date of Publication: 01 Apr 2016. -221.
 61. Hedegaard U, Kjeldsen LJ, Pottegard A et al. (2015) Improving Medication Adherence in Patients with Hypertension: A Randomized Trial. *American Journal of Medicine* 128:1351-1361.
 62. Chow EP, Hassali MA, Saleem F et al. (2015) Effects of pharmacist-led patient education on diabetes-related knowledge and medication adherence: A home-based study. *Health Education Journal*.75 (4) (pp 421-433), 2015.Date of Publication: 2015. 421-433.
 63. Cossette S, Frasure-Smith N, Vadeboncoeur A et al. (2015) The impact of an emergency department nursing intervention on continuity of care, self-care capacities and psychological symptoms: secondary outcomes of a randomized controlled trial. *International Journal of Nursing Studies* 52:666-676.
 64. Piette JD, Striplin D, Marinec N et al. (2015) A Randomized Trial of Mobile Health Support for Heart Failure Patients and Their Informal Caregivers. *SO: Medical care* 53:692-699.
 65. Hegedus A and Kozel B. (2014) Does adherence therapy improve medication adherence among patients with schizophrenia? A systematic review. *Int.J Ment.Health Nurs*. 23:490-497.
 66. Coleman CI, Limone B, Sobieraj DM et al. (2012) Dosing frequency and medication adherence in chronic disease. *Journal of Managed Care Pharmacy* 18:527-539.
 67. Srivastava K, Arora A, Kataria A et al. (2013) Impact of reducing dosing frequency on adherence to oral therapies: a literature review and meta-analysis. *Patient preference & adherence* 7:419-434.
 68. Iglay K, Cao X, Mavros P et al. (2015) Systematic Literature Review and Meta-analysis of Medication Adherence With Once-weekly Versus Once-daily Therapy. [Review]. *Clinical Therapeutics* 37:1813-1821.

69. Eaddy MT, Cook CL, O'Day K et al. (2012) How patient cost-sharing trends affect adherence and outcomes: a literature review. *P & T* 37:45-55.
70. Sinnott SJ, Buckley C, O'Riordan D et al. (2013) The effect of copayments for prescriptions on adherence to prescription medicines in publicly insured populations; a systematic review and meta-analysis. *PLoS ONE [Electronic Resource]* 8:e64914.
71. Checchi KD, Huybrechts KF, Avorn J et al. (2014) Electronic medication packaging devices and medication adherence: a systematic review. *JAMA* 312:1237-1247.
72. Vignon Zomahoun HT, de BM, Guillaumie L et al. (2015) Effectiveness and Content Analysis of Interventions to Enhance Oral Antidiabetic Drug Adherence in Adults with Type 2 Diabetes: Systematic Review and Meta-Analysis. *Value in Health* 18:530-540.
73. 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* 31:767-777.
74. Petry NM, Rash CJ, Byrne S et al. (2012) Financial reinforcers for improving medication adherence: findings from a meta-analysis. *American Journal of Medicine* 125:888-896.
75. Henderson C, Knapp M, Yeeles K et al. (2015) Cost-Effectiveness of Financial Incentives to Promote Adherence to Depot Antipsychotic Medication: Economic Evaluation of a Cluster-Randomised Controlled Trial. *PLoS ONE [Electronic Resource]* 10:e0138816.
76. Moran K and Priebe S. (2016) Better quality of life in patients offered financial incentives for taking anti-psychotic medication: Linked to improved adherence or more money? *Quality of Life Research* ,2016.
77. Petry NM, Alessi SM, Byrne S et al. (2015) Reinforcing adherence to antihypertensive medications. *Journal of Clinical Hypertension* 17:33-38.
78. Spoelstra SL, Schueller M, Hilton M et al. (2015) Interventions combining motivational interviewing and cognitive behaviour to promote medication adherence: a literature review. [Review]. *Journal of Clinical Nursing* 24:1163-1173.
79. Barker-Collo S, Krishnamurthi R, Witt E et al. (2015) Improving Adherence to Secondary Stroke Prevention Strategies Through Motivational Interviewing: Randomized Controlled Trial. *Stroke* 46:3451-3458.
80. Chien WT, Mui JH, Cheung EF et al. (2015) Effects of motivational interviewing-based adherence therapy for schizophrenia spectrum disorders: a randomized controlled trial. *Trials [Electronic Resource]* 16:270.
81. Moral RR, de Torres LAP, Ortega LP et al. (2015) Effectiveness of motivational interviewing to improve therapeutic adherence in patients over 65 years old with chronic diseases: A cluster randomized clinical trial in primary care. *Patient Education and Counseling*.98 (8) (pp 977-983), 2015.Date of Publication: August 01, 2015. 977-983.
82. Thom DH, Willard-Grace R, Hessler D et al. (2015) The impact of health coaching on medication adherence in patients with poorly controlled diabetes, hypertension, and/or hyperlipidemia: a randomized controlled trial. *Journal of the American Board of Family Medicine: JABFM* 28:38-45.
83. Renuga E, Ramakrishnan SR, Vanitha RN et al. (2016) Impact of continuous patient counselling on knowledge, attitude, and practices and medication adherence of diabetic patients attending outpatient pharmacy services. *Asian Journal of Pharmaceutical and Clinical Research*.9 (1) (pp 345-350), 2016.Date of Publication: January 2016. 345-350.
84. Gillies D, Buykx P, Parker AG et al. (2015) Consultation liaison in primary care for people with mental disorders. *SO: Cochrane Database of Systematic Reviews* .

85. Garcia MFFM, Bravin AM, Garcia PD et al. (2015) Behavioral measures to reduce non-adherence in renal transplant recipients: a prospective randomized controlled trial. *International Urology and Nephrology*.47 (11) (pp 1899-1905), 2015.Date of Publication: 01 Nov 2015. 1899-1905.
86. Chang YT and Lee LL. (2015) The effectiveness of compliance therapy on drug attitude among schizophrenic patients: a systematic review. [Review]. *JBIC Database Of Systematic Reviews And Implementation Reports* 13:213-240.
87. Mahtani KR, Heneghan CJ, Glasziou PP et al. (2011) Reminder packaging for improving adherence to self-administered long-term medications. *Cochrane Database of Systematic Reviews* .
88. de JT, Gurol-Urganci I, Vodopivec-Jamsek V et al. (2012) Mobile phone messaging for facilitating self-management of long-term illnesses. *Cochrane Database of Systematic Reviews* 12:CD007459.
89. Vervloet M, Linn AJ, Van Weert JC et al. (2012) The effectiveness of interventions using electronic reminders to improve adherence to chronic medication: a systematic review of the literature. *Journal of the American Medical Informatics Association* 19:696-704.
90. Boeni F, Spinatsch E, Suter K et al. (2014) Effect of drug reminder packaging on medication adherence: a systematic review revealing research gaps. *Systems Review* 3:29.
91. Lin H and Wu X. (2014) Intervention strategies for improving patient adherence to follow-up in the era of mobile information technology: A systematic review and meta-analysis. *PLoS One* 9.
92. Ducoulombier V, Luraschi H, Forzy G et al. (2015) Contribution of phone follow-up to improved adherence to oral osteoporosis treatment. *American Journal of Pharmacy Benefits*.7 (3) (pp e81-e89), 2015.Date of Publication: 01 May 2015. e81-e89.
93. Schwalm JD, Ivers NM, Natarajan MK et al. (2015) Cluster randomized controlled trial of Delayed Educational Reminders for Long-term Medication Adherence in ST-Elevation Myocardial Infarction (DERLA-STEMI). *American Heart Journal* 170:903-913.
94. Farmer AJ, Mcsharry J, Rowbotham S et al. (2016) Effects of interventions promoting monitoring of medication use and brief messaging on medication adherence for people with Type 2 diabetes: A systematic review of randomized trials. *Diabetic Medicine*.33 (5) (pp 565-579), 2016.Date of Publication: 01 May 2016. 565-579.
95. Thakkar J, Kurup R, Laba T-L et al. (2016) Mobile telephone text messaging for medication adherence in chronic disease a meta-analysis. *JAMA Internal Medicine*.176 (3) (pp 340-349), 2016.Date of Publication: March 2016. 340-349.
96. Garofalo R, Kuhns LM, Hotton A et al. (2016) A Randomized Controlled Trial of Personalized Text Message Reminders to Promote Medication Adherence Among HIV-Positive Adolescents and Young Adults. *AIDS & Behavior* 20:1049-1059.
97. Hamine S, Gerth-Guyette E, Faulx D et al. (2015) Impact of mHealth chronic disease management on treatment adherence and patient outcomes: a systematic review. [Review]. *Journal of Medical Internet Research* 17:e52.
98. Orrell C, Cohen K, Mauff K et al. (15-12-2015) A Randomized Controlled Trial of Real-Time Electronic Adherence Monitoring With Text Message Dosing Reminders in People Starting First-Line Antiretroviral Therapy. *Journal of Acquired Immune Deficiency Syndromes: JAIDS* 70:495-502.
99. Stoner SA, Arenella PB, and Hendershot CS. (2015) Randomized controlled trial of a mobile phone intervention for improving adherence to naltrexone for alcohol use disorders. *PLoS ONE [Electronic Resource]* 10:e0124613.
100. Kannisto KA, Adams CE, Koivunen M et al. (2015) Feedback on SMS reminders to encourage adherence among patients taking antipsychotic medication: A cross-sectional survey nested

within a randomised trial. *BMJ Open*.5 (11) (no pagination), 2015. Article Number: e008574. Date of Publication: 2015.

101. Barber S, Thakkar K, Marvin V et al. (2014) Evaluation of My Medication Passport: a patient-completed aide-memoire designed by patients, for patients, to help towards medicines optimisation. *BMJ Open* 4:e005608.
102. Wald DS, Bestwick JP, Raiman L et al. (2014) Randomised trial of text messaging on adherence to cardiovascular preventive treatment (INTERACT trial). *PLoS One* 9:e114268.
103. Fletcher BR, Hartmann-Boyce J, Hinton L et al. (2015) The Effect of Self-Monitoring of Blood Pressure on Medication Adherence and Lifestyle Factors: A Systematic Review and Meta-Analysis. [Review]. *American Journal of Hypertension* 28:1209-1221.
104. Kim JY, Wineinger NE, and Steinhubl SR. (2016) The Influence of Wireless Self-Monitoring Program on the Relationship Between Patient Activation and Health Behaviors, Medication Adherence, and Blood Pressure Levels in Hypertensive Patients: A Substudy of a Randomized Controlled Trial. *Journal of Medical Internet Research* 18:e116.
105. Granger BB, Ekman I, Hernandez AF et al. (2015) Results of the Chronic Heart Failure Intervention to Improve MEDication Adherence study: A randomized intervention in high-risk patients. *American Heart Journal* 169:539-548.
106. Katalenich B, Shi L, Liu S et al. (1-6-2015) Evaluation of a Remote Monitoring System for Diabetes Control. *Clinical Therapeutics* 37:1216-1225.
107. McGillicuddy JW, Taber DJ, Mueller M et al. (2015) Sustainability of improvements in medication adherence through a mobile health intervention. *Progress in Transplantation* 25:217-223.
108. Gums TH, Uribe L, Vander Weg MW et al. (2015) Pharmacist intervention for blood pressure control: medication intensification and adherence. *Journal of the American Society of Hypertension* 9:569-578.
109. Lyons I, Barber N, Raynor DK et al. (2016) The Medicines Advice Service Evaluation (MASE): a randomised controlled trial of a pharmacist-led telephone based intervention designed to improve medication adherence. *BMJ Quality & Safety* pii: bmjqs-2015-004670. [Epub ahead of print].
110. 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* 77:102-115.
111. Christensen M and Lundh A. (2013) Medication review in hospitalised patients to reduce morbidity and mortality. *Cochrane Database of Systematic Reviews* 2:CD008986.
112. Hansen RA, Kim MM, Song L et al. (2009) Comparison of methods to assess medication adherence and classify nonadherence. *Annals of Pharmacotherapy* 43:413-422.
113. Garfield S, Clifford S, Eliasson L et al. (2011) Suitability of measures of self-reported medication adherence for routine clinical use: a systematic review. *BMC Medical Research Methodology* 11:149.
114. Nguyen TM, La CA, and Cottrell N. (2014) What are validated self-report adherence scales really measuring?: a systematic review. *British Journal of Clinical Pharmacology* 77:427-445.
115. Kronish IM, Moise N, McGinn T et al. (2016) An Electronic Adherence Measurement Intervention to Reduce Clinical Inertia in the Treatment of Uncontrolled Hypertension: The MATCH Cluster Randomized Clinical Trial. *Journal of General Internal Medicine* ,2016.