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Chapter 12 Alternatives to hospital care

Emergency and acute medical care in over 16s: service delivery and organisation

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Chapter 12 Alternatives to hospital care

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12 Alternatives to hospital care

12.1 Introduction

There is an increasing evidence base to support the treatment of some acute medical illnesses using ambulatory care, that is, where patients receive treatment whilst staying in their own home or care home after a clinical assessment. In addition, there is an increasing recognition that not all patients have a good experience of hospital bed based care, and that treatment in the usual place of residence would be preferable if safe to do so with an appropriate care model in place.

Whilst there are policy statements from national bodies that are supportive of greater provision of alternatives to hospital care for acute medical illness, there is current uncertainty over the most clinically and cost-effective models of alternatives to hospital care.

12.2 Review question: Does community-based intermediate care improve outcomes compared with hospital care?

For full details see review protocol in Appendix A.

Table 1: PICO characteristics of review question

Population	Adults and young people (16 years and over) with a suspected or confirmed AME or at risk of an AME.

Interventions	Alternatives to hospital care including the following:
	• Hospital at home including care at home led by
	  ○ Secondary care physicians
	  ○ Primary care (GP and nurse)
	  ○ Both
	• Step up/down care
	• Rapid response schemes
	• Virtual wards
	For definitions of each intervention please refer section 1.2.1.
	Strata:
	• Early discharge
	• Admission avoidance

Comparison	Hospital-based care/services.
Outcomes	• Mortality (CRITICAL) • Avoidable adverse events (CRITICAL) • Quality of life (CRITICAL) • Patient satisfaction (CRITICAL) • Length of hospital stay (IMPORTANT) • Length of stay in programme (IMPORTANT) • Number of presentations to Emergency Department (IMPORTANT) • Number of admissions to hospital (CRITICAL) • Number of GP presentations (IMPORTANT) • Readmission (up to 30 days since admission) (IMPORTANT)
Study design	Systematic reviews (SRs) of RCTs, RCTs, observational studies only to be included if no relevant SRs or RCTs are identified.

12.2.1 Definitions of the different alternatives to hospital care evaluated in this review

12.2.1.1 Intermediate Care (IC)

The development of IC services was set out in 2001 within the National Service Framework for Older People. The aims of IC were stated as being to:

- promote faster recovery from illness,
- support timely discharge from hospital,
- prevent unnecessary acute hospital admission,
- maximise independent living.

The expectation was of multi-agency working based on comprehensive geriatric assessment, with short-term interventions to enable users to remain or resume living at home.

Definition of intermediate care

The definition of intermediate care provided in the Department of Health paper 'Intermediate Care - Halfway Home'[80] was used; "a range of integrated services to promote faster recovery from illness, prevent unnecessary acute hospital admission and premature admission to long-term residential care, support timely discharge from hospital and maximise independent living". The guidance makes clear that intermediate care services involve multi-disciplinary team working. Although homecare reablement is included within intermediate care services in some areas, services that do not have a clinical health element are not included.

The National Intermediate Care Audit demonstrates that intermediate care does increase the likelihood of returning home, improve the ability to perform activities of daily living and also increases the achievement of person specific goals. However, there is significant variation in delivery between regions throughout England and unfortunately at present it is not making a difference to the whole-system due to the lack of capacity within the service.[214]

Classification of Intermediate Care Schemes (as taken from the Department of Health 'Audit of Intermediate Care', 2008)

i. Home from hospital

A home from hospital scheme generally aims to provide short-term post-discharge care at a more intensive level than would normally be provided by professionals such as District Nursing. Home from hospital schemes are generally delivered in the user's own home and led by nursing staff, sometimes with input from medical and allied health professionals.

ii. Rapid response schemes

Rapid response schemes generally aim to support a user in their own home or other location either as a means of preventing admission or as a means of facilitating discharge from the acute hospital sector. Usually led by either a nurse or allied health professional, rapid response schemes can cover a wide range of interventions including administration of intravenous therapies, peg tube and catheter replacement, crisis psychiatric care and provide enhanced care to palliative care patients.

iii. Step up/down schemes

Step up/down schemes usually provide care in a setting other than an acute hospital and this can include a residential or, more usually, a nursing home. Time limited in nature, these schemes aim to either prevent admission to hospital, or aid in the discharge and transfer back home from hospital. Step up/down schemes can be aimed at similar patients to both rapid response and rehabilitation.

However, normally the users require more intensive therapy or continuous monitoring than could be provided in their own home.

iv. Rehabilitation schemes

The delivery of community rehabilitation is cognisant with the role of intermediate care which has been promoted by the Department of Health. Rehabilitation is defined as "a process aiming to restore personal autonomy to those aspects of daily life considered most relevant by patients and service users, and their family carers" (Kings Fund, 1998). It is believed that this form of care will reduce the burden on the NHS through the promotion of independence.

Rehabilitation schemes usually provide time limited therapy for patients who require on-going allied health support (generally physiotherapy or occupational therapy) to regain maximum independence. Users of rehabilitation schemes will often have sustained some form of fracture and may also have undergone surgery. Rehabilitation schemes can be delivered by a multi-disciplinary team, but are often led by physiotherapists and/or occupational therapists. These schemes may be longer-term in nature than other types of schemes.

Rehabilitation is defined as the process of restoration of skills by a person who has had an illness or injury so as to regain maximum self-sufficiency and function in a normal or as near normal manner as possible. Rehabilitation is a process aiming to restore personal autonomy to those aspects of daily life considered most relevant to patients, service users and their carers. It can be delivered at a community hospital, residential home or within a patient's own home.

v. Stroke schemes

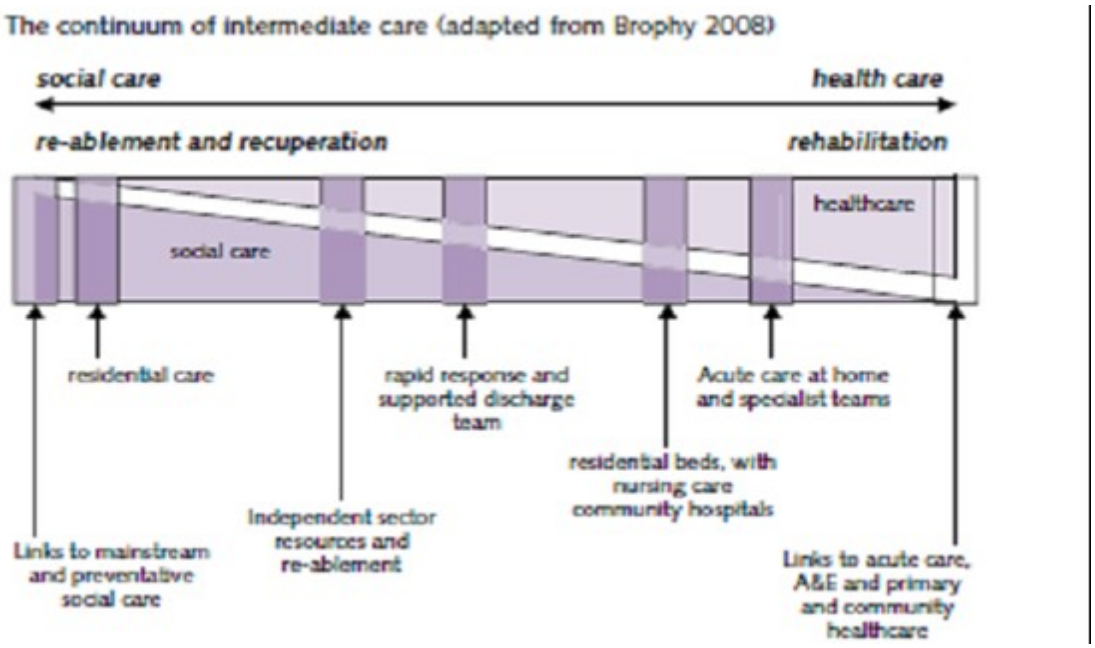
Stroke schemes tend to provide a high level of support for those patients who have undergone a cerebrovascular accident (CVA) and to provide a high level of rehabilitation, usually in the users own home, to assist them in gaining an increased level of independence. Stroke schemes can be delivered by a multi-disciplinary team that includes medical, nursing, allied health and social work, and also can include the assistance of generic rehabilitation assistants (covering physiotherapy and occupational therapy). These schemes may be longer-term in nature than other types of schemes.

vi. Community hospital schemes

Community hospital schemes usually provide acute hospital ward type care, but generally under the management of GPs rather than consultants. Community hospital schemes can provide nursing, rehabilitation or step up/down type care and are generally aimed at those users who require a high level of supervision or the administration of medicines or interventions which would not be suitable for a nursing home or a users' own home setting.

vii. Miscellaneous schemes

These schemes included a range of schemes which did not directly fit into one of the classifications previously described. They included an ED assessment team, a twilight nursing team, and a long-term behaviour support team. It could be debated whether these schemes can truly be classified as intermediate.



Within the Intermediate tier there is distinction between:

viii. **Enabling Homecare** - which provides the fundamental building block of a care system where optimised independence and choice is a primary goal. This is aimed at ensuring such skills are maintained by the individual and will be found across the whole care system including any homecare delivered as part of an intermediate tier.

ix. **Reablement** - for people with poor physical or mental health or disability where there is potential to improve independence and choice by learning or re-learning the skills necessary for daily living; and:

When referring to reablement in this context it is also helpful to distinguish between:

- Intake reablement - where all new referrals to adult social services (in particular home care) are considered for reablement; and
- Targeted reablement - where referrals to reablement are received from specific sources, normally hospital discharge or to prevent hospital admission.

x. **Hospital-at-home care** is generally defined as the community based provision of services usually associated with acute inpatient care.

"Hospital-at-home" programs are defined by the provision, in patients' own homes and for a limited period, of a specific service that requires active participation by health care professionals. The care tends to be multidisciplinary and may include technical services, such as intravenous services.

Many disparate models have been developed under the hospital-at-home label, leading to difficulties in evaluating their effectiveness.

Key features of the Johns Hopkins "hospital-at-home" model:

- A substitutive model providing hospital-level care for patients living in a specified geographic catchment area delineated by 30 minute travel time.
- Eligible patients are those with certain acute illnesses that require hospital-level care who also meet previously validated medical eligibility criteria.
- Robust input from physicians (at least daily visits and 24 hour coverage) and nurses (initial continuous nursing care following by intermittent visits and 24 hour coverage).

- Patient retains inpatient status and the hospital or health system retains responsibility for the acute care episode.
- Care is provided in a coordinated manner similar to that in an inpatient ward.

xi. The Virtual Ward

Virtual wards are a form of preventive hospital-at-home for patients at high predicted risk of unplanned hospital admission.

A model of home-based coordinated care with the aim of reducing hospital admissions in a relatively low-cost manner. The "virtual ward" program provides multidisciplinary case management services to people who have been identified, using a predictive model, as high risks for future emergency hospitalisation. Virtual wards use the systems, staffing and daily routine of a hospital ward to deliver preventive care to patients in their own homes. The Virtual Wards work just like a hospital ward, using the same staffing, systems and daily routines, except that the people being cared for stay in their own homes throughout.

Virtual wards seek to improve integration through a number of strategies, including a shared record, multidisciplinary team meetings ("ward rounds") and an automated alert system for informing virtual ward staff when a patient accesses another care service, such as attending local ED. Another strategy for promoting integration was to include a social worker as a core member of the virtual ward staff. In this regard, it could be argued that virtual wards are an adaptation of the public health model of chronic disease management described by Kendall and colleagues but rather than integrating health and education, virtual wards instead aim to provide patients with a well organised and coordinated service that crosses the health care and social care sectors.

Community matrons:

Community matrons are highly experienced senior nurses who work closely with patients in the community to provide, plan and organise their care. They mainly work with those with a serious long term or complex range of conditions. They therefore have an important role in the management of chronic long-term disease and multi-morbidity. These patients account a large consumption of NHS resources. Clear leadership, guidance and communication between the many services which are involved in the patient care is important to avoid mishaps. Therefore, the community matron is ideally placed to deliver this with the appropriate training and support. This review will determine if increasing the remit of community matrons and increasing the number of locations where community matrons can be accessed improves patient outcomes.

12.3 Clinical evidence

We searched for systematic reviews and randomised trials comparing the effectiveness of alternatives to hospital care (hospital at home, step-up/down care, rapid response schemes and virtual wards) with hospital care to improve outcomes for patients.

Thirty four randomised controlled trials were identified that compared alternatives to hospital care with hospital care. We identified 3 Cochrane reviews evaluating different alternatives to hospital care. All the reviews were assessed for relevance to the review protocol and methodology and were adapted and updated as part of this systematic review. The classification of interventions of the studies included in the Cochrane reviews did not match the definitions of interventions pre-specified by the guideline committee. We re-classified the studies included in the Cochrane reviews according to the definitions of the interventions (see section 12.2.1). Data for the studies presented in the Cochrane reviews has been included in the analysis. We have updated the Cochrane reviews with randomised controlled trials found from the search.

The studies have been classified in 2 strata- admission avoidance and early discharge. Admission avoidance is a service that provides active treatment by health care professionals outside hospital for a condition that otherwise would require acute hospital in-patient admission. Early discharge is a service that provides active treatment by health care professionals outside hospital for a condition that otherwise would require continued acute hospital in-patient care.

Within each strata, the studies have been grouped according to the type of service provided: hospital at home led by primary care, hospital at home led by secondary care, hospital at home led by primary and secondary care, step-up/down care and virtual wards.

12.3.1 Individual patient data (IPD) analysis

Two Cochrane reviews that met the protocol criteria for the alternatives to hospital care review (1 in the strata for early discharge and 1in the strata for admission avoidance) presented IPD analysis as well as RCT level meta-analysis.

Details of analyses presented in both Cochrane reviews are:

- Review strata 1 –Admission avoidance: Cochrane review on hospital at home admission avoidance. The review includes 10 trials.
  - 4 trials were included in the IPD analysis (hazard ratios and log hazard ratios presented for 2 of our protocol outcomes; mortality and admissions).
  - All 10 trials were included in the RCT meta-analysis. The RCT meta-analyses included RCT data from the 4 trials included in the IPD meta-analysis.
- Review strata 2- Early discharge: Cochrane review on hospital at home early discharge. The review includes 26 trials.
  - 13 trials were included in the IPD analysis (hazard ratios and log hazard ratios presented for 2 of our protocol outcomes; mortality and admissions).
  - All 26 trials were included in the RCT meta-analysis. The RCT meta-analyses included RCT data from the 13 trials included in the IPD meta-analysis.

The results of the IPD analysis have been presented as part of this evidence review (see section D.3, Appendix D).

See also the study selection flow chart in Appendix B, study evidence tables in Appendix E, forest plots in Appendix D, GRADE tables in Appendix G and excluded studies list in Appendix H.

12.3.2 Summary of included studies

Following is a summary of the number of studies included for each of the interventions:

- Hospital at home (led by primary care):
  - Number of studies identified in Cochrane reviews: 10.
  - Number of studies identified from search: 4.
- Hospital at home (led by secondary care):
  - Number of studies identified in Cochrane reviews: 4.
  - Number of studies identified from search: 3.
- Hospital at home (led by primary and secondary care):
  - Number of studies identified in Cochrane reviews: 7.
  - Number of studies identified from search: 1.
- Virtual wards:
  - Number of studies identified in Cochrane reviews: 0.
  - Number of studies identified from search: 2.
- Step up/down care:

- Number of studies identified in Cochrane reviews: 0.
- Number of studies identified from search: 5

See Table 2 below for details of the PICO characteristics of the studies included in the review.

Table 2: Summary of studies included in the review

Study	Intervention and comparison	Population	Outcomes	Comments
Cochrane reviews				
Jeppesen 2012[160]	Hospital at home for acute exacerbations of chronic obstructive pulmonary disease (COPD). - Randomised controlled trials comparing home versus hospital acre treatment for acute exacerbation of COPD.	Patients presenting to the emergency department with an exacerbation of their COPD. Studies must not have recruited patients for whom treatment at home is usually not viewed as an responsible option (for example, patients with an impaired level of consciousness, acute confusion, acute changes on the radiograph or electrocardiogram, arterial pH less than 7.35, concomitant medical conditions).	Mortality, readmission rates, health related quality of life, lung function and direct costs.	Eight RCTs in Cochrane review, of which 7 studies included in our evidence review One study Nissen 2007 not included as study not in English.
Shepperd 2008[271]	Hospital at home admission avoidance. Randomised controlled trials comparing admission avoidance hospital at home with acute hospital in-patient care.	Patients aged 18 years and over. The admission avoidance hospital at home interventions may admit patients directly from the community thereby avoiding physical contact with the hospital, or may admit from the emergency room.	Mortality, admissions, functional ability, quality of life, cognitive ability, patient satisfaction and costs.	Ten RCTs in Cochrane review , of which 8 RCTs included in our review. 2 RCTs excluded- Nicholson 2001- cost data only, Tibaldi 2004- no relevant outcomes .
Shepperd 2009[273]	Hospital at home early discharge. Randomised controlled trials comparing early discharge hospital at home with acute hospital in-patient	Patients aged 18 years and over. Evaluations of obstetric, paediatric and mental health hospital at home schemes are excluded from this	Mortality, readmission rates, satisfaction, destination at follow-up and cost savings	Twenty six RCTs in Cochrane review. (6/26 studies included our evidence review)

Study	Intervention and comparison	Population	Outcomes	Comments
	care.	review.		
Hospital at Home (Primary Care)				
Rich 1993[241] RCT	Hospital at home (extensive discharge planning). Team: nurse-led. Versus Control group: usual care after discharge (hospital services as required).	Adults (n=98) >70 years, with congestive heart failure. Washington University, USA.	Readmission (90 days), length of stay.	Not in Cochrane review. **EARLY DISCHARGE**
Utens 2012[300] Utens 2013[302] Utens 2014[303] RCT	Hospital from home (early discharge) Team: community nurses. Versus Control group: usual hospital care.	Adults (n=139) >40 years, admitted for exacerbation of COPD.	Admissions, quality of life, mortality, patient satisfaction and carer stress.	Not in Cochrane review. Follow up for 3 months. **EARLY DISCHARGE**
Corwin 2005[66] RCT	Hospital at home Team: GP or community GP and community care nurses. Versus Control group: hospital administration of antibiotics.	Adults (n=200) >16 years of age, with clinical signs of cellulitis or failure of oral antibiotics.	Readmission (within 4 weeks), length of stay and satisfaction.	Included in Cochrane review. Hospital at home admission avoidance. **ADMISSION AVOIDANCE**
Cotton 2000[67] RCT	Hospital at home (early discharge) Team: specialist respiratory nurses, GP. Versus Control: discharged after usual care.	Adults (n=81) exacerbation of COPD.	Readmissions (within 60 days), mortality.	Included in Cochrane review. Hospital at home early discharge. Hospital at home for acute exacerbations of chronic obstructive pulmonary disease (COPD). **EARLY DISCHARGE**
Hernandez 2003[141] RCT	Hospital at home (early discharge) Team: GP-led, respiratory nurse. Versus	Adults (n=222) with exacerbations of chronic COPD.	Mortality, presentations to ED, readmissions (8 weeks), length of stay, quality of life and patient	Included in Cochrane review Hospital at home for acute exacerbations of chronic obstructive pulmonary.

Study	Intervention and comparison	Population	Outcomes	Comments
	Control group: normal discharge after usual hospital care.		satisfaction.	**EARLY DISCHARGE**
Ojoo 2002[222] RCT	Hospital at home Team: outreach nurses. Versus Control group: inpatient care.	Adults (n= 60) >18 years, with an acute exacerbation of COPD.	Readmissions (3 months), mortality, quality of life, patient satisfaction and carer satisfaction.	Included in Cochrane review: Hospital at home early discharge. Hospital at home for acute exacerbations of chronic obstructive pulmonary. **EARLY DISCHARGE**
Richards 2005[242] RCT	Hospital at home Team: GP and primary care nurses. Versus Control group: hospital management.	Adults (n=55) with mild to moderately severe pneumonia.	Readmission (6 weeks), quality of life and adverse events.	Included in Cochrane review: Hospital at home admission avoidance. **ADMISSION AVOIDANCE**
Shepperd 1998[265] Shepperd 1998[268] RCT	Hospital at home Team: nurse-led, physiotherapist, occupational therapist, pathology, SALT. GPs held responsibility. Versus Control group: inpatient hospital care.	Adults (n=532) recovering from surgery mainly but elderly medical and COPD patients also (table 6&7); outcomes for medical elderly patients reported only.	Readmission (3 months), mortality, quality of life and carer stress.	Included in Cochrane review: Hospital at home early discharge. **EARLY DISCHARGE**
Talcott 2011[286] RCT USA	Home treatment: Supervised by the patients treating physician with additional assistance available from the research team. Patients at home were required to measure their temperature and blood pressure at least 4 times daily. They were examined by a home care nurse	n=117 Adult outpatients with post chemotherapy fever and neutropenia (absolute neutrophil count less than 500µl) that persisted after at least 24 hours.	Mortality and hospital re-admission.	**Admission avoidance**

Study	Intervention and comparison	Population	Outcomes	Comments
	who used a written protocol and was instructed to contact the primary physician if abnormal findings occurred. In addition, a physician examined each home care patient 2 to 4 days after discharge, at least weekly thereafter. Outpatients were readmitted to the hospital whenever a physician felt the patient's condition warranted it, if the patient requested or it proved infeasible to administer the prescribed antibiotics. Control: Continued inpatient antibiotic therapy.			
Wilson 1999[312] Wilson 2002[314] Wilson 2003[313] RCT	Hospital at home Team: nurse-led, physiotherapist, occupational therapists, health workers. GPs retain responsibility. Versus Control group: hospital care.	Adults (n=199) with an acute condition.	Mortality and readmissions (3 months).	Included in Cochrane review: Hospital at home admission avoidance. **ADMISSION AVOIDANCE**
Hospital at Home (Secondary care)				
Ince 2014[154] RCT Turkey	Home monitoring group. After a median of 12 hours patients discharged from hospital and visited on 2nd, 3rd and 5th days by staff nurse. Patients discharged with an IV port and basic instructions for the maintenance of the port. All patients	Patients aged >18 years with a diagnosis of mild non-alcoholic acute intestinal pancreatitis.	30 day hospital re-admission.	Not in Cochrane review. **EARLY DISCHARGE**

Study	Intervention and comparison	Population	Outcomes	Comments
	were visited in their homes twice a day by an experienced nurse and all information transferred back to the attending physician. Patients given phone numbers of 2 physicians as emergency contacts. Versus Hospital group – treatment in hospital.			
Mendoza 2009[202] RCT	Hospital at Home (seen daily by specialist nurse and physician; from hospital). Versus Inpatient hospital care.	Adults (n=80) >65 years of age with decompensated heart failure were recruited from Emergency Department of Spanish University Hospital.	Mortality, readmission (for HF within 1 year follow-up), length of stay and quality of life.	Not in Cochrane review. Follow up for 12 months. **ADMISSION AVOIDANCE**
Patel 2008[229] RCT	Hospital at Home (seen by specialist nurse at home; access to cardiologist consultant via phone). Versus Inpatient hospital care.	Adults (n=31)with a mean age of 77 years, presenting with deteriorating chronic heart failure were recruited from Swedish University Hospital.	Mortality and length of stay.	Not in Cochrane review. Follow up for 12 months. **EARLY DISCHARGE**
Tibaldi 2009[296] RCT	Hospital at Home (geriatricians, nurses, physiotherapists, social worker and counsellor). Versus Inpatient hospital care (general medical ward).	Elderly patients (n=101) with acute decompensation of chronic heart failure were recruited from the Emergency Department of an Italian University Teaching and Tertiary Care Hospital.	Mortality, admissions, length of stay and quality of life.	Not in Cochrane review. Follow up for 6 months. **ADMISSION AVOIDANCE**
Aimonino 2008[7]	Hospital at home Team: geriatricians, nurses,	Adults (n=104) >75 years of age, presenting with	Readmission (at 6 months), mortality at 6 month, length	Included in Cochrane review: Randomised controlled

Study	Intervention and comparison	Population	Outcomes	Comments
RCT	physiotherapists, social workers, counsellors. Versus Control group: routine hospital care.	acute exacerbation of COPD.	of stay, quality of life, patient satisfaction and carer stress.	trials comparing home versus hospital care treatment for acute exacerbation of COPD. 6 month follow up. **ADMISSION AVOIDANCE**
Vianello 2013A[304] RCT Italy	Hospital at home: Non-invasive ventilation (NIV) delivered at home by a portable ventilator; manually and/or mechanically assisted cough; continuous SpO2 monitoring; antibiotic therapy; pulmonology visit at home; district nurse visit at home and telephone access to pulmonologists. Hospital group: Received usual care, consisting of the same drugs and all other supportive measures delivered to the hospital at home group at the discretion of the ward team.	n=59 Neuromuscular disease patients with respiratory tract infection and with urgent need of hospitalisation.	Hospitalisation.	**ADMISSION AVOIDANCE**
Hospital at Home (Primary & Secondary Care)				
Nikolaus 1999[216] RCT	Hospital at Home Team: GP-led, nurses, physiotherapist and occupational therapists. Worked closely with hospital staff and primary care physician. Versus Control group: usual care in hospital and follow-up.	Adults (n=545) >65 years. Elderly hospitalised patients.	Mortality, readmission (at 1 year follow-up), length of stay and patient satisfaction.	Not in Cochrane review. 12 month follow up. **EARLY DISCHARGE**
Bowler	Hospital at Home (in-	Patients (n=25)	Readmissions (at 1	In Cochrane review:

Study	Intervention and comparison	Population	Outcomes	Comments
2001[38] RCT	patient status; home visits by nurses, GP and daily contact between these HP and hospital respiratory team) Versus Control: inpatient hospital care.	presenting with exacerbation of chronic obstructive pulmonary disease to emergency departments (or respiratory outpatient clinic) of hospital in Brisbane, Australia.	year follow-up).	Randomised controlled trials comparing home versus hospital care treatment for acute exacerbation of COPD. **EARLY DISCHARGE**
Caplan 2005[46] Caplan 1999[47] RCT	Hospital outreach team providing antibiotics, medications, blood transfusion. Team included nurse, GP, hospital physician, physiotherapists and occupational therapist. Versus Control group: inpatient care plus treated in accordance with standard regimens.	Adults (n=100) >65 years of age. Range of conditions including pneumonia, urinary tract infections and cellulitis, endocarditis and osteomyelitis. Recruited from admission.	Admissions, adverse events, patient satisfaction and carer satisfaction.	Included in Cochrane review: Hospital at home admission avoidance. 3 month follow up. **ADMISSION AVOIDANCE**
Davies 2000[79] RCT	Hospital at home. Team: nurse-led but 'clinical responsibility for the patients remained with the hospital respiratory physician'. Versus Control group: hospital care as an inpatient.	Adults (n=150) with a mean age of 70 years; experiencing an acute exacerbation of COPD.	Readmissions (3 months), quality of life and mortality.	Included in Cochrane review: Hospital at home admission avoidance and Randomised controlled trials comparing home versus hospital care treatment for acute exacerbation of COPD. 3 month follow up **ADMISSION AVOIDANCE**
Donald 1995[89] RCT	Hospital at home Team: full-time nurse, manager/coordinator, physiotherapists and occupational therapists. Overall responsibility for the	Adults (n=60) with a mean age of 82 years, who had been admitted acutely under the care of the elderly care physicians.	Readmission (6 months) and mortality.	In Cochrane review: Hospital at home early discharge. **EARLY DISCHARGE**

Study	Intervention and comparison	Population	Outcomes	Comments
	patient while under the care of HAH remained with the consultant, although the GP provided routine and emergency medical care. Versus Control group: conventional discharge.			
Harris 2005[138] RCT	Hospital at home Team: nurse-led but 'clinical responsibility was held by dedicated HAH registrar, consultant geriatrician and in some cases the GP'. Versus Standard hospital inpatient care.	Adults (n=285) with a mean age of 81 years presenting at ED or admitted to hospital for a broad range of diagnoses: fractures (28%); miscellaneous medical problems (18%); respiratory problems (16%); stroke and neurological diagnoses (14%); falls and injuries (11%); cardiac diagnoses (8%); and rehabilitation and other problems (5%). Location: New Zealand.	Readmission (30 days), admissions, mortality, length of stay, quality of life, carer stress, carer satisfaction and patient satisfaction.	Included in Cochrane review: Hospital at home admission avoidance. Hospital at home early discharge. **EARLY DISCHARGE**
Skwarska 2000[277] RCT	Hospital at home Team: GP and nurses. Review at weekly meetings with consultant and medical advice from on call registrar or consultant. Versus Control group: treated in the inpatient respiratory unit.	Adults (n=184) with an acute exacerbation of COPD.	Readmissions (at 3 months), admissions, mortality.	Included in Cochrane review: Hospital at home early discharge. Hospital at home for acute exacerbations of chronic obstructive pulmonary. Follow up of 18 months. **EARLY DISCHARGE**
Step up – Step down/Community Hospital				
Applegate19	Community hospital	Patients (n=155)	Mortality and	Not in Cochrane

Study	Intervention and comparison	Population	Outcomes	Comments
90[16] RCT	(geriatric assessment unit) versus usual care. Team consisted of physicians, rehabilitation nurses, physical therapists, occupational therapist, psychologists, social workers, nutritionists and specialists in speech therapy and audiology. Usual care: received wide range of services after discharge from the acute care hospital, include home health care and care in other rehabilitation units (that is, community services).	aged 65 years or over, risk of nursing home placement and potentially reversible functional impairment. All recruited from geriatric assessment unit.	length of stay.	review. Follow up of 12 months. **ADMISSION AVOIDANCE**
Garasen 2007[110] Garasen 2008[109] RCT	Community Hospital versus traditional prolonged care at a general hospital group.	Patients (n=142) aged 60 years or more admitted to the general hospital due to an acute illness or an acute exacerbation of a known chronic disease.	Mortality, readmission (26 week follow-up) and length of stay.	Not in Cochrane review. Follow up of 12 months. **EARLY DISCHARGE**
Herfjord 2014[140] RCT Norway	Intermediate care- Patients transferred from hospital to a nursing home unit with increased staff and multi-disciplinary assessment for a maximum stay of 3 weeks. Versus Usual care in hospital.	Patients admitted acutely from home to medical or orthopaedic department, aged 70 years or older, respiratory and circulatory stable and deemed able to return home within 3 weeks. Exclusion criteria: severe dementia, delirium, any need for surgery or intensive care treatment.	Mortality (1 year) and length of hospital stay.	Not in Cochrane review. Follow-up 1 year. **EARLY DISCHARGE**
Young 2007[322]	Community Hospital versus general	Elderly patients (n=390) requiring	Mortality.	Not in Cochrane review.

Study	Intervention and comparison	Population	Outcomes	Comments
RCT	hospital.	rehabilitation after hospital admission with acute illness.		Follow up for 6 months. **EARLY DISCHARGE**
Virtual Wards				
Jakobsen 2015 [159] RCT Denmark	Virtual hospital - home based tele-health hospitalisation. Participants were transported home within the first 24 hours of hospital admission. Patients were given the following equipment: touch screen with webcam, spirometer, thermometer, nebuliser, medicines and oxygen compressor. Daily ward rounds using the touch screen at appointed hours. Versus Usual care- standard hospital treatment.	Patients >45 years of age, with severe or very severe COPD, who had an acute exacerbation of COPD, who were compliant, and who had an expected hospitalisation of more than 2 days.	Mortality and quality of life.	Not in Cochrane review. **EARLY DISCHARGE**
Dhalla 2014[83] RCT	Virtual Ward (received usual care plus daily MDT meetings; patients were assessed by phone, at home or the clinic) versus usual care.	Adults (n=1923) at high risk of readmission (determined by length of stay, acuity of admission, comorbidities and emergency department visits in previous 6 months) being discharged from the general medicine wards of 4 participating hospitals in Toronto, Canada. Patients: 10% heart failure, 90% other conditions (not	Mortality, readmission (at 30 days) and presentations to ED.	Not in Cochrane review. Outcomes closest to discharge reported that is, 30 days. Paper also reports the same outcomes at 90 days, 6 months and 1 year. **ADMISSION AVOIDANCE**

Study	Intervention and comparison	Population	Outcomes	Comments
		specified).		

Table 3: Summary GRADE profiles for alternatives compared with hospital care

Alternatives compared to Hospital care					
Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Hospital care	Risk difference with Alternatives (95% CI)
Alternatives compared with Hospital at home led by primary care - early discharge					
Mortality - early discharge - Hospital at home led by primary care	591 (5 studies)	⊕⊕⊖⊖ LOWa due to imprecision	RR 0.9 (0.47 to 1.71)	Moderate	
				69 per 1000	7 fewer per 1000 (from 37 fewer to 49 more)
Length of stay (initial inpatient days) - early discharge - Hospital at home led by primary care	222 (1 study)	⊕⊕⊕⊖ MODERATEa due to imprecision			The mean length of stay (initial inpatient days) - early discharge - hospital at home led by primary care in the intervention groups was 2.44 lower (3.34 to 1.54 lower)
Admissions - early discharge - Hospital at home led by primary care	585 (6 studies)	⊕⊕⊖⊖ LOWa,b due to risk of bias, imprecision	RR 0.92 (0.73 to 1.15)	Moderate	
				367 per 1000	29 fewer per 1000 (from 99 fewer to 55 more)
Presentations to ED - early discharge - Hospital at home led by primary care	222 (1 study)	⊕⊕⊕⊖ MODERATEa due to imprecision	RR 0.44 (0.22 to 0.86)	Moderate	
				208 per 1000	116 fewer per 1000 (from 29 fewer to 162 fewer)
Quality of life (high score is good) - early discharge - hospital at home led by primary care (SGRQ; change score; reversed)	282 (2 studies)	⊕⊕⊕⊖ MODERATEa due to imprecision			The mean QOL (high score is good) - early discharge - hospital at home led by (SGRQ change score; reversed) in the intervention groups was 3.49 higher (0.38 lower to 7.36 higher)
Quality of life (higher values better QoL) - early discharge - hospital at home led by primary care (COOP chart; change score; reversed)	75 (1 study)	⊕⊕⊕⊖ MODERATEa due to imprecision			The mean Quality of life (higher values better QOL) - early discharge - hospital at home led by primary care (COOP chart; change score; reversed) in the intervention groups was

Alternatives compared to Hospital care					
					0.17 standard deviations higher (0.29 lower to 0.62 higher)
Patient Satisfaction (continuous-higher values more satisfied) - early discharge - Hospital at home led by primary care	285 (2 studies)	⊕⊕⊕⊕ HIGH			The mean patient satisfaction (continuous-higher values more satisfied) - early discharge - hospital at home led by primary care in the intervention groups was 0.25 standard deviations higher (0.01 to 0.48 higher)
Patient satisfaction (dichotomous) - early discharge - Hospital at home led by Primary care	54 (1 study)	⊕⊕⊕⊖ MODERATEb due to risk of bias	RR 1.04 (0.88 to 1.24)	Moderate	
				889 per 1000	36 more per 1000 (from 107 fewer to 213 more)
Carer satisfaction (dichotomous) - early discharge - Hospital at home led by primary care	34 (1 study)	⊕⊕⊕⊖ MODERATEb due to risk of bias	RR 0.97 (0.79 to 1.19)	Moderate	
				929 per 1000	28 fewer per 1000 (from 195 fewer to 177 more)
Quality of life (high score is good) - early discharge - hospital at home led by primary care (EQ-5D; change score)	101 (1 study)	⊕⊕⊖⊖ LOWa,b due to risk of bias, imprecision			The mean Quality of life (high score is good) - early discharge - hospital at home led by primary care (eq-5d; change score) in the intervention groups was 0.04 higher (0.07 lower to 0.16 higher)
Alternatives compared with Hospital at home led by secondary care- early discharge					
Mortality - early discharge - Hospital at home led by secondary care	31 (1study)	⊕⊖⊖⊖ VERY LOWa,b due to risk of bias, imprecision	RR 1.38 (0.22 to 8.59)	Moderate	
				111 per 1000	42 more per 1000 (from 87 fewer to 842 more)
Readmissions-early discharge- Hospital at home led by secondary care	84 (1 study)	⊕⊖⊖⊖ VERY LOWa,b,c due to risk of bias, imprecision,	RR 0.50 (0.05 to 5.31)	Moderate	
				127 per 1000	64 fewer per 1000 (from 121 fewer to 547 more)

Alternatives compared to Hospital care					
		inconsistency,			
Alternatives compared with Hospital at home led by primary and secondary care - early discharge					
Mortality - early discharge - Hospital at home led by both primary and secondary care	895 (4 studies)	⨁⨀⨀⨀ VERY LOWa,b due to risk of bias, imprecision	RR 1.02 (0.72 to 1.44)	Moderate	
				140 per 1000	3 more per 1000 (from 39 fewer to 62 more)
Readmissions (30 days) - early discharge - Hospital at home led by both primary and secondary care	285 (1 study)	⨁⨁⨁⨀ MODERATEa due to imprecision	RR 1.66 (0.97 to 2.83)	Moderate	
				127 per 1000	84 more per 1000 (from 4 fewer to 232 more)
Admissions - early discharge - Hospital at home led by both primary and secondary care	835 (5 studies)	⨁⨁⨁⨀ MODERATEb due to risk of bias	RR 0.94 (0.74 to 1.2)	Moderate	
				200 per 1000	12 fewer per 1000 (from 52 fewer to 40 more)
Length of stay (days in treatment) - early discharge - Hospital at home led by primary and secondary care	285 (1 study)	⨁⨁⨁⨀ MODERATEa due to imprecision			The mean length of stay (days in treatment) - early discharge - hospital at home led by primary and secondary care in the intervention groups was 3.1 higher (1.81 to 4.39 higher)
Carer satisfaction (dichotomous) - early discharge - Hospital at home led by both primary and secondary care	127 (1 study)	⨁⨁⨁⨀ MODERATEa due to imprecision	RR 1.61 (1.14 to 2.28)	Moderate	
				414 per 1000	253 more per 1000 (from 58 more to 530 more)
Patient Satisfaction (continuous-higher values more satisfied) - early discharge - Hospital at home led by primary and secondary care	281 (1 study)	⨁⨁⨁⨀ MODERATEb due to risk of bias			The mean patient satisfaction (continuous-higher values more satisfied) - early discharge - hospital at home led by primary and secondary care in the intervention groups was 0.25 standard deviations higher (0.01 to 0.48 higher)
Quality of life (high score is good) - early discharge - hospital at home led by primary and secondary care	241 (1 study)	⨁⨁⨁⨁ HIGH			The mean Quality of life (high score is good) - early discharge - hospital at home led by primary and

Alternatives compared to Hospital care					
(final score; SF-36; physical)					secondary care (final score; sf-36; physical) in the intervention groups was 0.4 higher (2.2 lower to 3 higher)
Patient satisfaction (dichotomous) - early discharge - Hospital at home led by both primary and secondary care	232 (1 study)	⨁⨁⨁⊖ MODERATE[a] due to imprecision	RR 1.15 (1 to 1.32)	Moderate	
				725 per 1000	109 more per 1000 (from 0 more to 232 more)
Quality of life (high score is good) - early discharge - hospital at home led by primary and secondary care (final score; SF-36; mental)	241 (1 study)	⨁⨁⨁⨁ HIGH			The mean Quality of life (high score is good) - early discharge - hospital at home led by primary and secondary care (final score; sf-36; mental) in the intervention groups was 1.3 higher (1.55 lower to 4.15 higher)
Alternatives compared with step-up/down care- early discharge					
Mortality - early discharge - Step up/down care	1008 (3 studies)	⨁⨁⊖⊖ LOW[a,b] due to risk of bias, imprecision	RR 0.88 (0.71 to 1.1)	Moderate	
				215 per 1000	26 fewer per 1000 (from 62 more to 22 more)
Length of stay (initial inpatient days) - early discharge - Step up/down care	518 (2 studies)	⨁⊖⊖⊖ VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision			The mean length of stay (initial inpatient days) - early discharge - step up/down care in the intervention groups was 3.59 higher (1.23 to 5.95 higher)
Readmissions - early discharge - Step up/down care	142 (1 study)	⨁⨁⨁⊖ MODERATE[a] due to imprecision	RR 0.54 (0.31 to 0.96)	Moderate	
				357 per 1000	164 fewer per 1000 (from 14 fewer to 246 fewer)
Alternatives compared with virtual wards- early discharge					
Mortality- early discharge- virtual wards	57	⨁⊖⊖⊖	RR 0.72	Moderate	

Alternatives compared to Hospital care					
	(1 study)	VERY LOW[a,b] due to risk of bias, imprecision	(0.18 to 2.95)	143 per 1000	40 fewer per 1000 (from 117 more to 279 more)
Quality of life -early discharge- virtual wards (EQ-5D summary index; change score)	57 (1 study)	⊕⊕⊕⊖ MODERATE[b] due to risk of bias			The mean Quality of life -early discharge- virtual wards (eq-5d summary index; change score) in the intervention groups was 0.00 higher (0.15 lower to 0.15 higher)
Alternatives compared with hospital at home led by primary care- admission avoidance					
Mortality - Admission avoidance - Hospital at home led by primary care	285 (2 studies)	⊕⊕⊕⊖ MODERATE[a] due to imprecision	RR 0.82 (0.53 to 1.29)	Moderate	
				309 per 1000	56 fewer per 1000 (from 145 fewer to 90 more)
Admissions(>30 days) - Admission avoidance - Hospital at home led by primary care	285 (2 studies)	⊕⊕⊖⊖ LOW[a] due to imprecision	RR 1.29 (0.73 to 2.29)	Moderate	
				100 per 1000	30 more per 1000 (from 28 fewer to 133 more)
Adverse events - Admission avoidance - Hospital at home led by primary care	49 (1 study)	⊕⊕⊖⊖ LOW[a] due to imprecision	RR 1.3 (0.62 to 2.73)	Moderate	
				320 per 1000	96 more per 1000 (from 122 fewer to 554 more)
Days to discharge (hazard ratio) - Admission avoidance - Hospital at Home Primary Care (Hazard Ratio)	194 (1 study)	⊕⊕⊖⊖ LOW[a] due to imprecision	HR 0.95 (0.71 to 1.27)	Moderate	
				0 per 1000	-
Patient satisfaction (dichotomous) - Admission avoidance - Hospital at home led by Primary care	179 (1 study)	⊕⊕⊕⊕ HIGH	RR 0.97 (0.92 to 1.02)	Moderate	
				989 per 1000	30 fewer per 1000 (from 79 fewer to 20 more)

Alternatives compared to Hospital care					
Readmissions(≤30 days) - Admission avoidance - Hospital at home led by primary care	307 (2 studies)	⊕⊕⊕⊕ HIGH	RR 4.68 (1.53 to 14.31)	Moderate	
				31per 1000	31per 1000
Quality of life (high score is good) - Admission avoidance - hospital at home led by primary care (final score; SF-12; mental)	49 (1 study)	⊕⊕⊖⊖ LOW[a] due to imprecision			The mean Quality of life (high score is good) - admission avoidance - hospital at home led by primary care (final score; sf-12; mental) in the intervention groups was 0.6 lower (5.46 lower to 4.26 higher)
Quality of life (high score is good) - Admission avoidance - hospital at home led by primary care (final score; SF-12; physical)	49 (1 study)	⊕⊕⊕⊖ MODERATE[a] due to imprecision			The mean Quality of life (high score is good) - admission avoidance - hospital at home led by primary care (final score; sf-12; physical) in the intervention groups was 3.6 lower (8.78 lower to 1.58 higher)
Alternatives compared with hospital at home led by secondary care- admission avoidance					
Mortality - Admission avoidance - Hospital at home led by secondary care	329 (4 studies)	⊕⊕⊖⊖ LOW[a] due to imprecision	RR 0.8 (0.47 to 1.35)	Moderate	
				150 per 1000	30 fewer per 1000 (from 80 fewer to 53 more)
Admissions(>30 days) - Admission avoidance - Hospital at home led by secondary care	252 (3 studies)	⊕⊕⊖⊖ LOW[a,b] due to risk of bias, imprecision	RR 0.56 (0.42 to 0.75)	Moderate	
				500 per 1000	220 fewer per 1000 (from 125 fewer to 290 fewer)
Length of stay (days in treatment) - Admission avoidance - Hospital at home led by secondary care	172 (2 studies)	⊕⊕⊖⊖ LOW[b,d] due to risk of bias, inconsistency			The mean length of stay (days in treatment) - admission avoidance - hospital at home led by secondary care in the intervention groups was 4.69 higher (2.86 to 6.52 higher)
Quality of life high score is good) - Admission	71	⊕⊕⊖⊖			The mean Quality of life (high score is good) -

Alternatives compared to Hospital care					
avoidance - hospital at home led by secondary care (change score; SF-36; mental)	(1 study)	LOW[a,b] due to risk of bias, imprecision			admission avoidance - hospital at home led by secondary care (change score; sf-36; mental) in the intervention groups was 1.2 higher (1.46 lower to 3.86 higher)
Patient satisfaction (dichotomous) - Admission avoidance - Hospital at home led by secondary care	104 (1 study)	⊕⊕⊕⊕ HIGH	RR 1.07 (0.95 to 1.2)	Moderate	
				885 per 1000	62 more per 1000 (from 44 fewer to 177 more)
Quality of life (high score is good) - Admission avoidance- hospital at home led by secondary care (NHP, change score; reversed)	205 (2 studies)	⊕⊕⊕⊖ MODERATE[e] due to inconsistency			The mean Quality of life (high score is good) - admission avoidance - hospital at home led by secondary care (nhp, change score; reversed) in the intervention groups was 1.13 higher (0.29 to 1.97 higher)
Quality of life (high score is good) - Admission avoidance- hospital at home led by secondary care (change score; SF-36; physical)	71 (1 study)	⊕⊕⊖⊖ LOW[a,b] due to risk of bias, imprecision			The mean Quality of life (high score is good) - admission avoidance - hospital at home led by secondary care (change score; sf-36; physical) in the intervention groups was 1.4 higher (2.38 lower to 5.18 higher)
Alternatives compared with hospital at home led by primary and secondary care- admission avoidance					
Adverse events - Admission avoidance - Hospital at home led by both primary and secondary care	100 (1 study)	⊕⊕⊖⊖ LOW[a] due to imprecision	RR 0.72 (0.27 to 1.93)	Moderate	
				163 per 1000	46 fewer per 1000 (from 119 fewer to 152 more)
Admissions(>30 days) - Admission avoidance - Hospital at home led by both primary and secondary care	250 (2 studies)	⊕⊕⊖⊖ LOW[a] due to imprecision	RR 1.14 (0.74 to 1.74)	Moderate	
				221 per 1000	31 more per 1000 (from 57 fewer to 164 more)
Mortality - Admission avoidance - Hospital at home led by both primary and secondary care	150 (1 study)	⊕⊕⊖⊖ LOW[a] due to imprecision	RR 1.12 (0.36 to 3.47)	Moderate	
				80 per 1000	10 more per 1000 (from 51 fewer to 198 more)
Patient Satisfaction (continuous-higher score is good) - Admission avoidance - Hospital at home led by	60 (1 study)	⊕⊕⊖⊖ LOW[a]			The mean patient satisfaction (continuous-higher score is good) - admission avoidance - hospital at

Alternatives compared to Hospital care					
primary and secondary care (reversed scale)		due to imprecision			home led by primary and secondary care (reversed scale) in the intervention groups was 1.98 standard deviations higher (1.33 to 2.64 higher)
Carer satisfaction (continuous) - Admission avoidance - Hospital at home led by primary and secondary care	41 (1 study)	⊕⊕⊕⊕ HIGH			The mean carer satisfaction (continuous) - admission avoidance - hospital at home led by primary and secondary care in the intervention groups was 1.55 standard deviations higher (0.8 to 2.29 higher)
Quality of life (high score is good) - Admission avoidance - hospital at home led by primary and secondary care (SGRQ; change score; reversed)	50 (1 study)	⊕⊕⊕⊖ MODERATE[a] due to imprecision			The mean Quality of life l (high score is good) - admission avoidance - hospital at home led by primary and secondary care (sgrq; change score; reversed) in the intervention groups was 2.83 lower (11.75 lower to 6.09 higher)
Alternatives compared with step-up/down care- admission avoidance					
Length of stay (initial inpatient days) - Admission avoidance - Step up/down care	155 (1 study)	⊕⊕⊖⊖ LOW[a,b] due to risk of bias, imprecision			The mean length of stay (initial inpatient days) - admission avoidance - step up/down care in the intervention groups was 4.1 lower (8.58 lower to 0.38 higher)
Mortality - Admission avoidance - Step up/down care	155 (1 study)	⊕⊕⊕⊖ MODERATE[a] due to imprecision	RR 0.49 (0.22 to 1.09)	Moderate	
				208 per 1000	106 fewer per 1000 (from 162 fewer to 19 more)
Alternatives compared with virtual wards- admission avoidance					
Mortality - Admission avoidance - Virtual wards	1913 (1 study)	⊕⊕⊖⊖ LOW[a] due to imprecision	RR 0.85 (0.56 to 1.28)	Moderate	
				49 per 1000	7 fewer per 1000 (from 22 fewer to 14 more)
Readmissions (30 days) - Admission avoidance - Virtual wards	1919 (1 study)	⊕⊕⊕⊕ HIGH	RR 0.89 (0.74 to 1.06)	Moderate	
				213 per 1000	23 fewer per 1000 (from 55 fewer to 13 more)
Presentations to ED - Admission avoidance - Virtual wards	1920 (1 study)	⊕⊕⊕⊕ HIGH	RR 0.95 (0.82 to	Moderate	

Alternatives compared to Hospital care					
			1.09)	296 per 1000	15 fewer per 1000 (from 53 fewer to 27 more)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID point, and downgraded by 2 increments if the confidence interval crossed 2 MID points.
(b) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias.
(c) Downgraded by 1 or 2 increments because heterogeneity, I^2=92%, unexplained by sub-group analysis.
(d) Downgraded by 1 or 2 increments because heterogeneity, I^2=88%, unexplained by sub-group analysis.
(e) Downgraded by 1 or 2 increments because heterogeneity, I^2=50%, unexplained by sub-group analysis.

Narrative findings

Length of hospital stay

Cotton 2000[67]

Mean length of initial admission (range) for the early discharge group 3.2 (1-16) and for conventional management 6.1 (1-13).

Richards 2005[242]

The median number of days to discharge in the home group was 4 (range: 1-14), compared with 2 (range, 0-10) in the hospital group (p=0.004).

Wilson 1999[312]

Analyses by intention to treat showed significantly shorter stays in care for the hospital at home group than for the hospital group (median initial stay, 8 days versus 14.5 days, p=0.026); median total days of care in 3 months, 9 days versus 16 days, p=0.031.

Donald 1995[89]

At 6 months the hospital at home total days in hospital (after study entry) of 22.5 (IQR 5-30) and the control group a mean number of days of 20.2 (IQR 8-27).

Applegate 1990[16]

The mean length of stay in the geriatric assessment unit was 23.6 (+/-13.2) days. For the high risk stratum, the average stay was 28.6 (+/-14.4days) and for the lower risk stratum it was 21.1 (+/-11.9) days.

Zimmer 1985[325]

Mean length of hospital stay during first 6 months for intervention (n=81) was 12.6 days and for control was 14.3 days.

Emergency department visits

Aiken 2006[6]

In the 6 months prior to the onset of PhoenixCare intervention, PhoenixCare participants averaged 0.12 emergency department visits per month (SD=0.18). Control participants averaged 0.11 emergency department visits per month (SD=0.02). This level of utilisation remained essentially unchanged during the intervention, with averages of 0.11 (SD=0.34) and 0.10 (SD=0.31) visits per month for Phoenix Care and control participants, respectively.

Zimmer 1985[325]

Mean ED visits per patient per month for days at risk in the first 6 months of study; intervention (n=81) 0.26 and control (n=75) 0.05.

Quality of Life

Applegate 1990[16]

The group assigned to the geriatric assessment unit had significantly more improvement ($p<0.05$) than the control group in regard to 3 basic self-care activities (bathing, dressing and the ability to transfer) during the 6 months after randomisation.

Patient satisfaction

Richards 2005[242]

Patient satisfaction with medical and nursing care was high in both groups, but significantly higher in the home care group (p=0.001). In the home care group, all patients reported that they were 'very happy' with their care. In the hospital care group, 60% were 'very happy', 32% 'quite happy' and 8% 'neither happy nor unhappy'.

Wilson 2002[314]

Patient satisfaction was greater with Hospital at Home than with hospital. Reasons included a more personal style of care and a feeling that staying at home was therapeutic. Carers did not feel that Hospital at Home imposed an extra workload.

Skwarska[277]

Replies to the questionnaires on satisfaction with the service were received from 69% of the patients treated at home, 95% of whom said they were 'completely satisfied' with the services and 90% felt they had been cared for just as well or better at home than they would have been in hospital.

Young 2007[322]

The reported patient satisfaction was similar for both groups. At 1 week after hospital discharge, the community hospital group showed greater satisfaction with the statement 'I am happy with the amount of recovery I have made' (odds ratio=2.12, 95% CI=1.30-3.46; p=0.004).

Zimmer 1985[325]

Mean unadjusted patient satisfaction scores at 6 months for the community palliative group was 95.0 (n=31; p=not statically significant) and for the control group 89.3 (n=22; p=not statically significant).

Carer satisfaction

Donald 1995[89]

There were 13 HAH carers and 7 control group carers, all of whom were interviewed at each assessment. A large majority of carers were happy with the timing of discharge. Questions ratings carer's opinions of how good they were at the caring role, and how well they were coping, were answered similarly with 2 HAH carers and 1 control group carer admitting difficulties in coping. No clear differences between the groups emerged, but the numbers were small.

Carer stress

Tibaldi 2009[296]

The level of stress of the caregiver was high on admission in both groups but more severe in caregivers of Geriatric Home Hospital Service (relative stress scale score, 25.4 [16.6] versus 17.1 [10.8] in the general medical ward group; p=0.003).

12.4 Economic evidence

Twelve economic evaluations, published in 13 papers, relating to hospital-at-home, virtual wards and step-up/step down community care have been included in this review.[7,23,102,118,202,204,229,235,242,288,292,296,304] One study[204] was relevant to all 3 of these strata.

These are summarised in the economic evidence profile tables (Table 4, to Table 10) and the economic evidence tables in Appendix E.

One study[239] of hospital-at-home was excluded due to very serious limitations and three more[17,165,225] were selectively excluded because there was better quality evidence available. One paper relating to step-up/step-down interventions was identified but was excluded due to the availability of more applicable evidence.[221] Another paper relating to virtual wards was identified but excluded due to serious limitations.[186] All of these are listed in Appendix H, with reasons for exclusion given.

The economic article selection protocol and flow chart for the whole guideline can found in the guideline's Appendix 41A and Appendix 41B.

Table 4: Economic evidence summary - Hospital at home versus inpatient care

Study	Country	Subgroup	Study design	Population	Incremental cost per patient	Main incremental effect per patient	Cost effectiveness
Admission avoidance							
Aimonino Ricauda 2008[7]	Italy	Hospital-led	RCT	COPD	Saves £202	-6% mortality	HaH dominates
Mendoza 2009[202]	Spain	Hospital-led	RCT	Heart Failure	Saves £2800	-3.4% mortality	HaH dominates
Richards 2005[242]	New Zealand	Primary care-led	RCT	Community acquired pneumonia	Saves £171	4.3% avoidable adverse events	Inpatient care costs £3,976 per AE avoided
Tibaldi 2009[296]	Italy	Hospital	RCT	Heart Failure	Saves £217	No difference in mortality	HaH dominates
Thornton 2005[292] &Elliott 2005[102]	UK	Hospital-led	Retrospective cohort study	Cystic Fibrosis	Saves £9,081	-16.2% patients with </= 0% decline in respiratory function	Inpatient care costs £46,098 per extra patient with no decline
Vianello 2013[304]	Italy	Both hospital and primary care	RCT	Neuromuscular disease patients with Respiratory tract infection	Saves £7,395	-3.3% mortality	HaH dominates
Early discharge							
Goossens 2013[118]	Netherlands	Primary care-led	RCT	COPD	Saves £131	-0.005 QALYs	Inpatient care cost £24,000 per QALY

Note: All studies were rated as partially applicable with potentially serious limitations – QALYs were rarely estimated; not all costs were included; only 2 studies were from a UK NHS perspective; based on individual studies rather than a systematic review of the evidence.
AE: adverse events; COPD=chronic obstructive pulmonary disease; HaH=Hospital-at- home; RCT=randomised controlled trial.

Study	Country	Subgroup	Study design	Population	Incremental cost per patient	Main incremental effect per patient	Cost effectiveness
Both admission avoidance and early discharge							
Bakerly 2009[23]	UK	Hospital-led	Matched case-control	COPD	Saves £600	N/A	HaH cost-saving
Patel 2008[229]	Sweden	Hospital-led	RCT	Heart failure	Saves £1960	+0.01 QALYs	HaH dominates
Puig-Junov 2007[235]	Spain	Primary care-led	RCT	COPD	Saves £560	-2.8% mortality (Hernandez 2003[141])	HaH dominates
Teuffel 2011[288]	Canada	Hospital-led	Decision tree	Cancer with low risk febrile neutropenia	Saves £4,000-£5,500	+0.03-0.1 QAFNEs	HaH dominates

Note: All studies were rated as partially applicable with potentially serious limitations – QALYs were rarely estimated; not all costs were included; only 2 studies were from a UK NHS perspective; based on individual studies rather than a systematic review of the evidence.

COPD=chronic obstructive pulmonary disease; HaH=Hospital-at- home; N/A: not applicable (for comparative costing studies); QALY=quality-adjusted life-year; QAFNE=quality-adjusted febrile neutropaenia episode; RCT=randomised controlled trial.

Table 5: Economic evidence profile: Hospital at home versus inpatient hospital care – Admission avoidance

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Aimonino Ricauda 2008[7]	Partially applicable[(a)]	Potentially serious limitations[(b)]	RCT. Elderly patients aged > 75 years, with exacerbation of COPD who were assessed in the ED for at least 12 to 24 hours and with stable clinical condition. Admission to a physician-led, substitutive clinical unit model at a geriatric home under the care of a team of geriatricians, nurses, physiotherapists, social workers and counsellors (hospital-at-home). Compared to admission to hospital ward.	Saves £202	-6% mortality	HaH dominates	No sensitivity analysis reported
Mendoza 2009[202]	Partially applicable[(c)]	Potentially serious limitations[(d)]	RCT. Elderly patients (>65 years) presenting to the ED with decompensated heart failure. HaH vs inpatient hospital care.	Saves £2800	-3.4% mortality	HaH dominates	No sensitivity analysis reported.
Richards 2005[242]	Partially applicable[(e)]	Potentially serious limitations[(f)]	RCT. Patients presenting to the ED with a clinical diagnosis of community-acquired pneumonia that is mild to moderately severe and who are low risk (CURB-65 score of 0-2). Treatment at home delivered by primary care teams under the Extended Care @Home program which provides extended medical and nursing care to patients in their home. Compared to in-hospital antibiotic treatment	Saves £171	4.3% avoidable adverse events	Inpatient care costs £3,976 per AE avoided	No sensitivity analysis reported

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Tibaldi 2009[296]	Partially applicable[(g)]	Potentially serious limitations[(h)]	RCT. Patients, 75 years or older, with a pre-existing diagnosis of CHF and persistent functional impairment indicative of New York Heart Association class III or IV. Hospital-led geriatric hospital-at-home service provided by a multidisciplinary team compared to routine hospital care in a general medical ward.	Saves £217	No difference in mortality	HaH dominates	No sensitivity analysis reported
Thornton 2005[292] &Elliott 2005[102]	Partially applicable[(i)]	Potentially serious limitations[(j)]	Retrospective cohort study. Adults with confirmed cystic fibrosis (CF) who experienced at least one respiratory exacerbation during the study period. Intervention: Home treatment with IV antibiotics, where the patient received >60% of the treatment courses at home. Comparator: Hospital treatment with intravenous (IV) antibiotics, where the patient received >60% of the treatment courses at hospital.	Saves £9,081	-16.2% patients with </= 0% decline in respiratory function	Inpatient care costs £46,098 per extra patient with no decline	No sensitivity analysis reported. Bootstrapping of cost data was used to calculate CIs
Vianello 2013[304]	Partially applicable[(k)]	Potentially serious limitations[(l)]	RCT. Adult neuromuscular patients with respiratory tract infection requiring hospital admission Intervention: Treatment at home under the care of a Hospital-at-home service. The service was delivered primarily by a district nurse with follow-up from a pulmonologist and respiratory therapist. Comparator: Admission to hospital for inpatient treatment of respiratory tract infection.	Saves £7,395	-3.3% mortality	HaH dominates	No sensitivity analysis reported

COPD=chronic obstructive pulmonary disease; HaH=Hospital-at- home; RCT=randomised controlled trial.

(a) QALYs are not used as an outcome measure. Some uncertainty regarding the applicability of Italian resource use (2005) and unit costs (2005) to the NHS context.
(b) Within-trial analysis; so does not reflect all the evidence available for this comparison. Local unit costs from hospital records were used; so may not reflect national unit costs. Uncertainty was not appropriately addressed and no sensitivity analysis undertaken.
(c) QALYs are not used as outcome measure. Spanish resource use data (2006-2007) and unit costs (2008), so some uncertainty about the applicability of resource use and costs to current NHS context.
(d) RCT-based analysis, so from one study by definition therefore not reflecting all evidence in area. Some local costs used; so there is uncertainty as to whether these will reflect national costs. Some uncertainty about whether time horizon is sufficient to capture all benefits and costs.
(e) There is uncertainty about the applicability of resource use (2002-2003) and unit costs (2003) from New Zealand to the NHS context. QALYs were not used as an outcome measure.
(f) Within-trial analysis so does not reflect all the evidence available for this comparison. The short time horizon (6 weeks) may not reflect all potential differences in costs and outcomes. Unit costs from EC@H service records were used to calculate the costs for patients in the home treatment group. It is not clear whether these costs are national level. Univariate analysis was used in the comparison and no sensitivity analysis was undertaken.
(g) Cost-consequences analysis, so QALYs are not used as outcome. Some uncertainty about the applicability of resource use and unit costs from Italy in 2005 to the current NHS context. RCT-based analysis so from one study by definition therefore not reflecting all evidence in area.
(h) There is some uncertainty about whether time horizon is sufficient to reflect all the possible downstream differences in costs and outcomes. The sources of unit costs are not clearly described, so not clear whether they are local or national unit costs. No sensitivity analysis is reported.
(i) QALYs are not used as outcome.
(j) Some uncertainty about the applicability of resource use and unit costs from 2002 to the current NHS context. Retrospective observational study, so by definition not reflecting all evidence in this area. Univariate analysis was used, so results subject to confounding. Some uncertainty about whether time horizon is sufficient to reflect all differences in costs and outcomes. Both local and National unit costs used, so some uncertainty regarding whether the local costs reflect national averages. Limited sensitivity analysis presented.
(k) Cost-consequences analysis, so QALYs are not used as outcome. Some uncertainty about the applicability of resource use and unit costs from Italy in 2010 to the current NHS context.
(l) RCT-based analysis so from one study by definition therefore not reflecting all evidence in area. It is not clear whether the cost of hospitalisation is included for those patients in the hospital at home arm who failed treatment and required hospitalisation. Unit costs from both local and national sources so may not be completely reflective of national unit costs. No sensitivity analysis is reported.

Table 6: Economic evidence profile: Hospital at home versus inpatient hospital care – Early discharge

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Goossens 2013[118]	Partially applicable[(a)]	Potentially serious limitations[(b)]	RCT. Patients (40 years or older) admitted to one of the participating hospitals for a COPD exacerbation. Early supported discharge scheme (hospital-at-home) after an initial 3 days under usual hospital treatment involving treatment and supervision at home for the remaining 4 days by a community nurse who is generically trained	Saves £131	-0.005 QALYs	Inpatient care cost £24,000 per QALY	Probability Intervention cost saving: 61.2% Probability Intervention cost-effective at 20K/30K threshold): 58%/55%

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
			(not specialist).				

COPD=chronic obstructive pulmonary disease; HaH=Hospital-at- home; QALY=quality-adjusted life-year; RCT=randomised controlled trial.

(a) Some uncertainty regarding the applicability of resource use (2007-2011) and unit costs (2009) from the Netherlands.

(b) RCT-based analysis, so from one study by definition therefore not reflecting all evidence in area that compares early supported discharge versus inpatient admission. Micro-costing study was used to calculate the cost of inpatient bed day cost in the base case analysis, which does not reflect the national unit cost for inpatient hospital day. Some uncertainty about whether time horizon of 3 months is sufficient to capture all benefits and costs.

Table 7: Economic evidence profile: Hospital at home versus inpatient hospital care – Both admission avoidance and early discharge

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Bakerly 2009[23]	Partially applicable[(a)]	Potentially serious limitations[(b)]	Matched case-control study. Patients admitted to a university hospital with acute exacerbation of COPD. Care delivered by an acute COPD assessment service, which provided an integrated care model. Compared to usual inpatient care.	Saves £600	N/A	HaH cost-saving	No sensitivity analysis reported
Patel 2008[229]	Partially applicable[(c)]	Potentially serious limitations[(d)]	RCT Patients seeking care for deterioration of chronic heart failure identified within 24-48 hours after admission from three medical facilities: ED, Heart failure outpatient clinic and a medical ward. Home care under the direction of a	Saves £1960	+0.01 QALYs	HaH dominates	Various sensitivity analyses were conducted but HAH continued to dominate

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
			specialist nurse (HC) versus hospital inpatient care.				
Puig-Junov 2007[235]	Partially applicable[(e)]	Potentially serious limitations[(f)]	RCT. Patients presenting to ED with acute exacerbation of COPD. Nurse-led hospital-at-home involving up to 5 visits from specialist respiratory nurse and phone consultation whenever needed. Compared to inpatient hospital care.	Saves £560	-2.8% mortality (Hernandez 2003[141])	HaH dominates	No sensitivity analysis reported
Teuffel 2011[288]	Partially applicable[(g)]	Potentially serious limitations[(h)]	Decision tree. Adult cancer patients low risk of febrile neutropenia receiving antibiotic treatment. Intervention 1. Inpatient IV antibiotics Intervention 2. Inpatient IV antibiotics and then early discharge with oral antibiotics Intervention 3. Home IV antibiotics Intervention 4. Home oral antibiotics	Saves £4,000-£5,500 (2/3/4 vs 1)	+0.03-0.1 QAFNEs (2/3/4 vs 1)	HaH dominates (2/3/4 vs 1)	PSA was used. The results were sensitive to variations in the costs of in-patient stay, outpatient visits, and home nurse visits. The duration of treatment and some utility assumptions were also key inputs. In some scenarios, home intravenous treatment was the preferred strategy, but the in-patient treatments were never cost-effective.

COPD=chronic obstructive pulmonary disease; HaH=Hospital-at- home; IV: intravenous; N/A: not applicable (for comparative costing studies); QALY=quality-adjusted life-year; QAFNE=quality-adjusted febrile neutropenia episode; RCT=randomised controlled trial.

(a) The model evaluated in the study is an integrated care model, with hospital at home representing one component of the model. The study compares costs only and no health outcomes are considered. No sensitivity analysis is reported.
(b) Some uncertainty exists regarding the applicability of resource use and costs from 2007 to the current NHS context. QALYs were not used as an outcome measure as the study compares costs only. Observational, matched case control study with no adjustment for possible confounders other than the matching variables. So, so does not reflect all the evidence available for this comparison. One year follow-up; so may not capture the long-term consequences of the intervention.
(c) Some uncertainty about the applicability of resource use and costs (2004-2006) from Sweden. QALYs are calculated using the VAS values.
(d) RCT-based analysis so from one study by definition therefore not reflecting all evidence in area. Local costs are used; some uncertainty as to whether these reflect national costs. Some uncertainty regarding whether time horizon is sufficient (12 months follow-up). Limited number of deterministic sensitivity analyses presented.
(e) Uncertainty regarding the applicability of resource use (1999-2000) and unit costs (2000) from Spain to the UK NHS context. Comparative cost analysis, assuming equivalent outcomes, so QALYs are not used as an outcome measure.
(f) Short time horizon (8 weeks) which might not capture all the differences in costs. Within-trial comparative costing analysis so does not reflect all the evidence in this area. The authors assumed equivalent health outcomes despite a previous publication from the same trial reporting favourable outcomes for hospital-at-home. Uncertainty was not adequately addressed and no sensitivity analysis undertaken.
(g) Some uncertainty regarding the applicability of resource use and unit costs from Canada (2009). The outcome used is not QALYs, but rather a quality adjusted FN episode.
(h) The short time horizon used (30 days) might not reflect all differences between strategies in terms of costs and outcomes. Some local costs were used to calculate the costs of hospital fees/charges and home care nurse visits. It was not reported how the baseline risk studies were identified. The cost-effectiveness threshold used in the PSA was arbitrary and may not have a meaningful interpretation.

Table 8: Economic evidence profile: Step up/Step-down care versus inpatient hospital care

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Monitor 2015[204]	Partially applicable[(a)]	Potentially serious limitations[(b)]	Hospital simulation model Short-term treatment to patients who are not suffering a hyper-acute episode in a community hospital setting. Patients referred by GP or ambulance, receiving treatment within two hours from a multidisciplinary team led by a consultant, seven days a week. Compared to usual hospital care.	**Total cost over five years:** £1m **Total cost in fifth year (per patient):** -£115	N/A	N/A	Estimated that a similar scheme would need to cost around £550 to £600 per patient intervention to be cost saving compared to treating patients in the acute setting.

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
O'Reilly 2008[220]	partially applicable[(c)]	Minor limitations[(d)]	RCT (same paper) – 6 months Population: Older people needing rehabilitation after an acute illness for which they required admission to hospital Two comparators: 1. Multidisciplinary care in a district general hospital at the department for care of elderly people 2. Prompt transfer to the locality based community hospital	2 versus 1 **Total cost (mean per patient):** £720	2 versus 1 **QALYs gained (mean per patient):** 0.048	2 versus 1 ICER= £16,324 per QALY gained	Costs of initial hospital admission, subsequent readmission and institutional care costs were explored in sensitivity analyses which gave similar results to the base case analysis. [(e)]

(a) No health outcomes.

(b) Not enough detail around methodology and modelled cohort. Costs not explicitly reported as per patient value. Full breakdown of cost inputs and outputs not reported.

(c) Unit costs from 2001-2002.

(d) Within-trial analysis so does not reflect all the evidence available for this comparison between care at a community hospital and at a district general hospital setting. The short time horizon (6 months) may not reflect all potential differences in costs and outcomes. An assumption was also made about the persistence of effect up to 1 year, which was not supported by evidence. Both local and national unit costs were used for the analysis. It is not clear whether the local unit costs used for some of the community care resources would be representative of national unit costs. Additionally, only a limited number of assumptions was tested in sensitivity analysis.

(e) A threshold analysis showed that when the per diem cost of the community hospital is reduced by over 30%, the mean cost per patient treated at a community hospital becomes lower than at a general hospital.

Table 9: Economic evidence profile: Virtual wards care versus inpatient care

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Monitor 2015[204]	Partially applicable[(a)]	Potentially serious limitations[(b)]	Hospital simulation model 24-hour remote triaging, advice and treatment to patients through video link. Aim to prevent unwell patients from attending hospital.	**Total cost over five years:** £0m **Total cost in fifth year (per patient):** -£404	N/A	N/A	Estimated that a similar scheme would need to cost around £4,000 to £4,300 per patient intervention to be cost saving compared to treating patients in the acute setting.

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
			Scheme provided by senior nurses to primarily frail elderly living in nursing homes. Compared to usual hospital care.				

(a) No health outcomes.
(b) Not enough detail around methodology and modelled cohort. Costs not explicitly reported as per patient value. Full breakdown of cost inputs and outputs not reported.

Table 10: Economic evidence profile: Rapid response scheme versus usual inpatient care

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Monitor 2015[204]	Partially applicable[(a)]	Potentially serious limitations[(b)]	Hospital simulation model Intervention was rapid response plus early supported discharge Rapid response and early supported discharge scheme. Scheme ran by a single consultant-led multidisciplinary team, seven days a week within patients own home. Scheme targets patients identified in acute inpatient wards, often recovering from an operation. Compared with usual hospital care.	**Total cost over five years:** £4m **Total cost in fifth year (per patient):** -£116	N/A	N/A	Estimated that a similar scheme would need to cost around £350 per patient intervention to be cost saving compared to treating patients in the acute setting.

(a) No health outcomes.
(b) Not enough detail around methodology and modelled cohort. Full breakdown of cost inputs and outputs not reported.

12.5 Evidence statements

12.5.1 Clinical

Strata – Early discharge

Six studies comprising 591 people evaluated the role of **hospital at home led by primary care** in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that hospital at home led by primary care may provide a benefit in reduced admissions (6 studies, low quality), presentations to ED (1 study, moderate quality), hospital length of stay (1 study, moderate quality), quality of life (various scores reported total of 5 studies, low to moderate quality) and patient satisfaction (continuous outcome: 2 studies, high quality and dichotomous; 1 study, moderate quality). The evidence suggested that there was no effect on mortality (5 studies, low quality) and there was a possible reduction in carer satisfaction (1 study, moderate quality) in hospital at home led by primary care compared to hospital care.

One study comprising 197 people evaluated the role of **hospital at home led by secondary care** in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that hospital at home led by secondary care may provide a benefit in reduced re-admissions (1 study, very low quality). There was a possible increase in mortality (1 study, very low quality) in hospital at home led by secondary care compared to hospital care.

Five studies comprising 895 people evaluated the role of **hospital at home led by both primary and secondary care** in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence showed that hospital at home led by primary and secondary care provided a benefit in reduced admissions (5 studies, moderate quality), and carer satisfaction (1 study, moderate quality). The evidence suggested that there was no effect on mortality (4 studies, very low quality). There was an increase in re-admissions (1 study, moderate quality) and length of stay (1 study, moderate quality) in hospital at home led by both primary and secondary care compared to hospital care. Evidence on quality of life showed no difference in 1 study and an improvement in another study (both moderate quality). Similarly, patient satisfaction in 1 study showed no difference the other showed an improvement (both high quality).

Three studies comprising 1008 people evaluated the role of **step-up/down care** in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that step-up/down care may provide a benefit in reduced mortality (3 studies, low quality) and readmissions compared to hospital care. There was a suggested increase in length of stay (2 studies, very low quality) in step-up/down care compared to hospital care.

One study comprising 57 people evaluated the role of virtual wards in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that virtual wards may provide a benefit in reduced mortality (1 study, very low quality). The evidence suggested that there was no effect on quality of life (1 study, moderate quality) in virtual wards compared to hospital care.

Strata – Admission avoidance

Four studies comprising 571 people evaluated the role of **hospital at home led by primary care** in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that hospital at home led by primary care may provide a benefit in reduced mortality (2 studies, moderate quality) and quality of life on SF-12 physical scores ((1 study, moderate quality). The evidence suggested that there was no effect on days to discharge (1 study, low quality). There was an increase in readmissions under 30 days (2 studies, high quality), adverse events (1 study, low

quality) and reduced patient satisfaction (1 study, high quality) in hospital at home led by primary care compared to hospital care. No difference was identified for admissions over 30 days (2 studies, low quality) and quality of life on SF-12 mental scores (1 study, low quality).

Four studies comprising 329 people evaluated the role of **hospital at home led by secondary care** in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that hospital at home led by secondary care may provide a benefit in reduced mortality (4 studies, low quality), reduced admissions after 30 days (3 studies, low quality), improved patient satisfaction (1 study, high quality) and quality of life (3 different scores reported, low to moderate quality). The evidence suggested that there was increased length of stay (2 studies, low quality) in hospital at home led by secondary care compared to hospital care.

Two studies comprising 252 people evaluated the role of **hospital at home led by both primary and secondary care** in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that hospital at home led by primary and secondary care may provide a benefit in improved patient satisfaction (1 study, low quality), carer satisfaction (1 study, high quality) and reduced adverse events (1 study, low quality). There was a possible increase in mortality (1 study, low quality), admissions (2 studies, low quality) and reduced quality of life (1 study, moderate quality) in hospital at home led by both primary and secondary care compared to hospital care.

One study comprising 155 people evaluated the role of **step-up/down** care in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested step-up/down care may provide a benefit in reduced mortality (1 study, moderate quality) and length of stay (1 study, low quality) compared to hospital care.

One study comprising 1920 people evaluated the role of **virtual wards** in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that virtual wards provide a benefit in reduced mortality (1 study, low quality), reduced re-admissions (1 study, high quality) and presentations to ED (1 study, high quality) compared to hospital care.

12.5.2 Economic

Four cost-effectiveness analyses and one cost-utility analysis found that **hospital at home led by secondary care** dominated inpatient care. One cost analysis found it to be cost saving (cost difference: £600 per patient) and one cost effectiveness analysis showed that inpatient care was more costly and more effective (£46,000 per extra patient with no decline in respiratory function). These studies were assessed as partially applicable with potentially serious limitations.

One cost-utility analysis found that inpatient care was not cost effective at a threshold of £20,000 per QALY compared with **hospital at home led by primary care** but it was cost-effective at a threshold of £30,000 per QALY gained (ICER:£24,000 per QALY gained). One cost-effectiveness analysis found that inpatient care was dominated. One cost-effectiveness analysis found that inpatient care was more effective but more costly (£4,000 per adverse event avoided). These studies were assessed as partially applicable with potentially serious limitations.

One cost-effectiveness analysis found that **hospital at home led by both primary and secondary care** dominated inpatient care. This study was assessed as partially applicable with potentially serious limitations.

One cost-utility analysis found that **step up/step down** was cost effective compared with inpatient care (ICER: £16,300 per QALY gained). One cost comparison study found that it was cost saving (cost difference: £115 per patient). These studies were assessed as partially applicable with potentially serious limitations.

One cost comparison study found that **virtual wards** are cost saving (cost difference: £404 per patient). This study was assessed as partially applicable with potentially serious limitations.

One cost comparison study found that **rapid response and early supported discharge** was cost saving (cost difference: £116 per patient). This study was assessed as partially applicable with potentially serious limitations.

12.6 Recommendations and link to evidence

Recommendations	**6. Provide multidisciplinary intermediate care as an alternative to hospital care to prevent admission and promote earlier discharge. Ensure that the benefits and risks of the various types of intermediate care are discussed with the person and their family or carer[a].**
Research recommendations	-
Relative values of different outcomes	Quality of life, mortality, avoidable adverse events, patient and/or carer satisfaction and number of admissions to hospital were considered by the committee to be critical outcomes. Number of GP presentations, readmission, length of hospital stay and number of presentations to the Emergency Department were considered by the committee to be important outcomes.
Trade-off between benefits and harms	This review examined evidence for the following interventions: • Hospital at home. • Step up/down care. • Virtual wards. • Rapid responses schemes (no evidence available). The studies in the reviews have been classified into 2 strata depending on the main purpose of the intervention; admission avoidance and early discharge. – **Admission avoidance:** where a service that provides active treatment by health care professionals outside hospital for a condition that otherwise would require acute hospital in-patient admission. Patients may avoid admission to an acute hospital ward after receiving community based care. – **Early discharge:** where a service that provides active treatment by health care professionals outside hospital for a condition that otherwise would require continued acute hospital in-patient care. Patients may be discharged early from hospital to receive care in the community. **Hospital at home** There was evidence from 36 RCTs comparing hospital at home (led by primary care, secondary care or both primary and secondary care), step-up/down care and virtual wards. The studies were categorised into 2 strata: hospital at home services focussing on early discharge and hospital at home services focussing on admission avoidance. Within each category, the evidence was classified into hospital at home led by primary care, hospital at home led by secondary care, hospital at home led by primary and secondary care, step up/down care and virtual wards. **Stratum – Early discharge** ***Hospital at home led by primary care*** Six studies evaluated hospital at home led by primary care compared to usual hospital care. The evidence suggested that hospital at home led by primary care may provide a benefit in reduced admissions, presentations to ED, hospital length of stay, quality of life and patient satisfaction. The evidence suggested that there was no effect on mortality and there was reduced carer satisfaction in hospital at home led

a NICE has published guidelines on transition between inpatient hospital settings and community or care home settings for adults with social care needs and intermediate care including reablement

Recommendations	**6. Provide multidisciplinary intermediate care as an alternative to hospital care to prevent admission and promote earlier discharge. Ensure that the benefits and risks of the various types of intermediate care are discussed with the person and their family or carer[a].**
Research recommendations	-
	by primary care compared to usual hospital care. No evidence was identified for avoidable adverse events, GP presentations or readmissions. ***Hospital at home led by secondary care*** Two studies evaluated hospital at home led by secondary care compared to usual hospital care. The evidence suggested that hospital at home led by secondary care may provide a benefit in reduced re-admissions. However, there was a possible increase in mortality. No evidence was identified for avoidable adverse events, quality of life, patient satisfaction, length of stay, length of stay in programme, presentation to ED, admissions and GP presentations. ***Hospital at home led by both primary and secondary care*** Five studies evaluated hospital at home led by both primary and secondary care compared to usual hospital care. The evidence showed a benefit in reduced admissions, and carer satisfaction compared to hospital care. The evidence suggested that there was no effect on mortality. There was an increase in re-admissions (30 days) and length of stay (days in treatment) in hospital at home led primary and secondary care compared to usual hospital care. Evidence on quality of life and on patient satisfaction was either neutral or suggested a trend for improvement. No evidence was identified for avoidable adverse events, length of stay in programme, presentation to ED and presentation to GP. ***Step-up/down care*** Three studies evaluated step-up/down care compared to hospital care. The evidence suggested that step-up/down care may provide a benefit in reduced mortality and readmissions compared to hospital care. There was a suggested increase in length of stay (initial inpatient days) in step-up down care compared to hospital care. No evidence was identified for avoidable adverse events, quality of life, patient satisfaction, length of stay in programme, number of presentations to ED, number of GP presentations and admissions. ***Virtual wards*** One study evaluated virtual wards compared to hospital care. The evidence suggested that virtual wards may provide a benefit in reduced mortality compared to hospital care but there was no effect on quality of life. No evidence was identified for avoidable adverse events, patient satisfaction, length of hospital stay, length of stay in programme, number of presentation to ED, number of admissions to hospital, number of GP presentation and readmission. **<u>Stratum – Admission avoidance</u>** There was variation in how these diverse admission avoidance schemes operated. Some schemes admitted patients directly from the community and some from the emergency department. The majority of the trials included in the admission avoidance strata recruited elderly patients with medical events like stroke and COPD requiring admission to hospital.

Recommendations	**6. Provide multidisciplinary intermediate care as an alternative to hospital care to prevent admission and promote earlier discharge. Ensure that the benefits and risks of the various types of intermediate care are discussed with the person and their family or carer[a].**
Research recommendations	-
	The committee considered that avoiding readmission was likely to be particularly important for people with chronic conditions as in this group hospital admission might have a disproportionately adverse effect on psychological wellbeing and independence. **Hospital at home led by primary care** Four studies evaluated the role of **hospital at home led by primary care** in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that hospital at home led by primary care may provide a benefit in reduced mortality and quality of life on SF-12physical scores. The evidence suggested that there was no effect on days to discharge. There was an increase in readmissions under 30 days, adverse events and reduced patient satisfaction in hospital at home led by primary care compared to hospital care. No difference was identified for admissions over 30 days and quality of life on SF-12 mental scores. **Hospital at home led by secondary care** Four studies evaluated hospital at home led by secondary care compared to hospital care. The evidence suggested that hospital at home led by secondary care may provide a benefit in reduced mortality, admissions (>30 days), improved patient satisfaction and quality of life compared to hospital care. The evidence suggested that there was increased length of stay in hospital at home led by secondary care compared to hospital care. No evidence was identified for avoidable adverse events, length of stay in programme, number of presentations to ED, number of GP presentations and readmission. **Hospital at home led by both primary and secondary care** Two studies evaluated hospital at home led by both primary and secondary care compared to hospital care. The evidence suggested that hospital at home led by primary and secondary care may provide a benefit in improved patient satisfaction, carer satisfaction and reduced adverse events compared to hospital care. There was a possible increase in mortality, admissions (>30 days) and reduced quality of life in hospital at home led by primary and secondary care compared to hospital care. No evidence was identified for length of stay, length of stay in programme, number of presentations to ED, number of GP presentation and readmission. **Step-up down care** One study evaluated step-up/down care compared to hospital care. The evidence suggested step-up/down care may provide a benefit in reduced mortality and length of stay compared to hospital care. No evidence was identified for avoidable adverse events, quality of life, patient satisfaction, length of stay in programme, number of presentations to ED, number of GP presentations and readmissions. **Virtual wards** One study evaluated virtual wards compared to hospital care. The evidence suggested that virtual wards provide a benefit in reduced mortality, reduced re-admissions (30 days) and presentations to ED compared to hospital care. No

Recommendations	**6. Provide multidisciplinary intermediate care as an alternative to hospital care to prevent admission and promote earlier discharge. Ensure that the benefits and risks of the various types of intermediate care are discussed with the person and their family or carer[a].**
Research recommendations	**-**
	evidence was identified for avoidable adverse events, quality of life, patient satisfaction, length of hospital stay, length of stay in programme, number of admissions to hospital and number of GP presentations. **Rapid response schemes** No evidence was available to evaluate rapid response schemes. **Overall** The committee chose to recommend alternatives to hospital care given the potential benefits in patient and carer satisfaction, facilitation of early discharge and prevention of hospital admission, if there is a discussion of the potential benefits and risks with the patient and their carer. The committee also concluded that RCT evidence supported the concept that, with appropriate patient selection, hospital at home schemes could be considered safe. The committee discussed what type of alternatives to hospital care should be recommended: hospital at home, community-based intermediate care or community-based care. This review did not search for data that specifically compared different schemes. The committee agreed that service development would need to be undertaken collaboratively between primary and secondary care. The committee noted that 'hospital-at-home' was not easily defined and that there were some regions in which community-based intermediate care could differ. Therefore, the committee chose to recommend community-based intermediate care generally, rather than specifying the precise content of the various interventions. The committee also noted that there were many different schemes and with different names, which could be confusing for the patient as well as the service provider. It was however felt that, despite this, if one concentrated on what each individual scheme provided to the patient then they were very similar. They generally involved nurses and/or therapists with medical support providing nursing care, rehabilitative therapy, education and support to a patient in the community with an aim to promote independence, prevent admission and facilitate discharge. Indeed, it was felt that if the names of the services were simplified under 1 heading, it would be much easier to understand and the focus could be on the level of support and care the patient required. The committee wished to clarify that community-based care should only be provided where equivalent care could be provided in a non-hospital based setting and following appropriate risk stratification using appropriate diagnostics, clinical presentation, patient preference, history and safety netting. The committee noted that there were some groups of people (for example, people with life threatening conditions such as acute myocardial infarction) in whom the provision of care in a non-hospital based setting was not appropriate in the acute stage.
Trade-off between net effects and costs	**Hospital at home** Eleven economic evaluations were included covering the 3 models of hospital at home (secondary care-led, primary care-led and mixed model). This evidence consistently showed that hospital at home schemes can be provided at a lower cost for a variety of patient groups. Seven studies showed that hospital at home was

Recommendations	**6. Provide multidisciplinary intermediate care as an alternative to hospital care to prevent admission and promote earlier discharge. Ensure that the benefits and risks of the various types of intermediate care are discussed with the person and their family or carer[a].**
Research recommendations	-
	dominant when compared to inpatient care, where it appeared to improve outcomes as well as lower costs. This was the case for all three of the full economic evaluations of interventions combining both admission avoidance and early discharge. In the remaining three studies, the health benefit for hospital care was small and did not appear to be cost effective. Cost savings were greatest for those interventions that included admission avoidance. The committee highlighted the importance of assessing patients' risk before referring them to be cared for under a hospital-at home service, which was in line with the inclusion criteria of the included studies. The committee also highlighted the importance of providing 24-hour access to care for hospital-at-home patients as currently available hospital-at-home services differ in terms of the hours that they operate. For example, the committee noted that most of the included studies provided 24-hour access to the service, either in person or via phone. The provision of these services across a 24 hour, 7-day period may affect cost in terms of both staff costs as well as its impact on patients' safety and efficacy. Anecdotally, the committee noted that many schemes provided extended day hours or 24 hours a day but services are shared with other out-of-hour services. **Step up/step-down models** One economic evaluation showed that care in a community hospital was cost effective compared to inpatient care, at a cost of £16,400 per QALY gained, which is below the NICE threshold. A cost simulation study showed that long-term costs were lower but it would take more than 5 years to break even because of the time taken to build up credibility and reach optimal scale. **Virtual wards** One cost simulation study showed that long-term costs were lower but it would take about 5 years to break even. **Rapid response schemes** A cost simulation study showed that long-term costs were lower but it would take more than 5 years to break even.
Quality of evidence	Overall, the quality of the evidence was graded from very low to high. Evidence was downgraded and this was mainly due to risk of bias, imprecision and inconsistency. The economic evidence for hospital at home was rated as partially applicable with potentially serious limitations, since QALYs were rarely measured, only two studies were set in the UK and the effectiveness evidence was not based on a systematic review.
Other considerations	The committee highlighted that they were aware of observational studies of alternatives to hospital care but wished to prioritise the inclusion of higher quality, RCT evidence for inclusion in the review. The committee emphasised that where possible, decisions about treatment location should be made collaboratively with the patient. It was noted that patient acceptability would need to be determined on a case by case basis. It is important that patients should be involved in discussions of risks and benefits. Overall it was felt the provision of intermediate care as an alternative to hospital admission should be supported and developed in view of the evidence reviewed. It

Recommendations	**6. Provide multidisciplinary intermediate care as an alternative to hospital care to prevent admission and promote earlier discharge. Ensure that the benefits and risks of the various types of intermediate care are discussed with the person and their family or carer[a].**
Research recommendations	-
	also fits with the NHS Five Year Forward View by providing more care in the community, but supported by primary and secondary care in an integrated way. The health economic data suggests that this model of care may be cost saving which is another important issue for the NHS in the ensuing years. Although it is likely that in the initial phase in development or expansion of schemes they may be costlier and will take some years to break even, and then become cost saving as some of the economic evidence showed. One barrier to the development of this model of care could be the conflict between primary and secondary care. The skills and resources of both sectors and the third sector (voluntary) will need to be harnessed for such models of care to work. It is also important that areas of good practice are shared. Simplification of delivery of intermediate care would also be of use; rather than focussing on the title of the service, it would be better if the needs of the patient are the focus of delivery of care. This would probably allow services between regions to be compared with each other and benchmarking of services. The National Audit of Intermediate Care[214] defines intermediate care in 4 categories: • Crisis response. • Home-based intermediate care. • Bed-based intermediate care. • Reablement. The committee discussed existing guidance from NICE on social care and felt is was appropriate to cross reference the following guideline: • Transition between inpatient hospital settings and community or care home settings for adults with social care needs (2015).[210] • Older people with social care needs and multiple long-term conditions (2015).[209] • Transition between inpatient mental health settings and community or care home settings (2016).[212] • Home care: delivering personal care and practical support to older people living in their own homes (2015).[208] • Intermediate care including reablement (2017).[213]– • Managing medicines for adults receiving social care in the community (2017).[211]

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Appendices

Appendix A: Review protocol

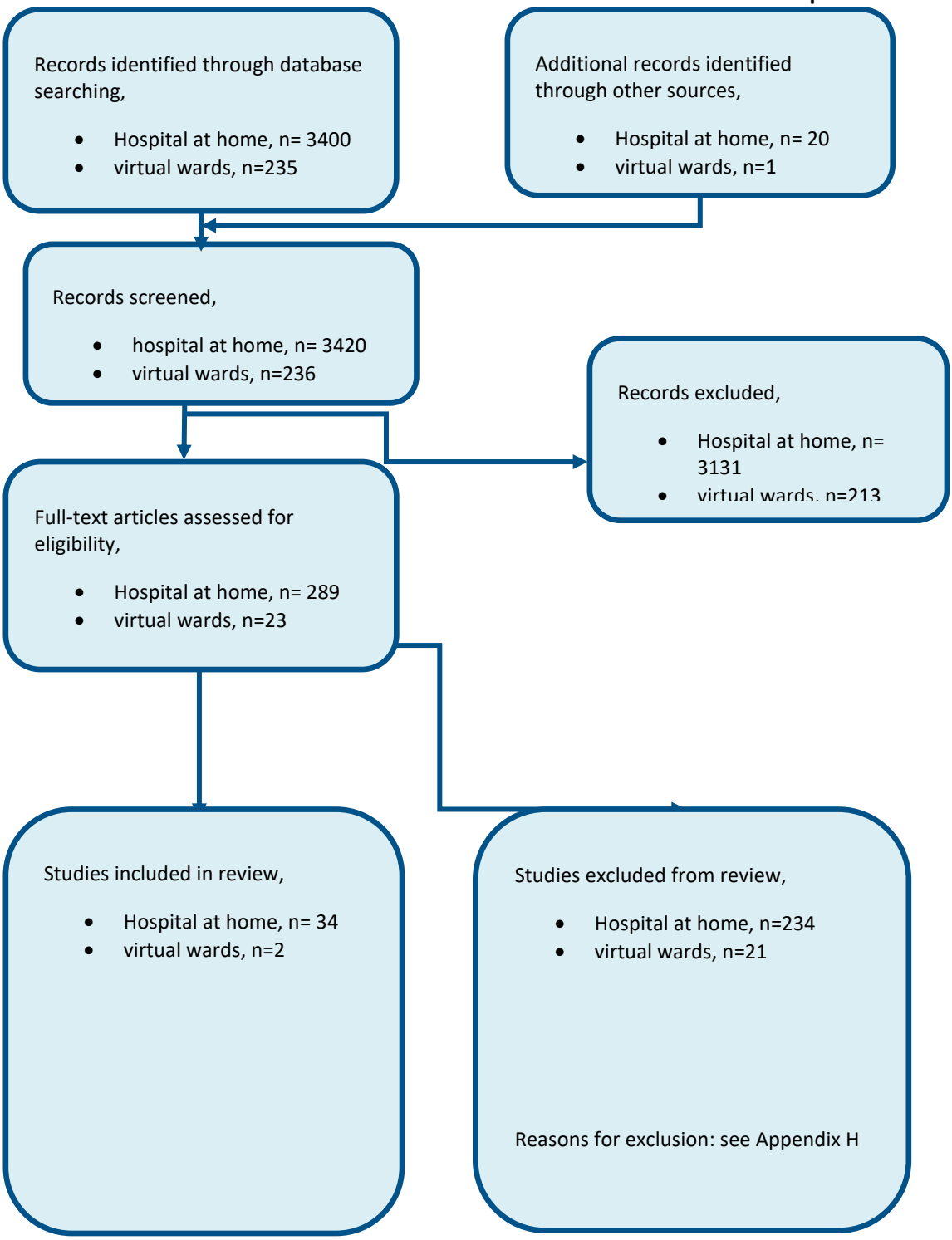
Table 11: Review protocol: Alternatives to hospital care

Review question	Alternatives to hospital care
Guideline condition and its definition	Acute Medical Emergencies. Definition: a medical emergency can arise in anyone, for example, in people without a previously diagnosed medical condition, with an acute exacerbation of underlying chronic illness, after surgery or after trauma.
Objectives	To determine if wider provision of community-based intermediate care prevents people from staying in hospitals longer than necessary while not impacting on patient and carer outcomes.
Review population	Adults and young people (16 years and over) with a suspected or confirmed AME or patients at risk of AME.
	Adults (17 years and above). Young people (aged 16-17 years).
	Line of therapy not an inclusion criterion.
Interventions and comparators: generic/class; specific/drug (All interventions will be compared with each other, unless otherwise stated)	Hospital at home; hospital at home led by primary care. Hospital at home; hospital at home led by secondary care. Step up/down care; step up/down care. Rapid response schemes. Virtual wards. Hospital-based care/services. Usual Care.
Outcomes	- Quality of life at during study period (Continuous) CRITICAL - Length of hospital stay at during study period (Continuous) IMPORTANT - Mortality at during study period (Dichotomous) CRITICAL - Avoidable adverse events at during study period (Dichotomous) CRITICAL - Patient and/or carer satisfaction at during study period (Dichotomous) CRITICAL - Number of presentations to Emergency Department at during study period (Dichotomous) IMPORTANT - Number of admissions to hospital at after 30 days of first admission (Dichotomous) CRITICAL - Number of GP presentations at during study period (Dichotomous) IMPORTANT - Readmission up to 30 days (Dichotomous) IMPORTANT
Study design	Systematic reviews (SRs) of RCTs, RCTs, observational studies only to be included if no relevant SRs or RCTs are identified.
Unit of randomization	Patient.
Crossover study	Permitted.
Minimum duration of study	Not defined.
Stratification	Early discharge. Admission avoidance.
Reasons for stratification	Each of them targets a separate outcome: early discharge would be primarily aimed at reducing length of stay, while admission avoidance would be primarily aimed at reducing hospital admission. Also, the population would be different as the admission avoidance group could be managed at home for the whole

	episode of care (they could be cared for at home from the start) while the early discharge group needs to be “stabilised” at hospital first then discharged.
Subgroup analyses if there is heterogeneity	- Frail elderly (frail elderly; not frail elderly); different from younger population.
Search criteria	Databases: Medline, Embase, the Cochrane Library. Date limits for search: none. Language: English.

Appendix B: Clinical article selection

Figure 1: Flow chart of clinical article selection for the review of alternatives to hospital care



Appendix C: Forest plots

C.1.1 Early discharge

Figure 2: Mortality- Early discharge

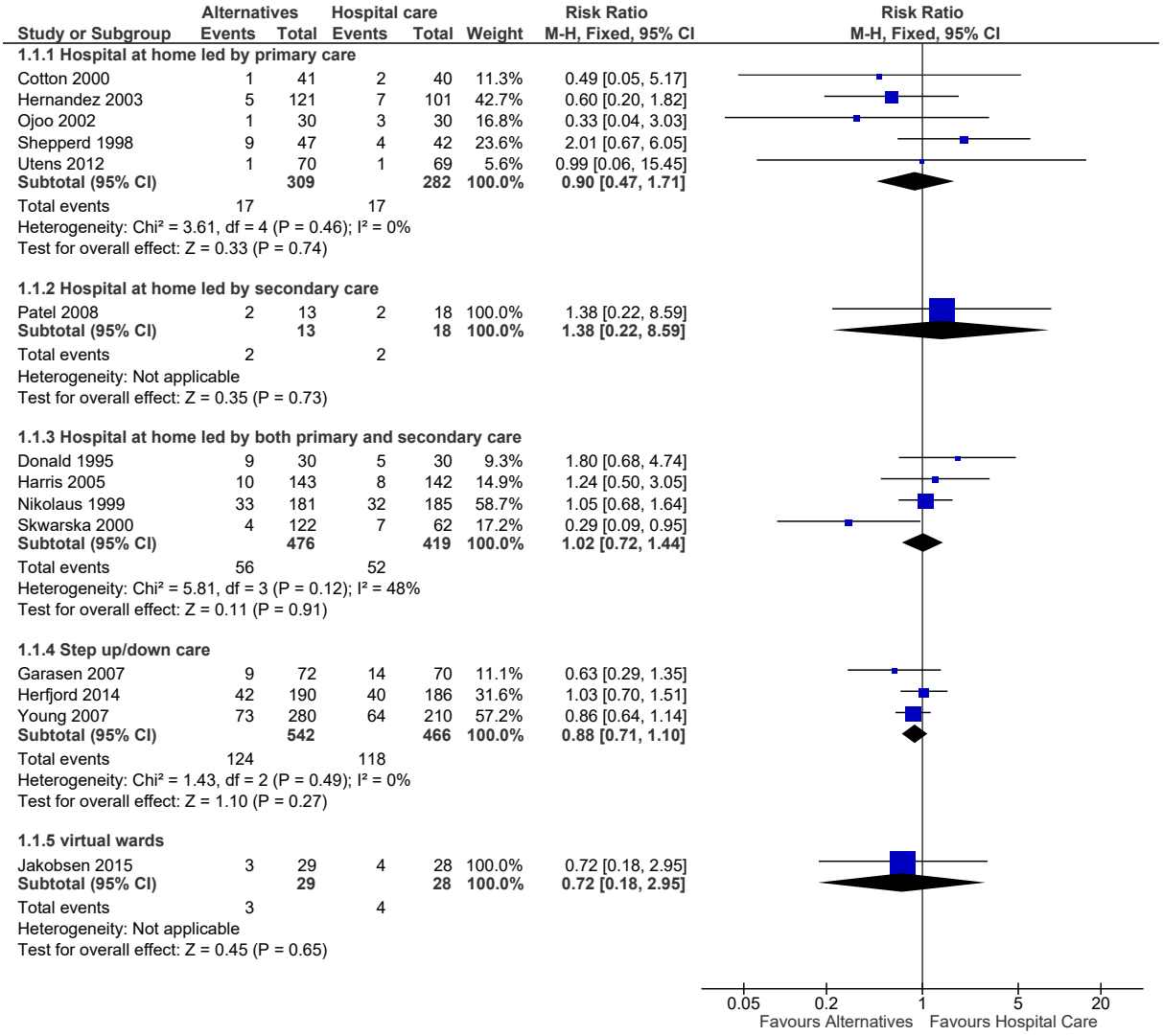


Figure 3: Readmissions (30 days) - Early discharge

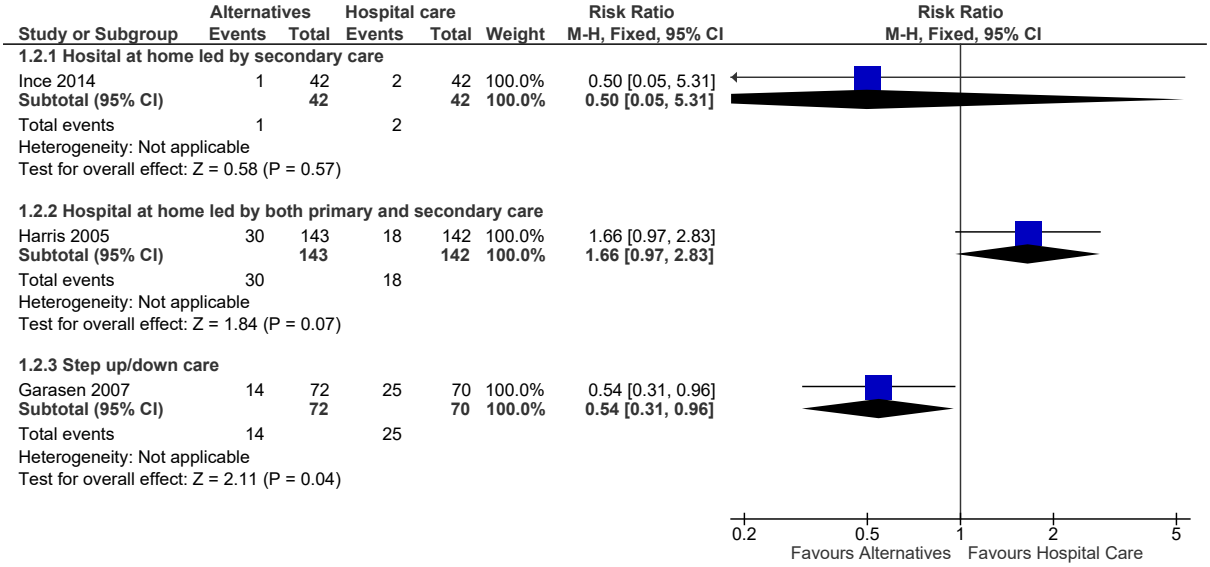


Figure 4: Admissions - Early discharge

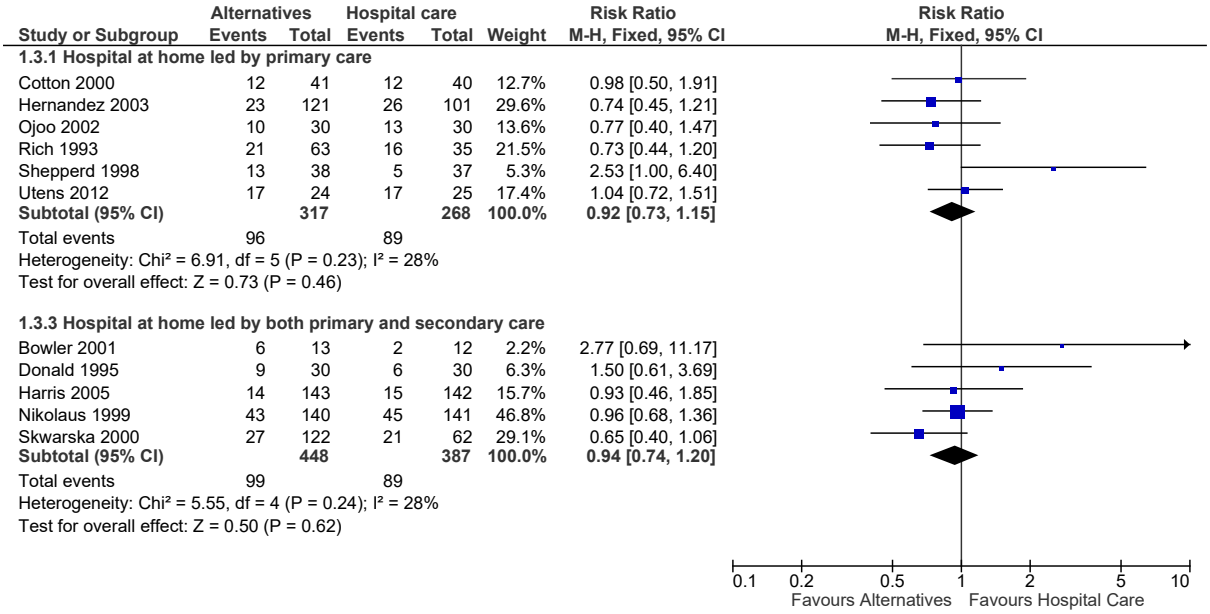


Figure 5: Presentations to ED - Early discharge

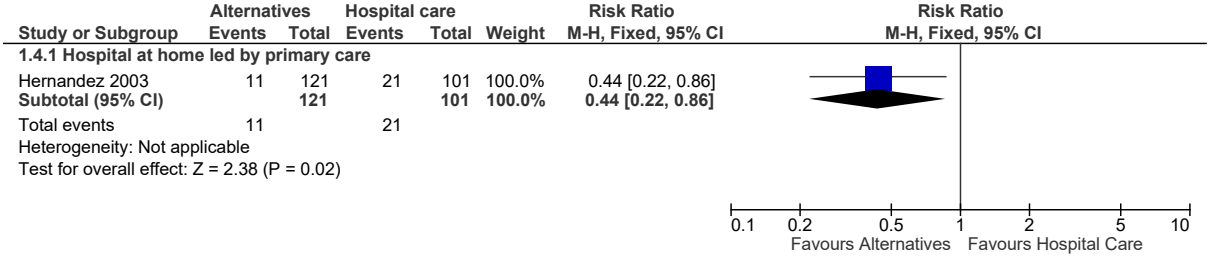


Figure 6: Length of stay (initial inpatient days) - Early discharge

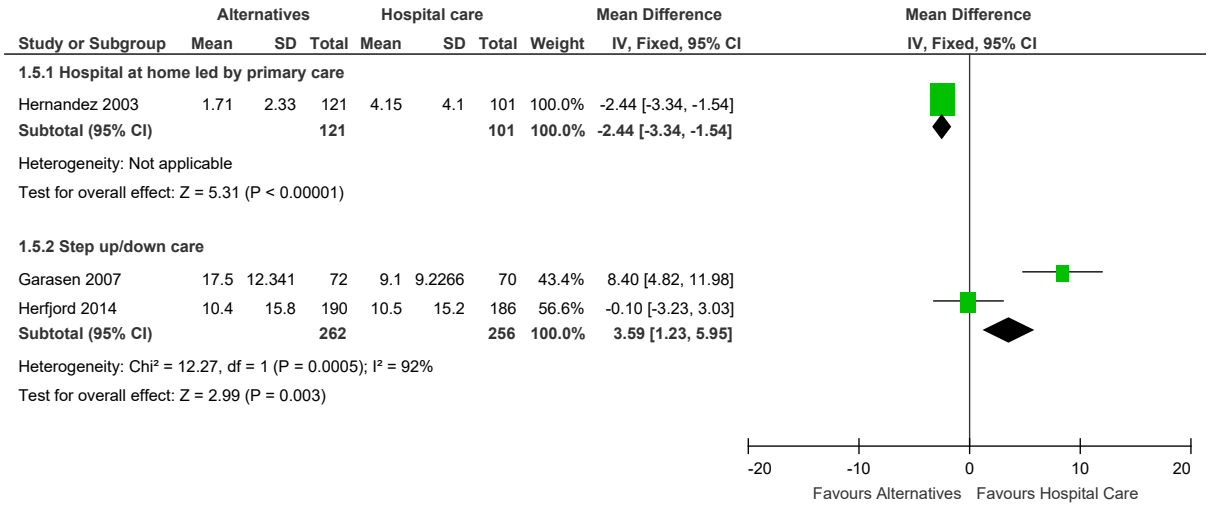


Figure 7: Length of stay (days in treatment) - Early discharge

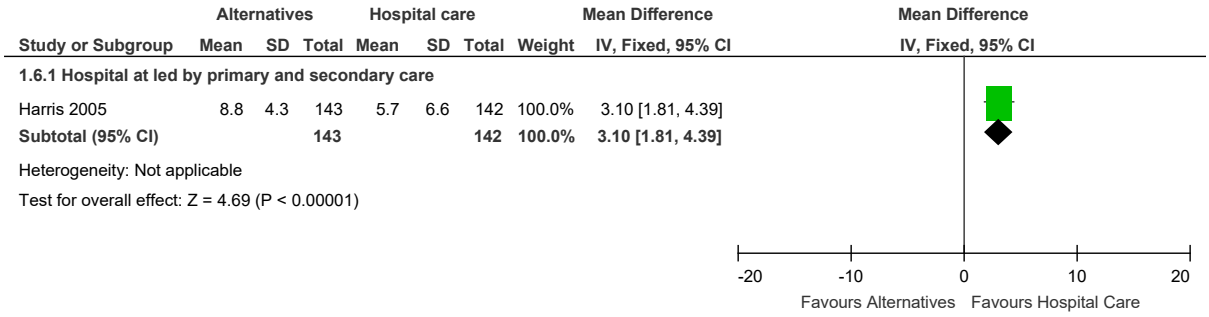


Figure 8: Quality of life(high score is good) - Early discharge

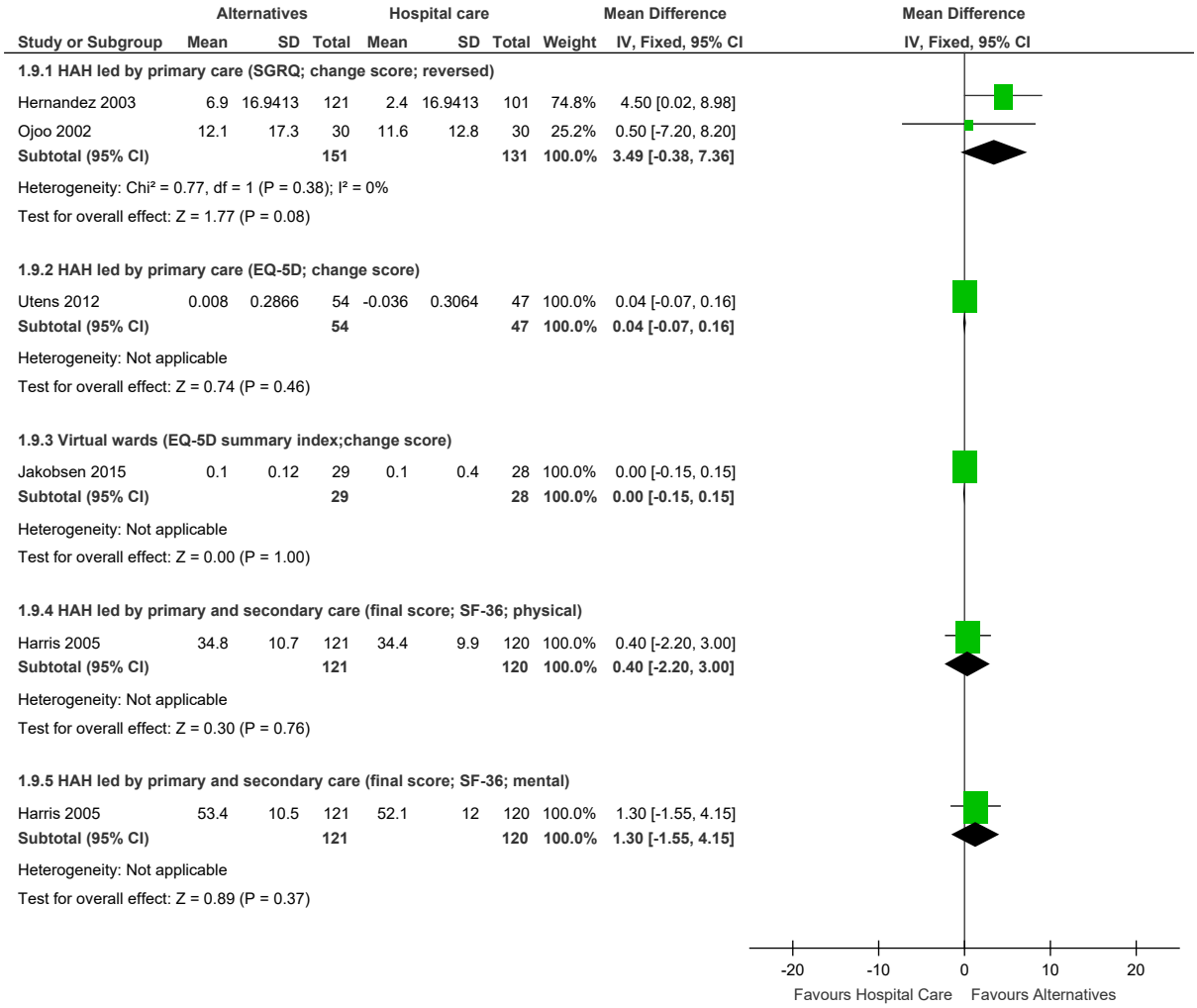


Figure 9: Quality of life (higher values better QoL) - Early discharge

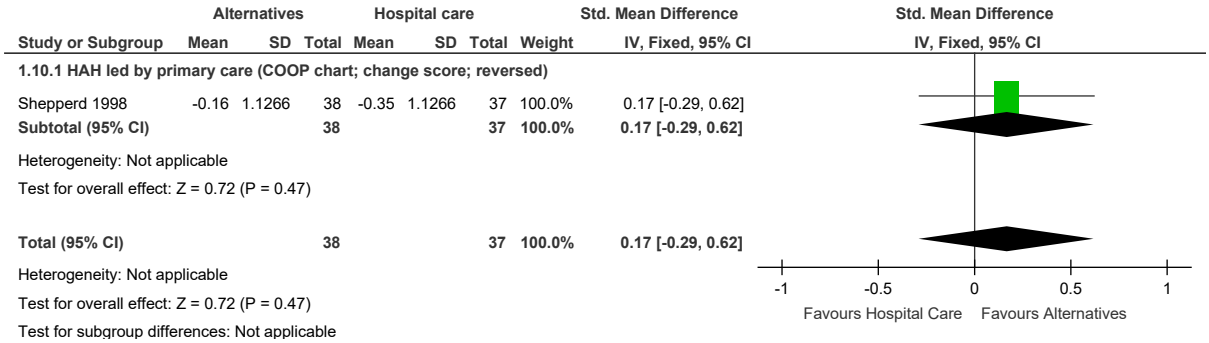


Figure 10: Patient satisfaction (dichotomous) - Early discharge

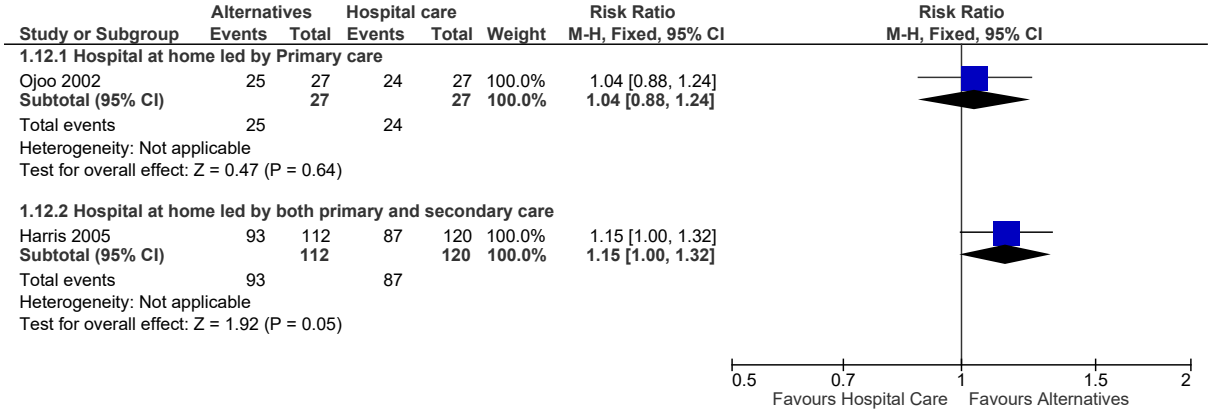


Figure 11: Patient Satisfaction (continuous-higher values more satisfied) - Early discharge

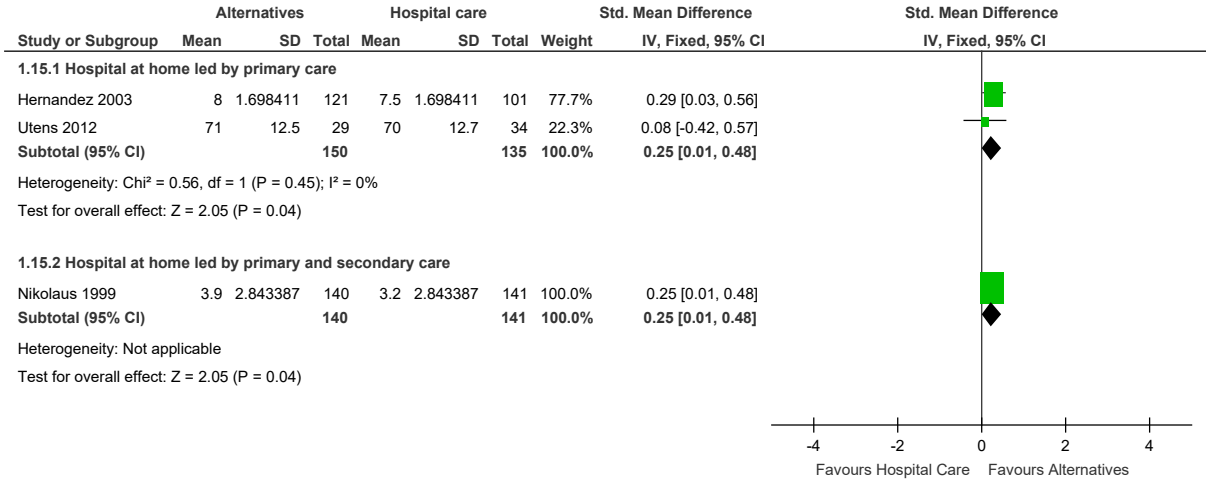
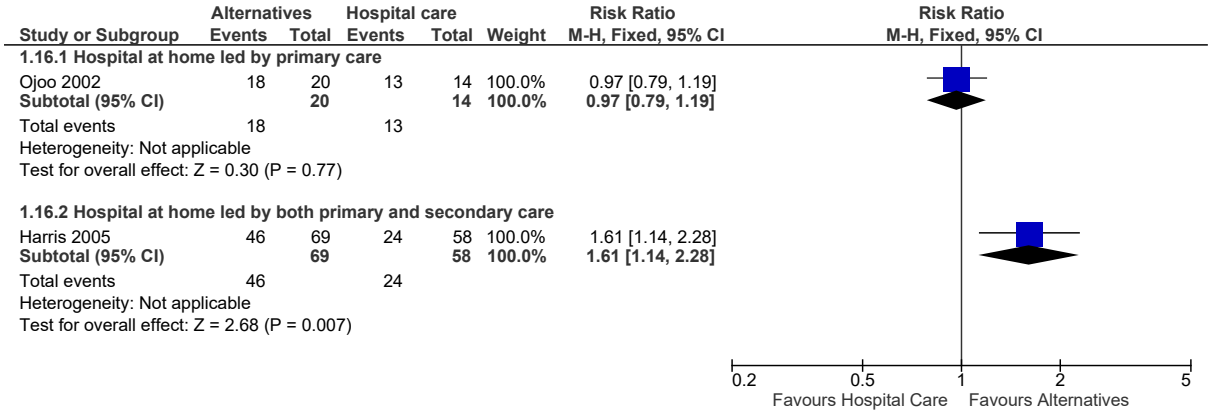


Figure 12: Carer satisfaction (dichotomous) - Early discharge



C.1.2 Admission avoidance

Figure 13: Mortality - Admission avoidance

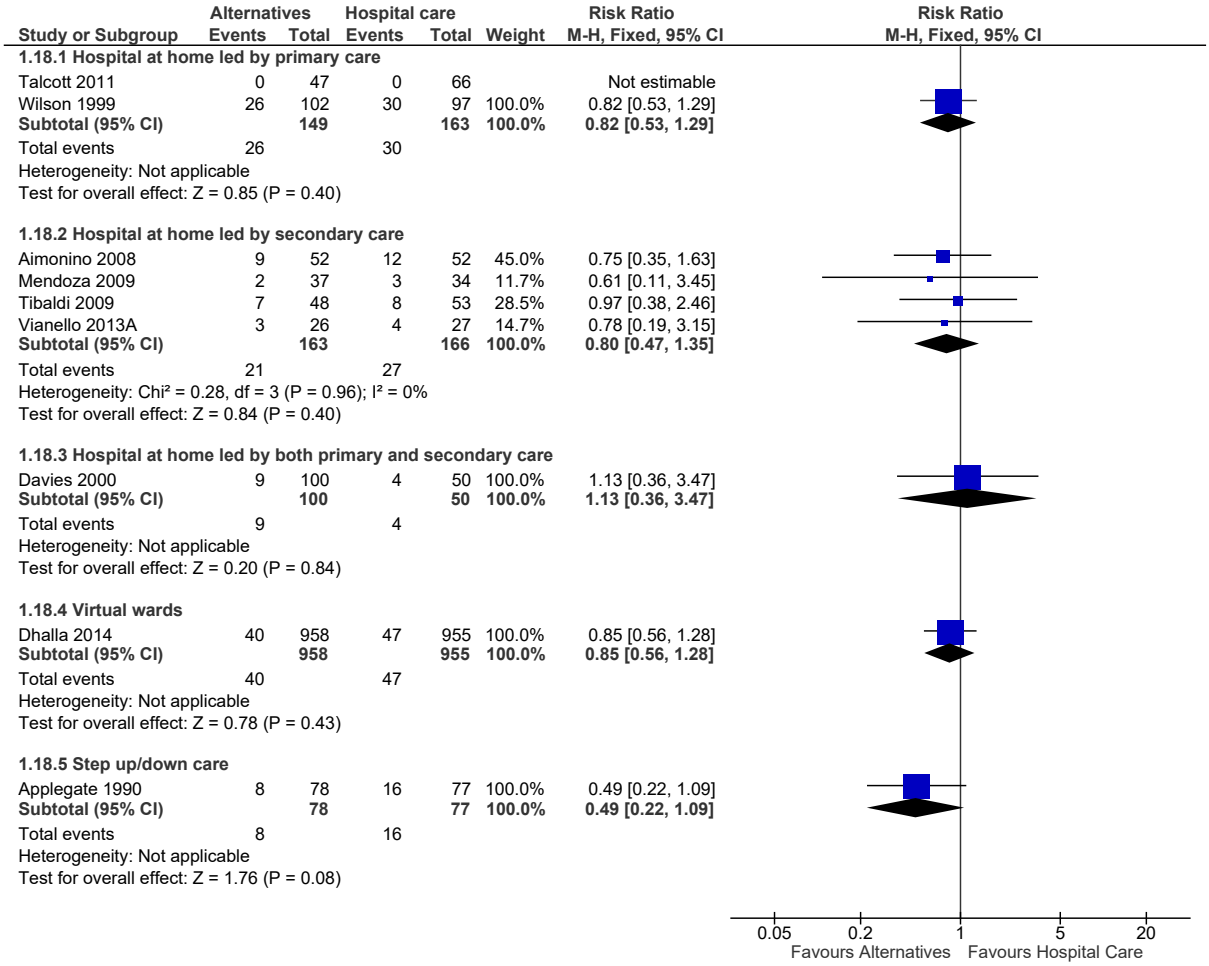


Figure 14: Readmissions (< 30 days) - Admission avoidance

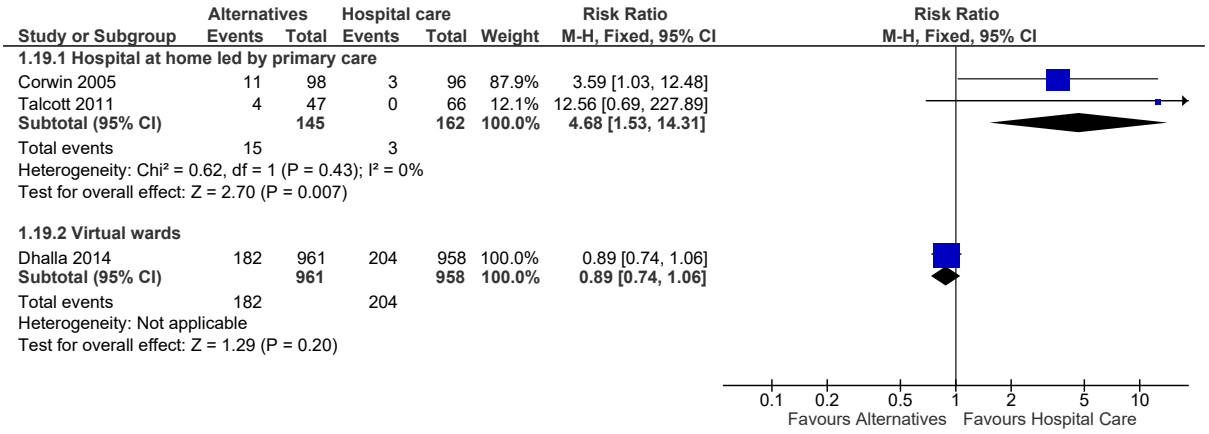


Figure 15: Admissions(>30 days) - Admission avoidance

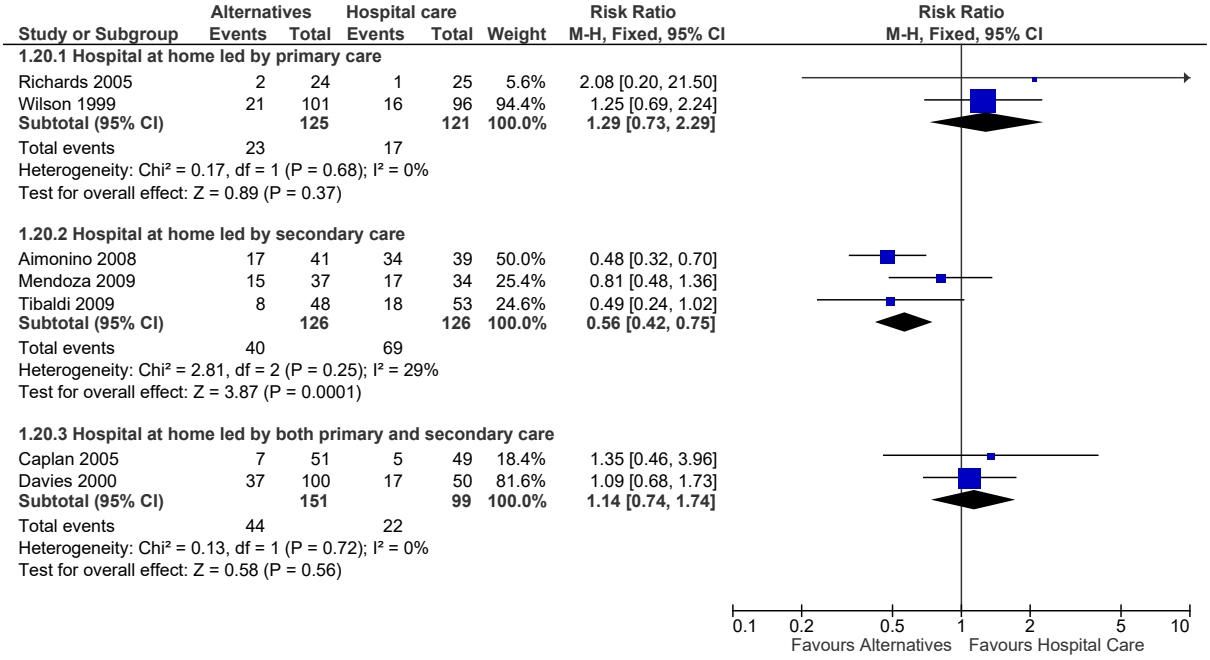


Figure 16: Presentations to ED - Admission avoidance

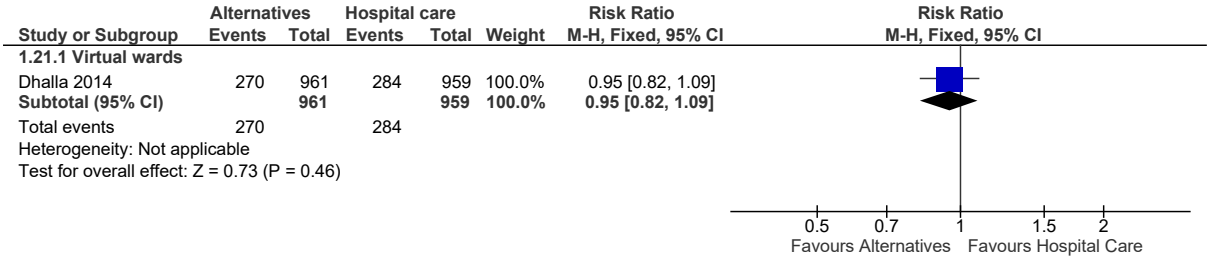


Figure 17: Length of stay (initial inpatient days) - Admission avoidance

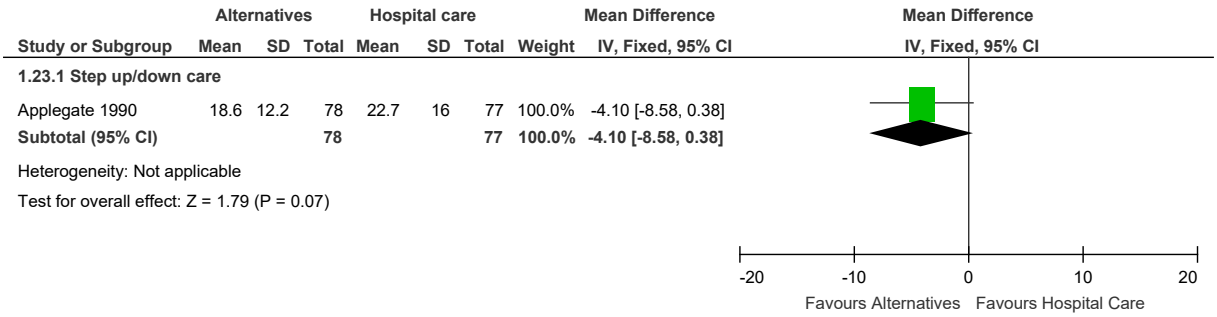


Figure 18: Length of stay (days in treatment) - Admission avoidance

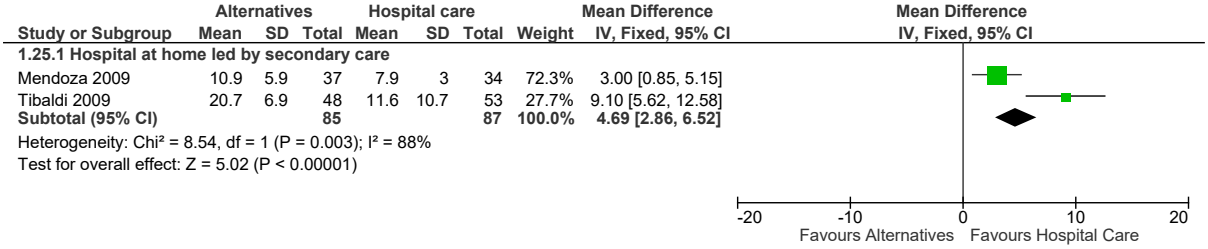


Figure 19: Quality of life (high score is good) - Admission avoidance

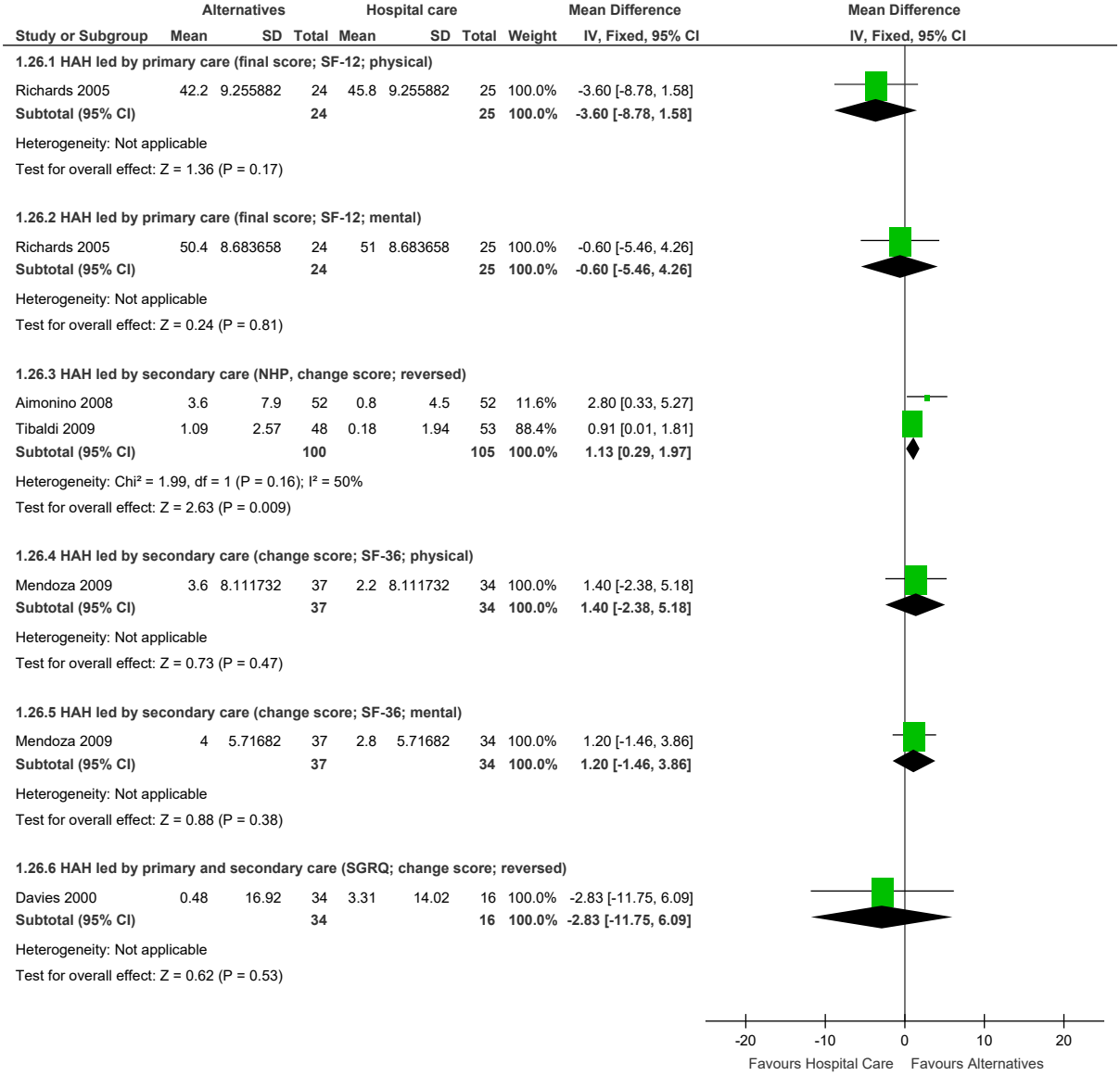


Figure 20: Patient satisfaction (dichotomous) - Admission avoidance

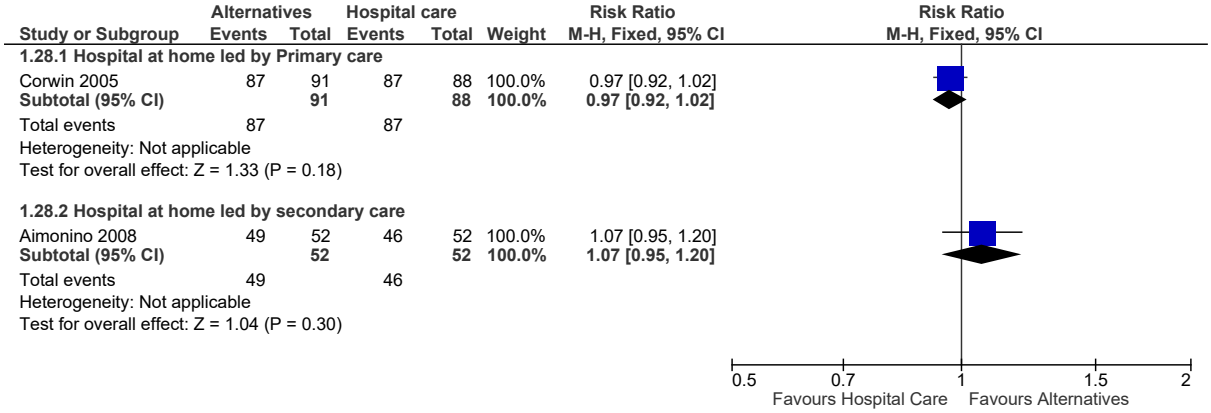


Figure 21: Patient Satisfaction (continuous-higher score is good) - Admission avoidance

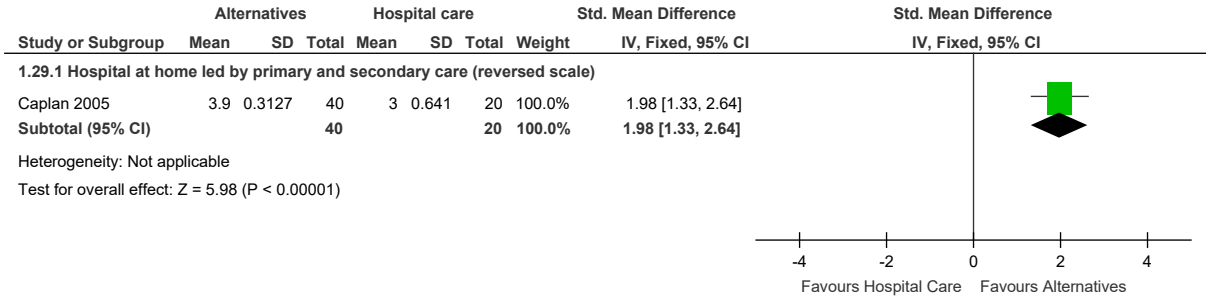


Figure 22: Days to discharge (hazard ratio) - Admission avoidance

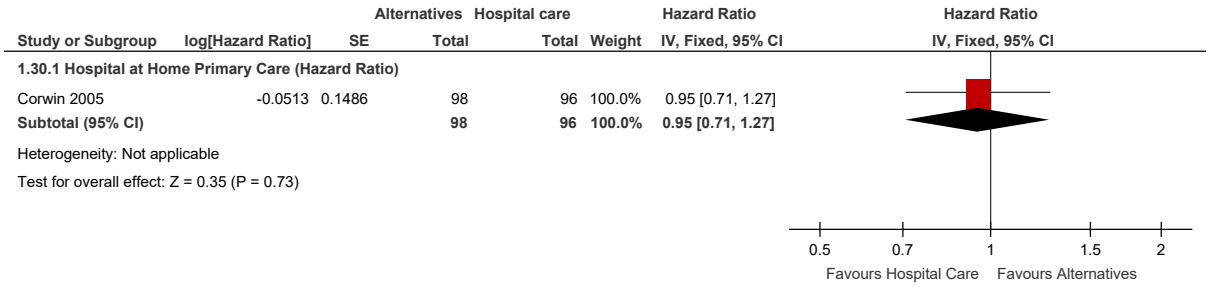


Figure 23: Carer satisfaction (continuous) - Admission avoidance

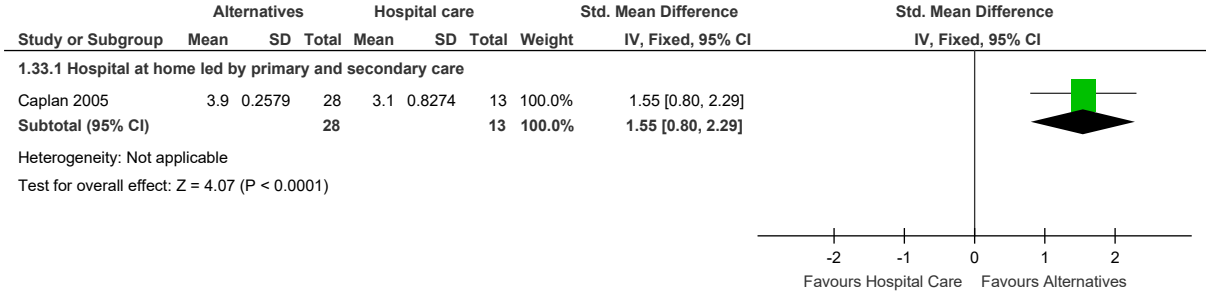
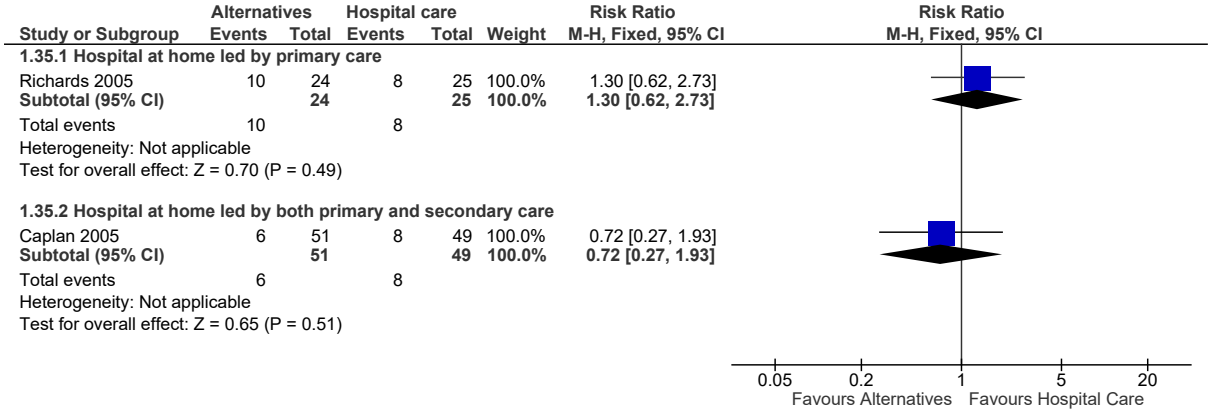


Figure 24: Adverse events – Admission avoidance



C.1.3 Individual patient data analyses

Figure 25: IPD generic inverse variance early discharge elderly medical mortality at 3 months

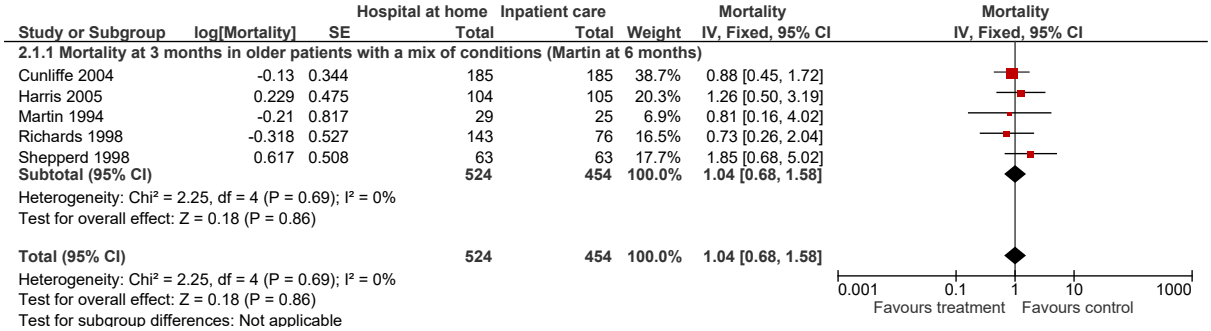


Figure 26: IPD generic inverse variance early discharge readmission at 3 months

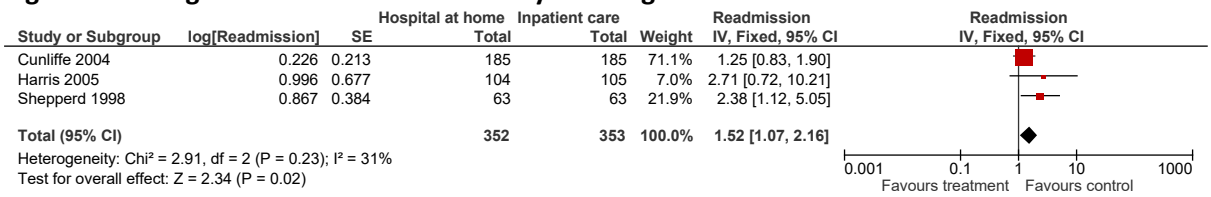


Figure 27: Readmission 3 months (excluding readmissions in the first 14 days)

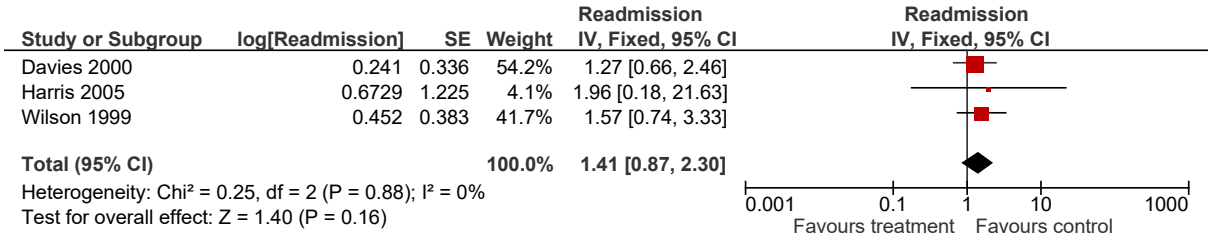
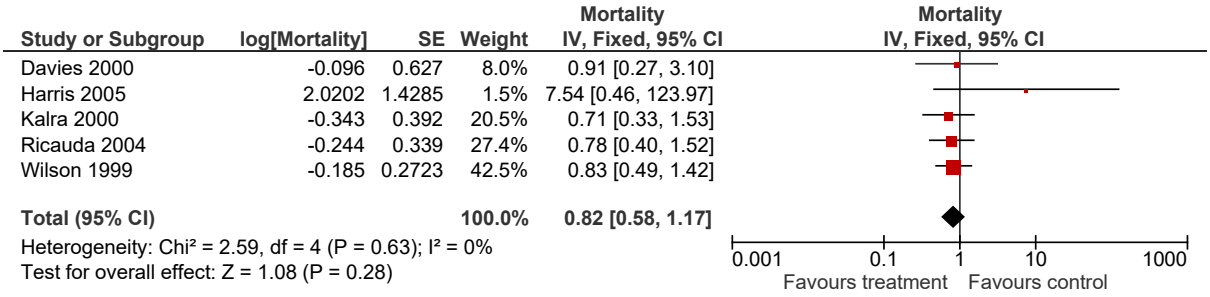


Figure 28: Mortality 3 months



Appendix D: Clinical evidence tables

D.1.1 Cochrane Review

Study	Herfjord 2014[140]
Study type	RCT (Patient randomised; Parallel).
Number of studies (number of participants)	1 (n=400).
Countries and setting	Conducted in Norway.
Line of therapy	Not applicable.
Duration of study	Intervention + follow up: intervention 3 weeks +1 year follow-up.
Method of assessment of guideline condition	Adequate method of assessment/diagnosis.
Stratum	Early discharge.
Subgroup analysis within study	Not applicable.
Inclusion criteria	Patients admitted acutely from home to medical or orthopaedic departments if they were a resident of the municipality, aged 70 years or older; respiratory and circulatory stable and deemed able to return home within three weeks.
Exclusion criteria	Severe dementia, delirium, any need for surgery or intensive care treatment.
Recruitment/selection of patients	Suitable patients were invited to participate in the trial if attending physician considered intermediate care an appropriate treatment option, and if randomisation could take place within the first 72 hours after admission.
Age, gender and ethnicity	Age - Mean (range): Intervention group- 83.6 (70-96); 84.6 (71-98). Gender (M:F): Females %: intervention group-73.2%; control group-73.7%. Ethnicity: not stated
Further population details	Not stated.
Indirectness of population	No indirectness.
Interventions	(n=200) Intervention 1: Hospital at home - Hospital at home led by primary care. The intervention included rapid transfer to intermediate care unit in a nursing home. The unit consisted of a single ward with 15 beds. The services were provided by a multi-disciplinary team of physician, nurse, physiotherapist and health care worker. The residing physician would either be a specialist in geriatric medicine and internal medicine or a junior doctor supervised by the geriatrician. Patients were mobilised out of bed and out of the room as soon as possible, and were encouraged to practice and maintain daily self-care activities and to exercise individually indoors and outdoors when possible. They

Study	Herfjord 2014[140]
	were offered individual physiotherapy and group-based exercise. The doctor made a ward round at least twice a week for each patient and other team members participated in the pre-ward round briefing. The multi-disciplinary team met twice weekly, discussed patients systematically and decided further plans for treatment. This included decisions regarding time of discharge within the 3 week maximum and making arrangements for further treatment and care after discharge. Duration: 3 weeks. Concurrent medication/care: not stated. Comments: Hospital at nursing home led by secondary care. (n=200) Intervention 2: Hospital-based care/services. Patients in the control group stayed in hospital and received usual care according to their condition. Some major differences between the intermediate care unit and the hospitals would be presence of physicians at weekends, availability of diagnostic tests, especially radiologic examinations and monitoring equipment like telemetry. In hospitals multi-disciplinary assessment was not applied systematically and patients were not likely to meet a geriatrician. Duration: 3 weeks. Concurrent medication/care: not stated.
Funding	Academic or government funding.
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: HOSPITAL AT HOME LED BY PRIMARY CARE versus HOSPITAL-BASED CARE/SERVICES Protocol outcome 1: Length of hospital stay at during study period - Actual outcome: Length of hospital stay at 1 year; Group 1: mean 10.4 (SD 15.8); n=190, Group 2: mean 10.5 (SD 15.2); n=186; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Mortality at during study period - Actual outcome: Mortality at 1 year; Group 1: 42/190, Group 2: 40/186; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Quality of life at during study period; Patient and/or carer satisfaction at during study period; Number of presentations to Emergency Department at during study period; Number of admissions to hospital at After 28 days of first admission; Number of GP presentations at during study period; Readmission up to 30 days; Avoidable adverse events at during study period.

Study	Ince 2014[154]
Study type	RCT (Patient randomised; Parallel).
Number of studies (number of participants)	1 (n=84).

Study	Ince 2014[154]
Countries and setting	Conducted in Turkey; setting: University School of Medicine and home.
Line of therapy	Not applicable.
Duration of study	Intervention + follow up: follow-up 30 days.
Method of assessment of guideline condition	Adequate method of assessment/diagnosis.
Stratum	Early discharge.
Subgroup analysis within study	Not applicable.
Inclusion criteria	Patients with mild non-alcoholic acute pancreatitis (NAAP).
Exclusion criteria	Not stated.
Recruitment/selection of patients	Not stated.
Age, gender and ethnicity	Age - Mean (SD): Home group-54.9 (16.4); hospital group- 54.2 (19.6). Gender (M:F): Define. Ethnicity: not stated.
Further population details	Not stated.
Indirectness of population	No indirectness.
Interventions	(n=42) Intervention 1: Hospital at home - Hospital at home led by primary care. Home monitoring group. After a median of 12 hours patients discharged from hospital and visited on 2nd, 3rd and 5th days by staff nurse. Patients discharged with an IV port and basic instructions for the maintenance of the port. All patients were visited in their homes twice a day by an experienced nurse and all information transferred back to the attending physician. During the home visit, the vital signs, symptoms, and general condition of each patient were recorded and transmitted by the nurse back to the attending physician. Patients given phone numbers of two physicians as emergency contacts. On the 7th, 14th and 30th days, the patients were requested to return for a follow-up visit at which time an assessment of their symptoms, physical examination and lab evaluation was conducted. Duration: 30 days. Concurrent medication/care: not stated (n=42) Intervention 2: Hospital-based care/services. Hospital group – treatment in hospital. Duration: 30 days. Concurrent medication/care: not stated.
Funding	No funding.

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: HOSPITAL AT HOME LED BY PRIMARY CARE versus HOSPITAL-BASED CARE/SERVICES.

Protocol outcome 1: Readmission up to 30 days.
- Actual outcome: Hospital re-admission at 30 days; Group 1: 1/42, Group 2: 2/42; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome

Study	Ince 2014[154]
data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Quality of life at during study period; Mortality at during study period; Avoidable adverse events at during study period; Patient and/or carer satisfaction at during study period; Number of presentations to Emergency Department at during study period; Number of admissions to hospital at after 28 days of first admission; Number of GP presentations at during study period; Length of hospital stay at during study period.

Study	Jakobsen 2015[159]
Study type	RCT (Patient randomised; Parallel).
Number of studies (number of participants)	(n=57).
Countries and setting	Conducted in Denmark; Setting: 2 University hospitals and home.
Line of therapy	Not applicable.
Duration of study	Intervention + follow up: follow-up-180 days after discharge.
Method of assessment of guideline condition	Adequate method of assessment/diagnosis.
Stratum	Early discharge.
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients >45 years of age, with severe or very severe COPD, who had an acute exacerbation of COPD, who were compliant, and who had an expected hospitalisation of more than 2 days.
Exclusion criteria	People with need of non-invasive ventilation (NIV) or manual or mechanical ventilation or of intravenous antibiotics, who had a Ph value of <7.35, who had unstable heart disease, malignancy, or poorly regulated diabetes, who were unable to give informed consent, or who had participated in another trial.
Age, gender and ethnicity	Age - Mean (SD): <60 years: control- 5 (17.9%); intervention- 5 (17.2) >80 years: control-6 (21.4); intervention-6 (20.7). Gender (M:F): female, n(%): control- 17 (60.7); intervention-18 (62.1). Ethnicity: not stated.
Further population details	1. Frail elderly.
Extra comments	Patients admitted with acute exacerbations were treated according to a strict hospital protocol for exacerbations in COPD.
Indirectness of population	No indirectness.
Interventions	(n=29) Intervention 1: Hospital at home - Hospital at home led by primary care. Virtual hospital- home based tele-health hospitalisation Participants were transported home within the first 24 hours of hospital admission. Patients were given the following equipment's – touch screen with webcam, spirometer, thermometer, nebuliser, medicine

Study	Jakobsen 2015[159]
	box containing antibiotics, prednisone, sedative, beta 2 agonists and anticholinergics , and oxygen compressor. Patients were ready for daily ward rounds using the touch screen at appointed hours. Unscheduled and acute contacts could always be effectuated 24/7 by the patient pressing the 'call hospital' button on the touch screen. Hospital personnel were instructed to treat the telehealth participants exactly the same way as they would treat them had they been present at the hospital except from physical contact which was not possible. Duration: 6 months. Concurrent medication/care: not stated. Comments: Patients in both groups were discharged by the attending doctor if they fulfilled the following five criteria: 1) slept >4 hours without awakening from respiratory symptoms, 2) forced expiratory volume in 1s not decreasing, 3) clinically stable, 4) condition improved during admission, 5) oxygen saturation >90% without supplemental oxygen or with regular oxygen supply if they were long term oxygen users. (n=28) Intervention 2: Hospital-based care/services. The patients allocated to the control group were hospitalised as usual, receiving standard hospital treatment for an exacerbation. Duration: 6 months. Concurrent medication/care: not stated.
Funding	No funding.
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: HOSPITAL AT HOME LED BY PRIMARY CARE versus HOSPITAL-BASED CARE/SERVICES. Protocol outcome 1: Quality of life at during study period. - Actual outcome: Quality of life (EQ-5D summary index) at 30 days after discharge; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Mortality at during study period. - Actual outcome: Mortality at 30 days after discharge; Group 1: 0/29, Group 2: 0/28; Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness - Actual outcome: Mortality at 6 months; Group 1: 3/29, Group 2: 4/28; Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Avoidable adverse events at during study period; Patient and/or carer satisfaction at during study period; Number of presentations to Emergency Department at during study period; Number of admissions to hospital at After 28 days of first admission; Number of GP presentations at during study period; Readmission up to 30 days; Length of hospital stay at during study period.

Study	Jeppesen 2012[160]
Study type	Systematic review of RCTs – Hospital at home for acute exacerbations of chronic obstructive pulmonary disease (COPD).
Number of studies (number of participants)	8 RCTs (n=870). (7 RCTs included in our review)
Countries and setting	Conducted in Australia, Denmark, Italy, Spain and the UK (4 trials).
Duration of study	The first search for this review was conducted up to and including August 2003 and the updated search was conducted up to February 2012.
Stratum	Admission avoidance.
Subgroup analysis within study	Sys review – pre-specified in protocol.
Inclusion criteria	The authors considered only randomised trials (RCTs) where patients presented to the emergency department with an exacerbation of their COPD and were randomised to either home support or hospital admission. They included only trials where patients randomised to home support were discharged from hospital within 72 hours of presenting to the emergency department and after an initial assessment by the hospital medical team.
Exclusion criteria	Studies must not have recruited patients for whom treatment at home is not an appropriate option in respiratory guidelines, that is, in the case of patients with an impaired level of consciousness, acute confusion, acute changes on the radiograph or electrocardiogram, arterial pH less than 7.35, concomitant medical conditions or those patients who present at the emergency department for social reasons.
Recruitment/selection of patients	The authors included patients with a diagnosis of COPD with an acute exacerbation presenting to an emergency department for treatment. Studies must not have recruited patients for whom treatment at home is not an appropriate option in respiratory guidelines, that is, in the case of patients with an impaired level of consciousness, acute confusion, acute changes on the radiograph or electrocardiogram, arterial pH less than 7.35, concomitant medical conditions or those patients who present at the emergency department for social reasons.
Age, gender and ethnicity	Overall summary of patient information not provided.
Further population details	Not stated.
Extra comments	-
Indirectness of population	No indirectness.
Interventions	Patients randomised to home support would be under the care of a specialist respiratory nurse (under guidance of the hospital medical team). All patients randomised to home support would be provided with the treatment as deemed appropriate at the time of initial assessment on presentation to the emergency department. All home support patients would have regular scheduled visits by the nurse as well as additional visits as requested by the patient or deemed appropriate by the nurse or the medical team. All home support patients

Study	**Jeppesen 2012[160]**			
	should be visited by the respiratory nurse until discharged from care. Patients randomised to in-hospital care would be treated as usual and at the discretion of the hospital medical team.			
Funding	Not stated.			
Summary of included studies				
Study	Intervention and comparison	Population	Outcomes	Comments
Aimonino Ricauda 2008[7] RCT Italy	Hospital at home Team: geriatricians, nurses, physiotherapists, social workers, counsellors Versus Control group: routine hospital care.	Adults (n=104) >75 years of age, presenting with acute exacerbation of COPD.	Hospital readmission, mortality at 6 month, quality of life, caregiver satisfaction Risk of bias (assessed in Cochrane review) For objective outcomes: Risk of bias: Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, other-low For subjective outcomes: Risk of bias: Selection - low, Blinding - high, Incomplete outcome data - Low, Outcome reporting - Low, other-low	Included in Cochrane: Randomised controlled trials comparing home versus hospital care treatment for acute exacerbation of COPD. 6 month follow up.
Bowler 2001[38] Nicholson 2001 [215] RCT Australia	Hospital at Home (in-patient status; home visits by nurses, GP and daily contact between these HP and hospital respiratory team) Versus Control: inpatient hospital care	Patients presenting with exacerbation of chronic obstructive pulmonary disease to emergency departments (or respiratory outpatient clinic) of hospital in Brisbane, Australia	Patient satisfaction, carer strain. Risk of bias (assessed in Cochrane review)For subjective outcomes: Risk of bias: Selection – unclear risk, Blinding - high, Incomplete outcome data - Low, Outcome reporting - high, other-high	In Cochrane Review: Randomised controlled trials comparing home versus hospital care treatment for acute exacerbation of COPD.
Cotton 2000[67] RCT	Hospital at home (early discharge) Team: specialist respiratory	Adults (n=81) exacerbation of COPD	Readmission, length of stay, mortality Risk of bias (assessed in Cochrane	Included in Cochrane: Hospital at home early discharge.

Study	Jeppesen 2012[160]			
UK (Scotland)	nurses, GP Versus Control: discharged after usual care.		review) For objective outcomes: Risk of bias: Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, other-low For subjective outcomes: Risk of bias: Selection - low, Blinding - high, Incomplete outcome data - Low, Outcome reporting - Low, other-low	Hospital at home for acute exacerbations of chronic obstructive pulmonary disease (COPD).
Davies 2000[79] RCT UK	Hospital at home. Team: nurse-led but 'clinical responsibility for the patients remained with the hospital respiratory physician' Versus Control group: hospital care as an inpatient.	Adults (n=150) with a mean age of 70 years; experiencing an acute exacerbation of COPD.	Admissions, quality of life, mortality. Risk of bias (assessed in Cochrane review) For objective outcomes: Risk of bias: Selection - Low, Blinding - Low, Incomplete outcome data - high, Outcome reporting - Low, other-low For subjective outcomes: Risk of bias: Selection - low, Blinding - high, Incomplete outcome data - high, Outcome reporting - Low, other-low	Included in Cochrane: Hospital at home admission avoidance and Randomised controlled trials comparing home versus hospital care treatment for acute exacerbation of COPD. 3 month follow up
Hernandez 2003[141] RCT Spain	Hospital at home (early discharge) Team: GP-led, respiratory nurse Versus	Adults (n=222) with exacerbations of chronic COPD	Mortality, ED visits, readmissions, quality of life, satisfaction Risk of bias (assessed in Cochrane review)	Included in Cochrane: Hospital at home for acute exacerbations of chronic obstructive pulmonary disease (COPD).

Study	Jeppesen 2012[160]			
	Control group: normal discharge after usual hospital care.		For objective outcomes: Risk of bias: Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, other bias-high For subjective outcomes: Risk of bias: Selection - low, Blinding - high, Incomplete outcome data - Low, Outcome reporting - Low, other bias-high	
Ojoo 2002[222] RCT UK	Hospital at home Team: outreach nurses Versus Control group: inpatient care.	Adults (n=60) >18 years, with an acute exacerbation of COPD	Satisfaction Risk of bias (assessed in Cochrane review) For subjective outcomes: Risk of bias: Selection – unclear risk, Blinding - high, Incomplete outcome data - Low, Outcome reporting - low, other bias- low	Included in Cochrane: Hospital at home early discharge. Hospital at home for acute exacerbations of chronic obstructive pulmonary disease (COPD).
Skwarska 2000[277] RCT UK	Hospital at home Team: GP and nurses. Review at weekly meetings with consultant and medical advice from on call registrar or consultant. Versus Control group: treated in the inpatient respiratory unit.	Adults (n=184) with an acute exacerbation of COPD	Quality of life, satisfaction. Risk of bias (assessed in Cochrane review) For subjective outcomes: Risk of bias: Selection - low, Blinding - high, Incomplete outcome data - high, Outcome reporting - Low, other-low	Included in Cochrane: Hospital at home early discharge. Hospital at home for acute exacerbations of chronic obstructive pulmonary disease (COPD). Follow up of 18 months.

Study	Shepperd 2008[271]
Study type	Systematic review of RCTs – Hospital at home admission avoidance.
Number of studies (number of participants)	10 (n=1333). (8 RCTs included in our review).
Countries and setting	Conducted in Australia, Italy, New Zealand and the United Kingdom.
Duration of study	Databases were searched through to January 2008.
Stratum	Admission avoidance.
Subgroup analysis within study	Sys review – pre-specified in protocol.
Inclusion criteria	Patients aged 18 years and over that were included in admission avoidance hospital at home schemes.
Exclusion criteria	Patients with long-term care needs were not included unless they required admission to hospital for an acute episode of care. Evaluations of obstetric, paediatric and mental health hospital at home schemes were excluded from the review since the preliminary literature searches by the authors suggested that separate reviews would be justified for each of these groups.
Recruitment/selection of patients	Randomised controlled trials recruiting patients aged 18 years and over. Studies comparing admission avoidance hospital at home with acute hospital inpatient care. The schemes may admit patients directly from the community, so avoiding physical contact with the hospital, or may admit from the emergency room.
Age, gender and ethnicity	Not stated overall.
Further population details	Two trials recruited patients with chronic obstructive pulmonary disease (COPD) (Davies 2000; Nicholson 2001), two trials recruited patients recovering from a moderately severe stroke who were clinically stable (Kalra 2000; Ricauda 2004), and three trials recruited patients with an acute medical condition who were mainly elderly (Caplan 1999; Harris 2005; Wilson 1999). As noted above, there was one trial each for patients with cellulitis (Corwin 2005), patients with community acquired pneumonia (Richards 2005).
Extra comments	-
Indirectness of population	No indirectness
Interventions	Hospital at home - Admission avoidance hospital at home schemes compared to acute hospital inpatient care. The schemes may admit patients directly from the community or from the emergency room. Definition used by the authors: hospital at home is a service that can avoid the need for hospital admission by providing active treatment by health care professionals in the patient's home for a condition that otherwise would require acute hospital in-patient care, and always for a limited time period. In particular, hospital at home has to offer a specific service to patients in their home requiring health care professionals to take an active part in the patients' care. If hospital at home were not available then the patient would be admitted to an acute hospital ward. Therefore, the following services are excluded from this review: • services providing long term care;

Study	**Shepperd 2008[271]**			
	• services provided in outpatient settings or post discharge from hospital; and • self-care by the patient in their home such as self-administration of an intra-venous infusion.			
Funding	Not stated.			
Summary of included studies				
Study	Intervention and comparison	Population	Outcomes	Comments
Caplan 2005[46] Caplan 1999[47] RCT Australia	Hospital outreach team providing antibiotics, medications, blood transfusion. Team: included nurse, GP, hospital physician, physiotherapists and occupational therapist. Versus Control group: treated in accordance with standard regimens.	Adults (n=100) >65 years of age. Range of conditions including pneumonia, urinary tract infections and cellulitis, endocarditis and osteomyelitis.	Quality of life (Barthel), patients and carer satisfaction, adverse events and mortality. Risk of bias (assessed in Cochrane review) Risk of bias: Selection – low (no further details for other domains)	Included in Cochrane: Hospital at home admission avoidance. 3 month follow up.
Corwin 2005[66] RCT New Zealand	Hospital at home Team: GP or community GP and community care nurses Versus Control group: hospital administration of antibiotics.	Adults (n=200) >16 years of age, with clinical signs of cellulitis or failure of oral antibiotics	Adverse events, length of stay, satisfaction Risk of bias (assessed in Cochrane review) Risk of bias: Selection – low (no further details for other domains)	Included in Cochrane: Hospital at home admission avoidance.
Davies 2000[79] RCT UK	Hospital at home. Team: nurse-led but 'clinical responsibility for the patients remained with the hospital respiratory physician' Versus Control group: hospital care as an inpatient.	Adults (n=150) with a mean age of 70 years; experiencing an acute exacerbation of COPD.	Admissions, quality of life, mortality. Risk of bias (assessed in Cochrane review) Risk of bias: Selection – unclear risk (no further details for other domains)	Included in Cochrane: Hospital at home admission avoidance and Randomised controlled trials comparing home versus hospital care treatment for acute exacerbation of COPD.

Study	Shepperd 2008[271]			
				3 month follow up
Harris 2005[138] RCT New Zealand	Home from hospital Team: nurse-led but 'clinical responsibility was held by dedicated HAH registrar, consultant geriatrician and in some cases the GP' Versus	Adults (n=285) with a mean age of 81 years presenting at ED or admitted to hospital for a broad range of diagnoses: fractures (28%); miscellaneous medical problems (18%); respiratory problems (16%); stroke and neurological diagnoses (14%); falls and injuries (11%); cardiac diagnoses (8%); and rehabilitation and other problems (5%) Location: New Zealand	Risk of bias (assessed in Cochrane review) Risk of bias: Selection – low (no further details for other domains)	Included in Cochrane: Hospital at home admission avoidance. Hospital at home early discharge.
Kalra 2000[164] RCT UK	Hospital outreach admission avoidance MDT with joint care from community services. Three arm trial: Stroke unit care (n=148) Versus Stroke team (n=150) Versus Home care (n=149)	Adults (n=457) recovering from a moderate to severe stroke	Mortality, Readmission, length of stay, Ranking level of independence, Barthel Risk of bias (assessed in Cochrane review) Risk of bias: Selection – low (no further details for other domains)	Included in Cochrane: Hospital at home admission avoidance.
Nicholson 2001[215] RCT Australia	Hospital at home (discharge from Emergency Department) Patients retained in patient status and received clinical supervision from hospital specialist, and hospital had legal and financial responsibility; also	Patients with chronic obstructive pulmonary disease Inclusion criteria: age > 45 years, COPD, current or ex smoker, FEV1 < 60% predicted, admission requested by GP or OPD clinic staff or ED	Cost to the health service Risk of bias (assessed in Cochrane review) Risk of bias: Selection – unclear risk (no further details for other domains)	

Study	Shepperd 2008[271]			
	received care from GP, community nursing and domiciliary care. Hospital medical staff provided 24 hour telephone support	staff, telephone at home treatment = 13 control = 12		
Ricauda 2004[240] RCT Italy	Home treatment (from a geriatric home hospitalisation service) Team: geriatricians, nurses, dieticians, physiotherapists, psychologists and social workers dedicated to the home management of stroke. Versus General medical ward.	Adults (n=120) elderly patients, with a mean age of 82 years; admitted to the emergency department with first acute ischemic stroke.	Quality of life, mortality, avoidable adverse events (respiratory and urinary tract infections) Risk of bias (assessed in Cochrane review) Risk of bias: Selection – unclear risk (no further details for other domains)	Included in Cochrane: Hospital at home admission avoidance.
Richards 2005[242] RCT New Zealand	Hospital at home Team: GP and primary care nurses Versus Control group: hospital management	Adults (n=55) with mild to moderately severe pneumonia	Length of stay (days to discharge), satisfaction. Risk of bias (assessed in Cochrane review) Risk of bias: Selection – low (no further details for other domains)	Included in Cochrane: Hospital at home admission avoidance.
Wilson 1999[312] Wilson 2002[314] Wilson 2003[313] RCT UK	Hospital at home Team: nurse-led, physiotherapist, occupational therapists, health workers. GPs retain responsibility. Versus Control group: hospital care.	Adults (n =199) with an acute condition.	Mortality, readmission, length of stay, satisfaction. Risk of bias (assessed in Cochrane review) Risk of bias: Selection – low (no further details for other domains)	Included in Cochrane: Hospital at home admission avoidance.

Study	Shepperd 2009[273]
Study type	Systematic review of RCTs – Hospital at home early discharge.
Number of studies (number of participants)	26 (n=3967). (6/26 studies included in our review)
Countries and setting	Conducted in Australia, Canada, New Zealand, Norway, Sweden, Thailand, and the UK (the majority of trials).
Duration of study	Databases were searched through to January/February 2008.
Stratum	Early discharge.
Subgroup analysis within study	Sys review – pre-specified in protocol.
Inclusion criteria	The review includes evaluations of early discharge hospital at home schemes that include patients aged 18 years and over. Patients were either recovering from a stroke, following elective surgery, or were older people with a mix of conditions.
Exclusion criteria	Patients with long-term care needs were not included unless they required admission to hospital for an acute episode of care. Evaluations of obstetric, paediatric and mental health hospital at home schemes were excluded from the review since the authors' preliminary literature searches suggested that separate reviews would be justified for each of these groups due to the different types of patient group and volume of literature. The following services were excluded from this review: services providing long term care, services provided in out-patient settings or post discharge from hospital, and self-care by the patient in their home such as self-administration of an intravenous infusion.
Recruitment/selection of patients	The review includes evaluations of early discharge hospital at home schemes that include patients aged 18 years and over. Patients were either recovering from a stroke, following elective surgery, or were older people with a mix of conditions.
Age, gender and ethnicity	Not stated overall.
Further population details	Not stated.
Extra comments	-
Indirectness of population	No indirectness – we excluded the papers with patients recovering from elective surgery for our analysis.
Interventions	Studies comparing early discharge hospital at home with acute hospital in-patient care. The authors used the following definition to determine if studies should be included in the review: hospital at home is a service that provides active treatment by health care professionals in the patient's home for a condition that otherwise would require acute hospital in-patient care, and always for a limited time period. In particular, hospital at home has to offer a specific service to patients in their home requiring health care professionals to take an active part in the patients' care. If hospital at home were not available then the patient would not be discharged early from hospital and would remain on an acute hospital ward. Therefore, the following services were excluded from this review: services providing long term care, services provided in out-patient settings or post discharge from hospital, and self-care by the patient in their home such as self-administration of an intravenous infusion.

Study	**Shepperd 2009[273]**			
Funding	Not stated.			
Summary of included studies				
Study	Intervention and comparison	Population	Outcomes	Comments
Cotton 2000[67] RCT UK	Hospital at home (early discharge) Team: specialist respiratory nurses, GP Versus Control: discharged after usual care.	Adults (n=81) exacerbation of COPD	Readmission, length of stay, mortality Risk of bias (assessed in Cochrane review) Risk of bias: Selection – low (no further details for other domains)	Included in Cochrane: Hospital at home early discharge. Hospital at home for acute exacerbations of chronic obstructive pulmonary disease (COPD).
Donald 1995[89] RCT UK	Hospital at home Team: full-time nurse, manager/coordinator, physiotherapists and occupational therapists. Overall responsibility for the patient while under the care of HAH remained with the consultant, although the GP provided routine and emergency medical care Versus Control group: conventional discharge.	Adults (n=60) with a mean age of 82 years, who had been admitted acutely under the care of the elderly care physicians.	Readmission, mortality, length of hospital stay. Risk of bias (assessed in Cochrane review) Risk of bias: Selection – low (no further details for other domains)	In Cochrane Review: Hospital at home early discharge.
Harris 2005[138] RCT New Zealand	Home from hospital Team: nurse-led but 'clinical responsibility was held by dedicated HAH registrar, consultant geriatrician and in some cases the GP' Versus	Adults (n=285) with a mean age of 81 years presenting at ED or admitted to hospital for a broad range of diagnoses: fractures (28%); miscellaneous medical problems (18%); respiratory problems (16%); stroke and neurological	Mortality, Readmission, Quality of life, Satisfaction, Length of stay Risk of bias (assessed in Cochrane review) Risk of bias: Selection – low (no further details for other domains)	Included in Cochrane: Hospital at home admission avoidance. Hospital at home early discharge.

Study	Shepperd 2009[273]			
		diagnoses (14%); falls and injuries (11%); cardiac diagnoses (8%); and rehabilitation and other problems (5%) Location: New Zealand		
Ojoo 2002[222] RCT UK	Hospital at home Team: outreach nurses Versus Control group: inpatient care.	Adults (n= 60) >18 years, with an acute exacerbation of COPD	Satisfaction Risk of bias (assessed in Cochrane review) Risk of bias: Selection – low (no further details for other domains)	Included in Cochrane: Hospital at home early discharge. Hospital at home for acute exacerbations of chronic obstructive pulmonary.
Shepperd 1998[265] Shepperd 1998[268] RCT UK	Hospital at home Team: nurse-led, physiotherapist, occupational therapist, pathology, SALT. GPs held responsibility. Versus Control group: inpatient hospital care.	Adults (n=532) recovering from surgery mainly but elderly and COPD patients also (table 6&7); outcomes for medical elderly patients reported only	Quality of life, carer satisfaction, readmission, mortality. Risk of bias (assessed in Cochrane review) Risk of bias: Selection – low (no further details for other domains)	Included in Cochrane: Hospital at home early discharge.
Skwarska 2000[277] RCT UK	Hospital at home Team: GP and nurses. Review at weekly meetings with consultant and medical advice from on call registrar or consultant. Versus Control group: treated in the inpatient respiratory unit.	Adults (n=184) with an acute exacerbation of COPD	Quality of life, satisfaction. Risk of bias (assessed in Cochrane review) Risk of bias: Selection – unclear risk (no further details for other domains)	Included in Cochrane: Hospital at home early discharge. Hospital at home for acute exacerbations of chronic obstructive pulmonary. Follow up of 18 months.

Hospital at home (Primary Care)

Study	COURTNEY 2009[68]
Study type	RCT (Patient randomised; Parallel).
Number of participants	Intervention group=64. Control group=64 (n=128).
Countries and setting	Tertiary metropolitan hospital in Australia.
Duration of study	Recruitment August 2004 – December 2006. Follow up for 24 weeks.
Stratum	Overall.
Subgroup analysis within study	Quality of Life measure according to the four major admission diagnoses (cardiac, respiratory, gastrointestinal and falls).
Inclusion criteria	Inclusion criteria were chosen based on previously published research identifying risk factors for readmission. 65 years or older and admitted with a medical condition. At least 1 risk factor for readmission (aged >75, multiple admissions in previous 6 months, multiple comorbidities, lived alone, lacked social support, poor self-rated health, moderate to severe functional impairment and history of depression).
Exclusion criteria	Patients' ability to participate in the planned intervention (for example, patients who were unable to walk independently or suffered a cognitive deficit would not be able to safely manage the intervention exercise programme).
Recruitment/selection of patients	A sample of 128 participants was recruited within 72 hours of admission to medical wards at a tertiary hospital in Brisbane, Australia. An information package on the study was provided and explained to potential participants, and signed consent was obtained from all participants. Baseline data were collected before randomisation and were thus blinded. After collection of baseline data, the research nurse at the clinical site contacted the project coordinator, who was blinded to baseline data and randomly allocated participants using a computerised randomisation program to the control or intervention group.
Age, gender and ethnicity	Age Mean: 78.8 Gender (% of F): 62.3% (76/122) Ethnicity: not stated.
Further population details	Not stated.
Extra comments	-
Indirectness of population	No indirectness.
Interventions	(n=64)Intervention 1: Hospital at home-In addition to usual care, they received an intervention following the 'Older Hospitalised Patients'

Study	COURTNEY 2009[68]
	Discharge Planning and In-home Follow-up Protocol (OHP-DP)', developed by the authors. The protocol commenced within 72 hours of admission and continued within 72 hours of admission and continued throughout hospitalisation, after transfer to home and in home for 6 months. The intervention was modified to the population of older patients who are at known risk of readmission yet still relatively healthy and potentially able to live independently, because it was felt that this group would particularly benefits from a relatively low resource intensive preventative intervention. Within 72 hours of admission, a registered nurse and physiotherapist undertook a comprehensive patient and developed a goal-directed, individualised care plan in consultation with the patient, health professionals, family and caregivers. The care plan included exercise intervention, nursing intervention while participant in the hospital, intervention after discharge. The latter included a nurse home visit within 48 hours of discharge to assess access availability of support, address transitional concerns, provide advice and support and ensure that the exercise program could be safely undertaken at home. Extra home visits were provided if required. Weekly follow-up telephone calls were provided for 4 weeks, followed by monthly follow up for a further 5 months. The nurse was also available for contact between 9am and 5pm weekdays. (n=64)Intervention 2: Hospital based care/services: Participants in the control received the routine care, discharge planning and rehabilitation advice normally provided. If in-home follow-up was necessary, it was organised in the routine manner (for example, referral to community health services).
Funding	Australian Research Council Discovery Project Grant.
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: HOSPITAL AT HOME (PRIMARY CARE) versus INPATIENT HOSPITAL CARE. Protocol outcome 1: Length of stay. - Actual outcome: Length of stay; Group 1: Mean (SD): 4.6 (+/-2.7); Group 2: Mean (SD): 4.7 (+/-3.3); Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness - Actual outcome: Emergency hospital readmissions; Group 1: 22.0% (21 readmissions); Group 2: 46.7% (49 readmissions); Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 3: GP presentations. - Actual outcome: Emergency GP visits; Group 1: 25.0% (13 emergency GP visits); Group 2: 67.3% (86 emergency GP visits); Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 4: Quality of Life. - Actual outcome: Health-related Quality of Life: Physical Component and Mental Component summary score; Group 1: Physical: Mean (SD): 43.8 (+/-9.4), Mental: Mean (SD): 59.4 (+/-5.1); Group 1: Physical: Mean (SD): 26.0 (+/-9.9), Mental: Mean (SD): 48.3 (+/-7.7); Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness .	
Protocol outcomes not	Mortality, avoidable adverse events, patient and/or carer satisfaction, length of stay, number of avoidable admissions.

Study	COURTNEY 2009[68]
reported by the study	

Study	KWOK 2008[173]
Study type	RCT (Patient randomised; Parallel).
Number of participants	Intervention group=49. Control group=56 (n=105).
Countries and setting	Prince of Wales Hospital, a major teaching hospital in Hong Kong.
Duration of study	Recruitment September 1999 – February 2001. Follow up for 6 months.
Stratum	Early discharge.
Subgroup analysis within study	No.
Inclusion criteria	> 60 years of age. Residing within the region. At least one hospital admission for chronic heart failure in the 12 months prior to the index admission.
Exclusion criteria	Communication problems but without caregivers. Residing in a nursing home. Terminal diseases with a life expectancy of less than 6 months.
Recruitment/selection of patients	Eligible subjects were identified and recruited by a research nurse on the day or the day before hospital discharge. After obtaining written consent from the subjects, the research nurse recorded demographic data, functional status, cognitive function, psychological state and a general health questionnaire. The ward nurses then phoned a second research assistant who assigned trial grouping according to a random number table. The group assignment was made known to patients. One intervention and two control group subjects dropped out because of moving out of Hong Kong and the development of symptomatic cancer.
Age, gender and ethnicity	Age. Mean (SD); Intervention: 79.5 years (+/-6.6). Control: 76.8 years (+/-7.0). Gender. (% of M): Intervention: 45.0% (22/49). Control: 45.0% (25/56). Ethnicity: not stated.

Study	KWOK 2008[173]
Further population details	The intervention group subjects were more likely to be recipients of 'comprehensive social security allowance' and had greater economical handicap.
Extra comments	
Indirectness of population	No indirectness.
Interventions	(n=49) Intervention 1: Hospital at home- The subjects were visited by a designated community nurse before they were discharged from the hospital. The objectives were to provide health counselling, such as drug compliance, dietary advice and to encourage subjects to contact the community nurse via a telephone hotline during office hours when they developed symptoms. The community nurse carried a pager and a mobile phone. The trained clerk, who answered the hotline, relayed the message from the subjects to the community nurse via the pager. The subjects were then visited by the community nurse at home within seven days of discharge. During the home visits, the community nurse checked vital signs and signs for poor control of CHF –ankle swelling, dyspnoea and basal crepitation on auscultation. Medications were checked and compliance encouraged. Avoidance of salty and high fat foods and regular physical exercise were promoted. Home care and day care services were arranged if social support was found to be insufficient. The community nurse thereafter performed weekly home visits for another month and monthly thereafter. The community nurse liaised closely with either a geriatrician or a cardiologist in their respective hospitals. After liaison, the community nurse could alter medication regime, arrange urgent hospital outpatient appointments and clinical admission. When subjects were readmitted, the community nurse visited the patient in hospital and provided background information to attending doctors. Subjects who refused further home visits were monitored by the community nurse by telephone. n=56) Intervention 2: The control subjects received usual medical and social care, except that they were followed up in the hospital outpatient clinics by the same group of designated geriatricians or cardiologists.
Funding	Health Services Research Committee/Health Care & Promotion Fund of Hong Kong.
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: HOSPITAL AT HOME (PRIMARY CARE) versus INPATIENT HOSPITAL CARE. Protocol outcome 1: Readmission. - Actual outcome: Readmission rates; Group 1: 46.0% (21 readmissions); Group 2: 57.0% (49 readmissions); Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Mortality. - Actual outcome: Death; Group 1: 4/49; Group 2: 8/56; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Avoidable adverse events, quality of life, patients and/or carer satisfaction, length of stay, number of presentations to ED, number of avoidable admissions, reduced GP presentations.

Study	RICH 1993[241]
Study type	RCT (Patient randomised; Parallel).
Number of participants	Intervention group=63. Control group=35 n=90.
Countries and setting	Jewish Hospital at Washington University; secondary and tertiary care university teaching hospital.
Duration of study	Recruitment April 1988 – March 1989. Follow up for 3 months.
Stratum	Early discharge Readmission risk categories low (0 risk factors n=52), intermediate (1 risk factor, n=123) or high (≥ 2 risk factors, n=65) based on the presence of four independent risk factors for readmission defined in a prior study at the same institution: four or more prior hospitalisations within the preceding five-year interval, previous history of CHF, hypercholesterolemia and right bundle branch block on the admitting ECG.
Subgroup analysis within study	Moderate-risk and high-risk subgroups.
Inclusion criteria	> 70 years of age. Admitted to medical ward between April 1988 and March 1989 Definite diagnosis of CHF (presence of definite radiographic evidence of pulmonary congestion) or by the presence of typical historical and physical findings of the CHF in conjunction with symptomatic improvement following dieresis.
Exclusion criteria	Low risk for readmission, as these patients would be unlikely to benefit significantly from a program designed to reduce readmission frequency. Residence outside the catchment area. Planned discharge to a nursing home or other chronic care facility. Non-cardiac illness likely to result in non-preventable readmission (for example, terminal malignancy). Server mental incapacity or psychiatric disturbance. Patient or physician refusal. Logical and discretionary reasons.
Recruitment/selection of patients	98 patients agreed to participate. After signing appropriate informed consent documents, the subjects were stratified according to risk category and randomly assigned on a 2:1 basis to receive either the study intervention or conventional medical care as determined by the patients' usual physician. 21 patients (8%) died during the initial hospitalisation and were excluded from further analysis.
Age, gender and ethnicity	Age.

Study	RICH 1993[241]
	Mean (SD); Intervention: 80 years (+/-6.3). Control: 77.3 years (+/-6.1). Gender (% of M): Intervention: 39.7% (25/63). Control: 42.9% (15/35). Ethnicity (White). Intervention: 46.0% (29/63). Control: 57.1% (20/35).
Further population details	
Extra comments	
Indirectness of population	No indirectness.
Interventions	(n=63) Intervention 1: Hospital at home- Consisted of four components: intensive education about CHF and its treatments, a detailed analysis of medications with specific recommendations designed to improve compliance and reduce adverse effects, early discharge planning and enhanced follow-up through home care and telephone contacts. At the time of discharge, a discharge summary form was completed by the study nurse detailing medications, dietary and activity restrictions and any anticipated problem areas identified by the social worker, hospital home care representative or study personnel. This form was transmitted to a nurse working with the Jewish Hospital Home Care Division, who then visited the patient at home within 48 hours (in most cases within 24 hours) of hospital discharge. In addition to surveying the home environment and identifying any additional problem areas, the home care nurse again reinforced the teaching materials, reviewed medications, diet and activity guidelines, assisted with initiating the daily weight chart and performed a general physical assessment and cardiovascular examination. The patients were seen three times in the first week, during which time the above functions were repeated and they were subsequently seen at regular intervals in accordance with federal home-care guidelines. In addition, the study burse contacted all patients by telephone to assess their progress, answer any questions and keep communication line open. All patients were encouraged to contact study personal or their personal physicians anytime new problems, symptoms or questions occurred. (n=35) Intervention 2: Hospital based care/services-The patients randomised to standard care received all conventional treatments as requested by the patients attending physician. Such measures could include social service evaluation, dietary and medication teaching, home care and all other available hospital services. However, because these patients were not seen regularly by the study nurse and did not receive the study educational materials or the formal medication analysis, the intensity of teaching was lower for the usual-care group.
Funding	Community Research Grant-in-Aid from the American Heart Association.
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: HOSPITAL AT HOME (PRIMARY CARE) versus INPATIENT HOSPITAL CARE. Protocol outcome 1: Readmission. - Actual outcome: Readmission rates; Group 1: 33.3% (21/63 readmissions); Group 2: 45.7% (16/35 readmissions); Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Length of stay.	

Study	RICH 1993[241]
- Actual outcome: Total hospital days; Group 1: Mean (SEM): 4.3 (+/-1.1); Group 2: Mean (SEM): 5.7 (+/-2.0); Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Mortality, avoidable adverse events, quality of life, patient and/or carer satisfaction, number of presentations to ED, number of avoidable admissions, reduced GP presentations.

Study	STEWART 1998[281] STEWART 1999[280]
Study type	RCT (Patient randomised; Parallel).
Number of participants	Home based intervention=49. Usual care=48 (n=97)
Countries and setting	Cardiology Unit of the Queen Elizabeth Hospital/University of Adelaide, Woodville, South Australia.
Duration of study	6 month follow up.
Stratum	Overall.
Subgroup analysis within study	n/a.
Inclusion criteria	Presence of CHF (defined on the basis of a formal demonstration, impaired systolic function and persistent functional impairment indicative of New York Heart Association class 2, 3 or 4 statuses. Acute ischemia or infarction with previously documented CHF were included. Being discharged home and requiring continuous pharmacotherapeutic intervention for a chronic condition. Patients with CHF who were determined to be at high risk for unplanned readmission were identified on the basis of 1 or more unplanned admissions for acute heart failure before study entry.
Exclusion criteria	Acute MI or unstable angina pectoris. Presence of terminal malignancy requiring palliative care. Home address outside catchment area.
Recruitment/selection of patients	Not stated.
Age, gender and ethnicity	Age. Years (SD); Intervention: 76 years (+/-11). Control: 74 years (+/-10). Gender. M:F; Intervention: 22:27. Control: 25:23.

Study	STEWART 1998[281] STEWART 1999[280]
	Ethnicity (Non-English speaking background). Intervention: 10/49. Control: 9/48.
Further population details	Not stated.
Extra comments	-
Indirectness of population	No indirectness.
Interventions	(n=49) Intervention 1: Hospital at home- Before discharge, patients assigned to an HBI (n=49) were visited by the study nurse (S.P.) and counselled in relation to complying with the treatment regimen and reporting any sign of clinical deterioration or acute worsening of their heart failure. One week after discharge, these patients were visited at home by the study nurse and pharmacist. On arrival, the study pharmacist performed an assessment of the patient's knowledge of the prescribed medications (via questionnaire) and the extent of compliance (via pill count). Patients who demonstrated poor medication knowledge (<75% composite knowledge score of dosage, intended effect, potential adverse effects, and special instructions) or malcompliance (≥15% deviation from prescribed dosage at discharge) received a combination of the following: (1) remedial counselling, (2) initiation of a daily reminder routine to enhance timely administration of medications, (3) introduction of a weekly medication container enabling pre-distribution of dosages, (4) incremental monitoring by caregivers, (5) provision of a medication information and reminder card, and (6) referral to a community pharmacist for more regular review thereafter. Patients were further evaluated by the study nurse to detect any clinical deterioration or adverse effects of prescribed medication since discharge; those requiring medical review were immediately referred to their primary care physician. After the home visit, all patients' primary care physicians were contacted by the study nurse to inform them of the home visit and to discuss the need (if any) for further remedial action or more intensive follow-up thereafter. (n=48) Intervention 2: Hospital based care/services- Patients assigned to the UC group (n=48) received the pre-existing levels of post discharge care: all patients in the UC group had appointments to be reviewed by their primary care physician or cardiologist (in the hospital's outpatient department) within 2 weeks of discharge. Furthermore, 13 patients (27%) were receiving regular home support (for example, domiciliary care or community nurse visits) after discharge.
Funding	Commonwealth Department of Health and Family Services, Canberra, Australia, through the Pharmaceutical Education Program.
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: HOSPITAL AT HOME (PRIMARY CARE) versus INPATIENT HOSPITAL CARE. Protocol outcome 1: Readmission. - Actual outcome: Unplanned Readmission rates; Group 1: 24/49 readmissions; Group 2: 31/48 readmissions. Risk of bias : Selection - Low, Outcome reporting - high, other-unclear risk Protocol outcome 2: Mortality. - Actual outcome: Out of hospital deaths; Group 1: 6/49; Group 2: 12/48. Risk of bias : Selection - Low, Outcome reporting - high, other-unclear risk	

Study	STEWART 1998[281] STEWART 1999[280]
Protocol outcomes not reported by the study	Avoidable adverse events, quality of life, patient and/or carer satisfaction. Length of stay, number of presentations of ED, number of avoidable admissions, reduced GP presentations.

Hospital at Home (Secondary Care)

Study	MENDOZA 2009[202]
Study type	RCT; prospective, randomised study
Number of studies (number of participants)	1 (n=80); Randomised into 2 groups (1:1); 9 patients withdrew; analysis done on n=71; Hospital at Home (n=37), Inpatient Hospital Care (n=34)
Countries and setting	Txagorritxu University Hospital, Vitoria-Gasteiz, Spain, with a catchment area of 250'000 people and a HaH unit staffed by 6 physicians and 8 nurses
Duration of study	Between May 2006 and March 2007
Stratum	Admission avoidance
Subgroup analysis within study	n/a
Inclusion criteria	Aged ≥65 years; with diagnosis and prognosis evaluation of heart failure (HF) since at least 12 months prior to the study; New York Heart Association (NYHA) functional class II or III before coming to ED due to exacerbation
Exclusion criteria	Admitted in the preceding 2 months for deterioration of HF or acute coronary syndrome; presence of severe symptoms such as sudden worsening of HF; poor prognosis factors (haemodynamic instability, severe arrhythmia, baseline creatinine above 2.5 mg/dL); no response to treatment in the ED; active cancer, severe dementia, or any other disease at an advanced stage indicating life expectancy of less than 6 months; acute psychiatric diseases, active alcoholism; active pulmonary tuberculosis; those living in a psycho-geriatric institution; no guarantee of all-day supervision; absence of a telephone at home or living more than 10km from the hospital
Recruitment/selection of patients	All patients sought care at the ED on their own initiative or were referred by GP. When ED doctors diagnosed decompensation of CHF and identified patient as potential candidate for the study based on eligibility criteria, the doctor responsible for recruitment to the study was called. Once patient assigned consent form, they were randomly allocated (1:1) to one of the intervention groups.
Age, gender and ethnicity	Hospital at Home (n=37)= Age – Mean (SD): 78.1 years (6.2). Gender (M/F): 1/1. Ethnicity: no information given Inpatient Hospital Care (n=34)= Age – Mean (SD): 79.9 years (6.3). Gender (M/F): 2/1. Ethnicity: no information given
Further population details	There are differences in group characteristics although not statistically significant: For example, patients in Inpatient Hospital Care group slightly older, more males (p=0.06), less admissions in previous year for HF, lower functional status (p=0.06; Barthel index).

Study	MENDOZA 2009[202]
Extra comments	Although they recorded data at months 1, 3, 6 and 12, the authors only report outcome data at 1 year follow-up.
Indirectness of population	No indirectness
Interventions	(n=37) Intervention 1: Hospital at Home- HaH unit staffed by 6 physicians and 8 nurses Patients were explained HaH unit while they were still in ED, given an info sheet and contact numbers. Within 12 – 24 hours of ED visit they received visits to their homes from an internal medicine specialist and a nurse, who were staff members of the HaH unit. In case of deterioration occurring outside working hours (daily 8am to 9pm), patients and family were instructed to call 112, emergency services, explaining that they were patients under the supervision of the HaH unit. Apart from nursing and clinical evaluation, samples were taken for laboratory tests and ECGs performed in patient's home when necessary. X-ray and echocardiography at hospital was equally accessible for HaH patients as for inpatients. Daily visits by specialist nurse. Physician visited daily or every other day depending on their clinical condition. Treatment within HaH finished with referral to primary care after recovery or, in the case of deterioration or no response to treatment, with transfer to the cardiology ward. (n=34) Intervention 2: Inpatient Hospital Care Patients were admitted to the hospital, cardiology ward and were managed by the usual staff of cardiology specialists and nurses, in accordance with guideline recommendations. Concurrent medication/care: both received usual care Follow-up: After initial admission (intervention), patients were followed up by their primary care physician, who was not aware of the study. A physician or nurse from the study team contacted each patient at months 1, 3, 6 and 12 to record events such as death, new admissions, or visits to ED, the cardiologist, or GP. Blood tests, re-evaluation of functional status and health-related QoL were performed at month 12.
Funding	This study was financed with a grant from the Caja Vital Kutxa ('a Spanish Savings Bank, a socially-conscious financial institution that leads the financial sector in its 116 area of influence').

All results at 12 months follow-up as no other data presented

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: HOSPITAL AT HOME versus INPATIENT HOSPITAL CARE

Protocol outcome 1: Mortality
- Actual outcome: Death; Group 1: n=2/37; Group 2: n=3/34; p=0.67; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness

Protocol outcome 2: Readmission
- Actual outcome: Readmission for heart failure at 1 year; Group 1: n=15/37, Group 2: n=17/34; p=0.42; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness

Study	MENDOZA 2009[202]
Protocol outcome 3: length of stay - Actual outcome: average length of stay: days (SD); Group 1: 10.9 (5.9), Group 2: 7.9 (3.0); p=0.01; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 4: Quality of Life (physical) - Actual outcome: Quality of Life (physical component of SF36); Group 1: 3.6 (-0.5; 7.7); Group 2: 2.2 (-1.9; 6.4); p=0.47; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 5: Quality of Life (mental) - Actual outcome: Quality of Life (mental component of SF36); Group 1: 4.0 (-0.9; 8.9), Group 2: 2.8 (-2.4; 8.0); p=0.38; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 6: Functional status (difference from baseline) - Actual outcome: Variation in Barthel Index (higher values=more independent); Group 1: 4.0 (-0.9; 8.9), Group 2: 4.7 (-2.2; 11.5); p=0.21; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Avoidable adverse events, patient and/or carer satisfaction, number of presentations to ED, number of unnecessary admissions, reduced GP presentations

Study	PATEL 2008[229]
Study type	RCT; open, randomised, controlled pilot study
Number of studies (number of participants)	1 (n=31); Randomised into 2 groups; Hospital at Home (n=13), Conventional Care (n=18)
Countries and setting	Sahlgrenska University Hospital/Oestra, a hospital serving 250’000 inhabitants in Goeteborg, Sweden
Duration of study	Between April 2004 and May 2006
Stratum	Early discharge
Subgroup analysis within study	n/a
Inclusion criteria	Prior diagnosis of chronic heart failure (CHF) according to the European Society of Cardiology guidelines, assessed as being in need of hospital care by their consulting physician and complying with all of the inclusion criteria:. Earlier diagnosed with (CHF) with diastolic or systolic left ventricular dysfunction; deterioration of HF 3 days with symptoms of increasing dyspnoea, orthopnoea, weight gain ≥ 2kg, debuting peripheral oedema or abdominal swelling; clinical signs, for example, extended

Study	PATEL 2008[229]
	jugular vein, leg oedema, tachypnoea, pulmonary rales, ascites and third heart sound; at least one symptom and one sign should be present; New York Heart Association (NYHA) class II-IV
Exclusion criteria	Unwillingness to participate; worsening of CHF <3 days; newly onset HF; pulmonary or pre-pulmonary oedema; need for monitoring of arrhythmia; other morbidities indicating need for hospitalisation; living at an institution; inability to follow instructions; S-Haemoglobin < 100 g/L or a decrease of S-haemoglobin > 20 g/L; S-Creatinine > 250 µmol/L; S-Potassium >5.5 mmol/L or <3.4 mmol/L; S-Troponin T>0.05 µg/L; Creatine kinase-MB>5 µg/L; ASAT and ALAT >three times above the normal value; Systolic blood pressure <95 mm Hg; heart rate <45 or >110 beats/min
Recruitment/selection of patients	Patients seeking care for deterioration of CHF were identified within 24 hr after admission from 3 medical facilities: an ED, a heart failure (HF) outpatient clinic and a medical ward. After one year the protocol was amended with an extension of time to 48 hr for study inclusion. After consent was obtained routine blood tests were performed, complete history taken and examination done by cardiologist, and then patients were randomised to one of the 2 groups.
Age, gender and ethnicity	Hospital at Home (n=13)= Age – Mean (SD): 77 years (10). Gender (M/F): 1/1. Ethnicity: no information given Conventional Care (n=18)= Age – Mean (SD): 78 years (8). Gender (M/F): 4/1. Ethnicity: no information given
Further population details	The conventional care group included a larger number of male, more educated patients as well as a higher prevalence of diabetes ($p<0.05$).
Extra comments	Three of the 18 patients in the conventional care group withdrew their consent during the study period (2 because of fatigue, 1 did not give a reason). Sample size quite small; considerably smaller than their sample size calculation suggested (77 per group). Paper sets out to measure QoL but then does not report it, just QALY's. Study records follow-ups at 1, 4, 8 and 12 months, but only presents data relevant to clinical review at 12 months follow-up. Paper is not clear whether they are Means (SD) or Medians (SE).
Indirectness of population	No indirectness
Interventions	(n=13) Intervention 1: Hospital at home Hospital at Home (paper calls it Home Care group): patients were initially treated in ED or in the ward for up to 48 hrs and subsequently sent home. All patients were followed up the day after returning home by a specialist nurse from the HF clinic. Patients were visited daily or every other day by the specialist nurse for the next 5-7 days as determined by the patients' health status. Home visits were terminated when a patient: was symptomatically stable or improving; had stable or falling weight; had no signs of pulmonary rales and had no oedema above the ankle. Specialist nurse could be phoned during office hours; nurses at intensive cardiac care unit could be phoned after office hours. Cardiologist was always available for telephone consultation. After termination of home visits, patients were referred to the HF clinic for drug up-titration if necessary. After each home visit, the nurse and study physician had a short consultation to discuss the patient's condition. (n=18) Intervention 2: Conventional Care -patients treated in accordance with hospital treatment guidelines. All data were collected in the same way as in the HC group.

Study	PATEL 2008[229]
	Concurrent medication/care: both received usual care
Funding	Support from Swedish Research Council and other academic and government bodies.
All results at 12 months follow-up as no other data presented RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: HOSPITAL AT HOME versus CONVENTIONAL CARE Protocol outcome 1: Mortality - Actual outcome: Death; Group 1: n=2/13; Group 2: n=2/18; Risk of bias: All domain - high, Selection - high, Blinding - high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: length of stay - Actual outcome: average length of stay of hospitalisation: mean number of days (SD); Group 1: 5.6 (9.4); Group 2: 4.5 (6.2); Risk of bias: All domain - high, Selection - high, Blinding - high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Avoidable adverse events, patient and/or carer satisfaction, number of unnecessary admissions, presentation to ED (data does not make sense – removed from analysis), re-admission (data does not make sense – removed from analysis), reduced GP presentations; quality of life

Study	TIBALDI 2009[296]
Study type	RCT; prospective, single-blind, randomised controlled trial
Number of studies (number of participants)	1 (n=101); Randomised into 2 groups (1:1); Hospital at Home (n=48), General Medical Ward (n=53); followed-up to 6 months: Hospital at Home (n=39), General Medical Ward (n=43)
Countries and setting	San Giovanni Battista Hospital of Torino, Italy (large, urban university teaching and tertiary care hospital)
Duration of study	1st April 2004 to 31st April 2005
Stratum	admission avoidance
Subgroup analysis within study	n/a

Study	TIBALDI 2009[296]
Inclusion criteria	Aged ≥75 years with pre-existing diagnosis of chronic heart failure (CHF- stage C according to the American Heart Association classification) and a persistent functional impairment indicative of New York Heart Association (NYHA) class III or IV status were considered eligible for the study when admitted to the ED of the hospital for acute decompensation of their chronic condition and assessed as being in need of hospital care. Additional inclusion criteria: appropriate care supervision at home, telephone connection, living in the hospital-at-home catchment area, informed consent, at least 1 previous admission for acute CHF, and need for intravenous drug infusion
Exclusion criteria	New-onset heart failure; absence of family and social support; need for mechanical ventilation, haemodialysis, or intensive monitoring; severe dementia (Mini Mental Examination score <14); terminal malignant neoplasm; severe renal impairment (estimated glomerular filtration rate <20 mL/min); hepatic failure (Child-Pugh classes B and C); serum haemoglobin levels less than 9 g/dL (to convert to grams per litre, multiply by 10); and planned cardiac surgery (for example, valve replacement).
Recruitment/selection of patients	In the ED all potentially eligible patients with an acute decompensation of CHF underwent baseline standard clinical evaluation, routine blood tests, chest radiography etc. Study participants were enrolled within 12 to 24 hours of ED admission by research assistants who screened patients for eligibility and obtained informed consent. The project manager then randomly assigned patients to one of the two groups.
Age, gender and ethnicity	Hospital at Home (n=48)= Age – Mean (SD): 82.2 years (5.2). Gender (M/F): 1/1. Ethnicity: no information given General Medical Ward (n=53)= Age – Mean (SD): 80.1 years (4.9). Gender (M/F): 1/1. Ethnicity: no information given
Further population details	At baseline 2 groups were similar in all sociodemographic, health and clinical characteristics apart from age: patients in HaH group slightly older (p=0.04).
Extra comments	Sample analysed on intention-to-treat basis. The population sample was very old, comorbid and acutely ill. The number of deaths (7 in HaH and 8 in hospital group) and patients lost to follow-up (2 in each group) was very similar for both groups.
Indirectness of population	No indirectness
Interventions	(n=48) Intervention 1: Hospital at Home Hospital at Home (paper calls it Geriatric Hospital at Home service): provides substitutive HaH care in a clinical unit model and has been in operation for more than 20 years. The MDT is equipped with 7 cars and consists of 4 geriatricians, 13 nurses, 3 physios, 1 social worker, and 1 counsellor. The main feature is that physicians and nurses work together as a team, with daily meetings to discuss the needs of each patient and to organise individualised medical care plans. 7 days a week and on average for 25 patients per day and 450 patients per year. Close collaboration between HaH team and ED department. HaH patients are considered hospital patients, and all services are provided by the hospital, which retains legal and financial responsibility for care. In the ED all necessary diagnostic tests are provided and then the patient moves home by ambulance. In the first days after admission to HaH each patient was visited at home on a daily basis by physicians and nurses. Thereafter at intervals of 2 to 3 days or less, as required by the clinical condition of the patient. (n=53) Intervention 2: General Medical Ward Routine hospital care. Protocols for prevention of nosocomial infections, bed sores, and immobilisation are routinely adopted for frail

Study	TIBALDI 2009[296]
	elderly inpatients. Concurrent medication/care: both received usual care Study reports follow-up at 6 months.
Funding	Not mentioned. But author affiliations are with the Department of Medicine at the University of Torino, Italy
All results at 6 months follow-up as no other data presented RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: HOSPITAL AT HOME versus GENERAL MEDICAL WARD Protocol outcome 1: Mortality - Actual outcome: Death; Group 1: n=7/48; Group 2: n=8/53; Risk of bias: All domain - low, Selection - low, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Admission - Actual outcome: Admission to hospital; Group 1: n=8/48, Group 2: n=18/53; Risk of bias: All domain - low, Selection - low, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 3: length of stay - Actual outcome: average length of stay in ED: mean hours (SD; range); Group 1: 14.6 (3.4; 3-24 hrs), Group 2: 16.3 (3.0; 5-24 hrs); Risk of bias: All domain - low, Selection - low, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectnessProtocol outcome 4: length of stay - Actual outcome: average length of stay of first additional hospital admission: mean (SD); Group 1: 22.1 (9.5); Group 2: 25.3 (12.2); Risk of bias: All domain - low, Selection - low, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 5: length of stay - Actual outcome: overall length of treatment: mean days (SD); Group 1: 20.7 (6.9); Group 2:11.6 (10.7); p=0.001; Risk of bias: All domain - low, Selection - low, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectnessProtocol outcome 6: Quality of Life - Actual outcome: Nottingham Health Profile (higher values=better; mean (SD) changes in scores from baseline); Group 1: +1.09 (2.57), Group 2: +0.18 (1.94); Risk of bias: All domain - low, Selection - low, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Avoidable adverse events, patient and/or carer satisfaction, number of presentations to ED, readmission, reduced GP presentations

Study	Talcott 2011[286]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=117)
Countries and setting	Conducted in USA; Setting: Hospital and home
Line of therapy	1st line
Duration of study	Intervention + follow up:
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Admission avoidance
Subgroup analysis within study	Not applicable
Inclusion criteria	Adult outpatients with post chemotherapy fever and neutropenia (absolute neutrophil count less than 500µl) that persisted after at least 24 hour.
Exclusion criteria	AIDs associated malignancy, neutropenia arising more than 21days after chemotherapy, and intensive chemotherapy requiring bone marrow or peripheral stem cell support.
Recruitment/selection of patients	Outpatients at presentation, exhibit no indication for hospitalisation other than fever and neutropenia, such as systemic hypotension, altered mental status, respiratory failure, or inadequate oral fluid intake during 24 hour observation, and have adequately controlled cancer.
Age, gender and ethnicity	Age - Median (range): Hospital care: 47 (20-81); early discharge: 47 (25-74). Gender (M:F): Hospital care: 33/33; HAH: 28/19. Ethnicity: not stated
Further population details	1. Frail elderly
Indirectness of population	--
Interventions	(n=47) Intervention 1: Hospital at home - Hospital at home led by primary care. Patients were supervised by the treating physician with additional assistance available from the research team. Patients at home were required to measure their temperature and blood pressure at least 4 times daily. They were examined by a home care nurse who used a written protocol and was instructed to contact the primary physician if abnormal findings occurred. In addition, a physician examined each home care patient 2 to 4 days after discharge, at least weekly thereafter. Outpatients were readmitted to the hospital whenever a physician felt the patient's condition warranted it, if the patient requested or it proved infeasible to administer the prescribed antibiotics. Duration: study period. Concurrent medication/care: not feasible (n=66) Intervention 2: Hospital-based care/services. Continued inpatient antibiotic therapy. Duration: study period.

Study	Talcott 2011[286]
	Concurrent medication/care: not stated
Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: HOSPITAL AT HOME LED BY PRIMARY CARE versus HOSPITAL-BASED CARE/SERVICES Protocol outcome 1: Mortality at during study period - Actual outcome for Early discharge: Mortality at end of study; Group 1: 0/47, Group 2: 0/66; Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Number of admissions to hospital at After 28 days of first admission - Actual outcome for Early discharge: Hospital re-admission at end of study; Group 1: 4/47, Group 2: 0/66; Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Quality of life at during study period; Avoidable adverse events at during study period; Patient and/or carer satisfaction at during study period; Number of presentations to Emergency Department at during study period; Number of GP presentations at during study period; Readmission up to 30 days; Length of hospital stay at during study period

Study	Vianello 2013[304]
Study type	RCT (Patient randomised; Parallel).
Number of studies (number of participants)	1 (n=59).
Countries and setting	Conducted in Italy; Setting: Hospital and home.
Line of therapy	1st line.
Duration of study	Intervention + follow up: Follow-up -3 months.
Method of assessment of guideline condition	Adequate method of assessment/diagnosis.
Stratum	Admission avoidance.
Subgroup analysis within study	Not applicable.
Inclusion criteria	Neuromuscular disease patients with respiratory tract infection and with urgent need of hospitalisation
Exclusion criteria	Requirement of critical care with 24 hour surveillance; living outside the geographic area covered by our district nurse service; no non-professional care givers or care giver networks at home; and presence of an advance directive

Study	Vianello 2013[304]
	declining to undergo intubation and/or CPR.
Recruitment/selection of patients	All consecutive neuromuscular disease (NMD) patients who were referred to the ED or to the out-patient clinic between Jan 2009 and Dec2011 with respiratory tract infection and urgent hospitalisation were recruited.
Age, gender and ethnicity	Age - Mean (SD): HAH: 44.6 (20.4); HOSPITAL: 46.7 (20.2). Gender (M:F): HAH: 17/9; Hospital: 24/3. Ethnicity: not stated.
Further population details	1. Frail elderly.
Indirectness of population	No indirectness.
Interventions	(n=26) Intervention 1: Hospital at home - Hospital at home led by primary care. Non-invasive ventilation (NIV) delivered at home by a portable ventilator; manually and/or mechanically assisted cough; continuous SpO2 monitoring; antibiotic therapy; pulmonology visit at home; district nurse visit at home; telephone access to pulmonologists. Duration: end of study. Concurrent medication/care: not stated. (n=27) Intervention 2: Hospital-based care/services. Patients received usual care, consisting of the same drugs and all other supportive measures delivered to the hospital at home group at the discretion of the ward team. Duration: end of study. Concurrent medication/care: not stated.
Funding	Funding not stated.
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: HOSPITAL AT HOME LED BY PRIMARY CARE versus HOSPITAL-BASED CARE/SERVICES. Protocol outcome 1: Mortality at during study period. - Actual outcome for Admission avoidance: Mortality at 3 months; Group 1: 3/26, Group 2: 4/27; Risk of bias: All domain - Low, Selection - High, Blinding - Low, Incomplete outcome data - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Quality of life at during study period; Avoidable adverse events at during study period; Patient and/or carer satisfaction at during study period; Number of presentations to Emergency Department at during study period; Number of admissions to hospital at After 28 days of first admission; Number of GP presentations at during study period; Readmission up to 30 days; Length of hospital stay at during study period.

D.2 Hospital at Home (Primary & Secondary Care)

Study	NIKOLAUS 1999[216]

Study	NIKOLAUS 1999[216]
Study type	RCT (Patient randomised; Parallel).
Number of participants	n=545.
Countries and setting	University Hospital of Heidelberg.
Duration of study	Follow up for 12 months.
Stratum	Early discharge.
Subgroup analysis within study	None.
Inclusion criteria	Elderly (>65 years) who lived at home before admission. Had multiple chronic conditions or functional deterioration after convalescence. At risk of nursing home placement.
Exclusion criteria	Terminally ill or severe dementia. Patients who lived too far away (>15km) for the home intervention team to make regular visits.
Recruitment/selection of patients	Patients over 65 years with acute disease are usually referred to the geriatric centre at the University Hospital of Heidelberg. They are either referred directly by their general practitioner or admitted from the emergency wards of the departments of internal medicine, neurology and surgery. Eligible patients gave informed consent and randomly assigned to (i) comprehensive geriatric assessment and additional in-hospital and post-discharge follow up treatment by an interdisciplinary home intervention team, (ii) comprehensive geriatric assessment with recommendations, followed by usual care at home or (iii) assessment of activities of daily living and cognition, followed by usual care in hospital and at home. The randomisation was carried out by means of sealed envelopes containing group assignments using a random number sequence. Baseline characteristics of the subjects were comparable. 30 subjects lost to follow up (and the baseline characteristics of these subjects were comparable to those of the whole study sample.
Age, gender and ethnicity	Age. Mean: 84.1 years. Gender. (% of F): 73.4%. Ethnicity: not stated.
Further population details	Not stated.
Extra comments	-

Study	NIKOLAUS 1999[216]
Indirectness of population	No indirectness.
Interventions	Intervention 1: Hospital at home-consisted of 3 nurses, a physiotherapist, an occupational therapist, asocial worker and a secretary. The tea, worked closely with hospital staff and the primary care physician. While the patient was in hospital the team gave them additional treatment (such as additional training in washing, eating, dressing and/or walking). One home visit was carried out during the hospital stay to evaluate the patient's home (for example, for safety hazards) and to prescribe technical aids, when necessary. After discharge, the team provided treatment (such as physiotherapy/occupational therapy). The mean treatment period was 7.6 days (range 1 – 41 days). At least 1 home visit was carried out within 3 days of discharge. Three months after discharge, a follow up visit was made to check whether recommendation were being implemented, home care continued and technical aids used, and to identify any new problem. Intervention 2: Hospital based care/services-assessment of activities of daily living and cognition, followed by usual care in hospital and at home.
Funding	Sozialministerium Baden Wurttemberg (Government Funding).
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: HOSPITAL AT HOME (PRIMARY & SECONDARY) Versus USUAL CARE. Protocol outcome 1: Length of stay. - Actual outcome: Length of hospital stay, days; Group 1: Mean (range): 33.5 (30.4-36.5); Group 2: Mean (range): 42.7 (39.8-45.6); Risk of bias: All domain - high, Selection - high, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Quality of Life. - Actual outcome: Activities of daily living score; Group 1: Mean (range): 81.2 (77.8-84.6); Group 2: Mean (range): 80.9 (78.1-83.8); Risk of bias: All domain - high, Selection - high, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 3: Patient Satisfaction. - Actual outcome: Self-perceived score/life satisfaction score; Group 1: Self-perceived health score: Mean (range): 3.7 (3.4-4.0), Life satisfaction score: Mean (range): 3.9 (3.6-4.2); Group 2: Self-perceived health score: Mean (range): 3.0 (2.8-3.2), Life satisfaction score: Mean (range): 3.2 (2.9-3.4); Risk of bias: All domain - high, Selection - high, Blinding - high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 4: Readmission. - Actual outcome: Rehospitalisation; Group 1: 43/140 (30.7%); Group 2: 45/141 (31.9%); Risk of bias: All domain - high, Selection - high, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Mortality, avoidable adverse events, carer satisfaction, number of presentations to ED, number of avoidable admissions, reduced GP presentations.

D.3 Step up – Step down/Community Hospital

Study	APPLEGATE 1990[16]
Study type	RCT (Patient randomised; Parallel).
Number of participants	Geriatric Assessment Unit (n=78). Control Group (n=77) n=155.
Countries and setting	Geriatric Assessment Unit, Baptist Memorial Hospital, Memphis, USA.
Duration of study	July 1985 – June 1987 was the enrolment period; patients followed up for 1 year thereafter.
Stratum	Admission avoidance.
Subgroup analysis within study	Yes. Stratification performed before randomisation according to whether the patient, the family or the consulting physician thought that the patient had a higher or lower risk of immediately going to a nursing home.
Inclusion criteria	At risk for nursing home placement. To have potentially reversible functional impairment in more than one activity of daily living, or both. Age of 65 or older. Loss of independence in more than one activity of daily living. Willingness to participate in a randomised study and give signed informed consent. Access to a primary physician willing to resume care of the patient at discharge.
Exclusion criteria	Medical problems that were unstable or required continued short term monitoring. If their survival was estimated to be less than six months. If they had serious chronic mental impairment. If a nursing home placement was considered inevitable.
Recruitment/selection of patients	278 referrals received from physicians and social work personnel, to the Hospital. Of which 123 were considered ineligible. The remaining 155 patients were randomly assigned, 77 to the control group and 78 to the geriatric assessment unit. Further details: baseline characteristics of patients well-balanced across both groups; all completed the study (no loss/drop outs recorded).
Age, gender and ethnicity	Age. Mean: 78.8 years (range: 61-100). Gender. (% of F): 77%.

Study	APPLEGATE 1990[16]
	Nationality. White (84.5%), other (15.5%).
Further population details	Most common diagnoses at referral: hip fractures in 28 patients, other fractures in 23, other conditions requiring orthopaedic surgery in 9, conditions requiring non-orthopaedic surgery in 14, circulatory disorders in 21, stoke in 15, musculoskeletal disorders in 9, psychiatric disorders in 7, endocrine disorders in 6 and miscellaneous medical disorders in 17.
Extra comments	-
Indirectness of population	No indirectness.
Interventions	(n=78) Intervention 1: Hospital at home- The Geriatric Assessment Unit: 10-bed unit in rehabilitation hospital (occupies a separate building from main hospital). Primary objective of the unit was to improve health and functional status sufficiently that patients at risk of institutionalisation could avoid placement in a nursing home. Within the unit, an interdisciplinary assessment of medical, social and psychological function was completed within 72 hours of admission by a team of physicians (university faculty and fellows), rehabilitation nurses, physical therapists, occupational therapist, psychologists, social workers, nutritionists and specialists in speech therapy and audiology. After the assessments were completed, the team determined at the first of a series of weekly meetings whether the patient was a candidate for a specific treatment, rehabilitation or both. If medical treatment was required, the patient was either treated in the unit or returned to the acre of the referring physician. Any patient with a defect in vision, hearing, or speech was referred to the appropriate therapist .If the patients needed rehabilitation care, a rehabilitation plan with specific goals was developed, and the patients' progress was revaluated weekly. All patients receiving rehabilitation care were required were required to have a degree of impairment such that physical, occupational or recreational therapy was needed in some combination three times a day in order to meet Medicare requirements. When patients reached their rehabilitation goals or attained a stable level of function, they were discharged without any subsequent services from the geriatric-assessment-unit team. (n=77) Intervention 2- Standard care: Neither the staff members of the geriatric assessment unit nor the investigators in the study were involved in the care of the patients in the control group after randomisation. Instead, the controls received the usual care provided by their physicians. There were no differences between groups in the specialties of the primary physicians providing care for their patients; two thirds of the patients in each group received primary care from internists in the community. The patients received a wide range of services after discharge from the acute care hospital, including home health care and care in other rehabilitation units.
Funding	None stated.
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: STEP UP/STEP DOWN versus STANDARD CARE. Protocol outcome 1: Mortality. - Actual outcome: Mortality at 6 months; differences between two groups greatest at 6 months (p=0.08) but diminished thereafter.	

Study	APPLEGATE 1990[16]
Group 1: 8/78 patients; Group 2: 1/77 patients; Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Length of Stay. - Actual outcome: Length of stay in acute hospitals; Group 1: 69 days (SD not reported); Group 2: 74 days (SD not reported); Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 3: Quality of Life. - Actual outcome: Functional Status; Geriatric assessment unit had significantly more improvement (P<0.05) than the control group in regard to three basic self-care activities (bathing, dressing and the ability to transfer) during the six months after randomisation and tended to have less deterioration in one other activity (the ability to administer medications). Risk of bias: All domain - high, Selection - low, Blinding - high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Avoidable adverse events; patient and/or carer satisfaction; re-admission; number of presentations to ED; Number of unnecessary admissions; reduced GP presentations.

Study	GARASEN 2007[110] GARASEN 2008[109]
Study type	RCT (Patient randomised; Parallel).
Number of participants	Community Hospital=72. General Hospital=70 n=142.
Countries and setting	Sobstad Nursing Home (reassigned to become a community hospital) and St Olavs University Hospital, Norway.
Duration of study	August 2003 – May 2004. Follow up for 12 months.
Stratum	Early discharge.
Subgroup analysis within study	None reported.
Inclusion criteria	Patients aged 60 years or more admitted to the general hospital due to an acute illness or an acute exacerbation of a known chronic disease.

Study	GARASEN 2007[110] GARASEN 2008[109]
	Probably be in need of inward care for more than 3 to 4 days. Admitted from their own homes. Expected to return home when inward care was finished.
Exclusion criteria	Severe dementia. A psychiatric disorder needing specialised care 24 hours a day.
Recruitment/selection of patients	When an eligible patient was identified and accepted for inclusion, a blinded randomisation was performed by the Clinical Research Department at the Faculty of Medicine using random number tables in blocks to ensure balanced groups.
Age, gender and ethnicity	Age. Community Hospital (Mean=80.8. Median=81.5). Assigned General Hospital (Mean=81.3. Median=81). Gender. Community Hospital (Males=34. Females=102). Assigned General Hospital (Males=27. Females=43). Ethnicity: not stated.
Further population details	Activities of Daily Living. Community Hospital (Mean=2.24). Assigned General Hospital (Mean=2.05). A non-significant difference (p=0.27).
Extra comments	-
Indirectness of population	No indirectness.
Interventions	(n=72) Intervention 1: Hospital at home- Intermediate Care Intervention: The experimental intervention was based on individualised intermediate care including evaluation and treatment ('care' and 'cure') of each patient's diseases. However, the main focus was to improve the patients' ability to manage daily activities when returning home. On admission to the community hospital the physicians performed a medical examination of the patients and a careful evaluation of available earlier health records from the admitting general practitioner, the general hospital physicians and the community home care services. The communication with each patient and his family focusing on physical and mental challenges was also essential to understand the needs and level of care. Intermediate care at the community hospital was compared to conventional care in general hospital beds at medical, surgical and orthopaedic departments. (n=70) Intervention 2: Hospital based care/services-General Hospital: Traditional prolonged care at a hospital.

Study	GARASEN 2007[110] GARASEN 2008[109]
Funding	Central Norway Regional Health Authority.
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: STEP UP/STEP DOWN (COMMUNITY HOSPITAL) versus STANDARD CARE. Protocol outcome 1: Readmission. - Actual outcome: Readmission for the same disease; Group 114/72 (19.4%); Group 2: 25/70 (35.7%); Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Length of Stay. - Actual outcome: Number of days of care after randomisation; Group 1:31 days (95% CI 26.1-34.7); Group 2: 29.8days (95% CI 23.2-36.4); Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 3: Mortality. - Actual outcome: Mortality within 6 months; Group 1:9/72 (12.5%); Group 2: 14/70 (20%). Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness - Actual outcome: Mortality within 12 months; Group 1: 13/72 (18.1%); Group 2: 22/70 (31.4%); Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Avoidable adverse events; quality of life; patient and/or carer satisfaction; number of presentations to ED; number of unnecessary admissions; reduced GP presentations.

Study	THOMAS 1993[289]
Study type	RCT (Patient randomised; Parallel).
Number of participants	Experimental group (Community Hospital) = 68. Control group (no intervention) = 64 n=132. Five patients refused assessment (control group=2, experimental group=3) and seven patients were lost to follow up (control=4, experimental=3).
Countries and setting	A non-academic affiliated 503-bed community hospital.
Duration of study	Follow up for 6 months.
Stratum	Overall.

Study	THOMAS 1993[289]
Subgroup analysis within study	None reported.
Inclusion criteria	All patients over the age of 70 years admitted to a 503-bed community hospital were eligible.
Exclusion criteria	Refusal of consent. Admission to intensive care unit, coronary care unit, an obvious terminal illness, renal haemodialysis. Place of residence greater than 50 miles from the hospital.
Recruitment/selection of patients	Study patients were similar in both groups at randomisation.
Age, gender and ethnicity	Age. Experimental group (Community Hospital): 76 (+/- 5.4). Control group: 77 (+/- 5.4). Gender. Experimental group (Community Hospital): Male: 22; Female 40. Control group: Male: 24; Female 34. Race. Experimental group (Community Hospital): White: 49; Black: 13. Control group: White: 43; Black: 15.
Further population details	Not stated.
Extra comments	-
Indirectness of population	No indirectness
Interventions	(n=68) Intervention 1: Community Hospital- received individual assessments from each team member consisting of a physician, geriatric nurse specialist, pharmacist, and physical therapists. Team discussions of each patient led to formal recommendations placed in the patients charts. An additional copy of the consultation was mailed to the attending physicians' office. The team continued to monitor progress of the experimental group. (n=64) Intervention 2: In-hospital treatment then discharged. Received no recommendations and no subsequent visits.
Funding	Not stated.
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: STEP UP/STEP DOWN versus STANDARD CARE. Protocol outcome 1: Mortality. - Actual outcome: Death at 6 months; Group 1:3/62 (6%); Group 2: 12/58 (21%); Risk of bias: All domain - high, Selection - high, Blinding - low, Incomplete outcome	

Study	THOMAS 1993[289]
data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness - Actual outcome: Death at 12 months; Group 1:7/68 (10%); Group 2: 13/64 (20%); Risk of bias: All domain - high, Selection - high, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Length of Stay. - Actual outcome: Length of hospital stay; Group 1:9 days; Group 2: 10.1 days; Risk of bias: All domain - high, Selection - high, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 3: Readmissions. - Actual outcome: Readmissions in 6 months; Group 1:0.3 per patient; Group 2: 0.6 per patient; Risk of bias: All domain - high, Selection - high, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 4: Quality of Life. - Actual outcome: Functional activity scores using Katz ADL scale; Group 1: 61% (36/59) remained same. 17% (10/59) worsened. 22% (13/59) showed improvement; Group 2: 70% (32/46) remained the same. 23% (10/46) worsened. 7% (4/46) showed improvement. Risk of bias: All domain - high, Selection - high, Blinding - high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Avoidable adverse events; patient and/or carer satisfaction; number of presentations to ED; number of unnecessary admissions; reduced GP presentations.

Study	YOUNG 2007[322]
Study type	RCT (single-blind, randomised, prospective trial).
Number of participants	Community Hospital=280. General Hospital=210 n=390.
Countries and setting	Community hospitals in five geographical areas in urban and rural settings in the midlands and North England.
Duration of study	November 2000 – August 2003 patient identification. Follow up for 6 months.
Stratum	Early discharge.
Subgroup analysis within study	None reported.

Study	YOUNG 2007[322]
Inclusion criteria	Address within the catchment area of the relevant community hospital. In the opinion of their attending senior physician, were medically stable and in need of post-acute rehabilitation care before anticipated home discharge.
Exclusion criteria	Patients with features of medical instability (pyrexia, breathlessness at rest, history of chest pain within 48 hours, or need for IV medications). Patients who were drowsy or unconscious. Patients requiring stroke unit rehabilitation with a specialists or treatment in other departments such as surgery or coronary care. Patients who needed new residential new residential or nursing home placements.
Recruitment/selection of patients	773 elderly patients who had been emergently admitted to elderly care departments (four general hospital sites) or a combined elderly and medical unit (one general hospital site) were identified and monitored. Of these, 490 were recruited, 280 randomised to community hospital care and 210 to usual care. 421 (86%) received the treatment to which they were allocated. Further details: the characteristics were of the groups were similar at baseline. Lost/drop outs – Community 11/280; Usual care 11/210.
Age, gender and ethnicity	Age. Community Hospital (Median=86. Range=81-90). General Hospital (Median=86. Range=82-90). Gender. Community Hospital (Males=83. Females=197). General Hospital (Males=69. Females=141). Ethnicity: not stated.
Further population details	Not stated.
Extra comments	-
Indirectness of population	No indirectness.
Interventions	(n=280) Intervention 1: Community Hospital - The seven participating community hospitals in the five sites ranged from a consultant-led rehabilitation hospital in an urban setting to small, rural, general practitioner-led units. The community hospitals provided a multi-disciplinary rehabilitation approach with multidisciplinary assessment and treatment, individualised care plans, involvement of therapists, shared coverage between consultants and general practitioners, and close involvement of social service staff. (n=210) Intervention 2: General Hospital: Usual care consisted primarily of an extended general hospital stay with multidisciplinary care but could include transfer to other post-acute services according to existing local operational policies.
Funding	Department of Health.
	RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: STEP UP/STEP DOWN versus STANDARD CARE.

Study	YOUNG 2007[322]
	Protocol outcome 1: Length of Stay. - Actual outcome: Length of hospital stay care after randomisation; Community Hospital: Median: 22 days (range: 1-195; interquartile range: 11-45); General Hospital: Median: 20 days (range: 1-230; interquartile range: 10-34); Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Quality of Life. - Actual outcome: NEADL Scale as a measure of independence at 6 months; Community Hospital: Median 20 (IQR 9-32); General Hospital: Median 20 (IQR 6-32). Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness - Actual outcome: Barthel Index (functional activity restriction) at 6 months; Community Hospital: Median 16 (IQR 13-18); General Hospital: Median 16 (IQR 12-18); Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 3: Mortality. - Actual outcome: Death at 6 months; Community Hospital: 73/280 (26.1%); General Hospital: 64/210 (30.5%); Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 4: Patient satisfaction. - Actual outcome: Patient satisfaction. The reported patient satisfaction was similar for both groups. At 1 week after hospital discharge, the community hospital group showed greater satisfaction with the statement 'I am happy with the amount of recovery I have made'; Risk of bias: All domain - low, Selection - low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness
Protocol outcomes not reported by the study	Avoidable adverse events; carer satisfaction; readmission; number of presentations to ED; number of unnecessary admissions; reduced GP presentations.

Virtual Wards

Study	DHALLA 2014[83]
Study type	RCT; parallel-group randomised trial.
Number of studies (number of participants)	1 (n=1923); 'High-risk population' randomised into 2 groups (ratio 1:1): Virtual Ward (n=963) or Usual Care (n=960).
Countries and setting	General internal medicine wards of 4 participating hospitals in Toronto, Canada.
Duration of study	Between June 2010 to May 2013.
Stratum	Admission avoidance.
Subgroup analysis within study	n/a
Inclusion criteria	Aged ≥18 years; being discharged from the general internal medicine ward of any of the 4 participating hospitals; at high risk of re-admission (as determined by LACE [length of stay, acuity of admission, comorbidities, and emergency department visits in the previous 6 months] score ≥10), and resided within the boundaries of the Toronto Central Local Health Integration Network.
Exclusion criteria	Being discharged to a rehabilitation or complex continuing care facility, if neither they nor anyone they could designate could speak English, if they had been previously enrolled in the study, of if they did not wish to participate.
Recruitment/selection of patients	Patients randomised when discharge was imminent or immediately after discharge. 30143 patients were assessed for eligibility at the 4 hospitals. Of the 6559 eligible patients, 1932 were randomly assigned to one of the two groups. The randomisation list was stratified by discharge site and homelessness.
Age, gender and ethnicity	Usual Care (n=960) = Age – Mean (SD): 71.3 years (16.0). Gender (M/F): 1/1. Ethnicity: no information given. Virtual Ward (n=963) = Age – Mean (SD): 71.2 years (16.1). Gender (M/F): 1/1. Ethnicity: no information given.
Further population details	No important differences between the two groups in terms of demographics. Reason for hospitalisation: 10% heart failure; 90% other.
Extra comments	
Indirectness of population	No indirectness.
Interventions	(n=963) Intervention 1: Virtual ward- in addition to receiving usual care, patients assigned to the virtual ward group were admitted to the virtual ward on the day they were discharged home. They were contacted by a team member the next day, provided with written information about the services available. Patients could call the relevant member of the team during business hours; or call was sent to the VW physician's pager after hours. Team consisted of care coordinators, part-time pharmacist, part-time nurse, full-time physician, clerical assistant. Most of the staff worked for the Toronto Central Community Care Access Centre. The team met every morning to discuss newly admitted and current patients and to design and execute individualised care plans. Patients could be assessed by phone, at home, in a clinic at the hospital where the VW team was based, or alternative location (for example, GP office). Patients were discharged from VW when the team believed they were ready for discharge or when it was clear that they were unwilling to further engage with the team.

Study	DHALLA 2014[83]
	(n=960) Intervention 2- Usual care: typewritten structured discharge summary given to patient at time of discharge and also sent to GP, a prescription when indicated, counselling from the resident physician or other members of the health care team, arrangements for homecare as needed, and recommendations or appointments for follow-up care with the patient's primary care and specialist physicians. Follow-up at a post-discharge clinic was not a routine practice at any of the hospitals but could have been arranged at the discretion of the discharging physicians. Concurrent medication/care: both received usual care but VW group received extra VW team support. Retrospective analysis of data by authors indicated that VW team provided high intensity of care. Patients were discussed at the MDT meetings an average of 6.3x (SD=2.1) and received an average of 2.8 home visits (SD=0.95). This does not include potential extra care provided by home care contractors or physicians not associated with VW. The mean length of stay in VW was 35.5days (SD=27.0).
Funding	Canadian Institutes of Health Research, the Ontario Ministry of Health and Long-Term Care, the Green Shield Canada Foundation, the University of Toronto Department of Medicine, and the Academic Funding Plan Innovation Fund.
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: VIRTUAL WARD versus USUAL CARE. Protocol outcome 1: Mortality (at 30 days) reported as number/total number. (%). - Actual outcome: Death; Group 1: n=40/958 (4.2); Group 2: n=47/955 (4.9); Risk of bias: All domain - high, Selection - high, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Readmission (at 30 days). - Actual outcome: readmission; Group 1: n=182/961 (18.9), Group 2: n=204/958 (21.3); Risk of bias: All domain - high, Selection - high, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Protocol outcome 3: ED visits (at 30 days). - Actual outcome: ED visits; Group 1: n=270/961 (28.1), Group 2: n=284/959 (29.6); Risk of bias: All domain - high, Selection - high, Blinding - low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness Note: outcomes closest to discharge reported that is, 30 days. Paper also reports the same outcomes at 90 days, 6 months, and 1 year.	
Protocol outcomes not reported by the study	Avoidable adverse events, quality of life, patient and/or carer satisfaction, length of stay, number of unnecessary admissions, reduced GP presentations.

Appendix E: Economic evidence tables

E.1 Hospital at Home

E.1.1 Admission avoidance

Study	Aimonino-Ricauda 2008[9]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA (health outcome: various outcomes) **Study design:** RCT **Approach to analysis:** within-trial analysis of individual patient level cost and outcome data on Intention-to-treat basis. **Perspective:** Italian health care provider **Follow-up:** 6 months **Discounting:** Costs: n/a; Outcomes: n/a	**Population: (n=104)** Elderly patients aged > 75 years, with exacerbation of COPD who were assessed in the ED for at least 12 to 24 hours and with stable clinical condition. **Cohort settings:** Mean age: Intervention 1: 79.2 years (SD=3.1) Intervention 2: 80.1 years (SD=3.2) Male: Intervention 1: 75% Intervention 2: 56% **Intervention 1: (n=52)** Admission to general medical ward	**Total costs (mean per patient):** Intervention 1: £1,302 Intervention 2:£1,100 Incremental (2−1): -£202 (95% CI: NR; p=0.38) **Cost per day (mean per patient)** Intervention 1: £142 Intervention 2:£95 Incremental (2−1): -£47 (95% CI: NR; p=0.002) **Currency & cost year:** 2005 euros converted to 2005 US dollars using currency exchange rate (presented here as 2005 UK pounds[(a)]) **Cost components incorporated:**	**From clinical review** **Mortality (mean per patient):** Intervention 1: 23% Intervention 2: 17% Incremental (2−1): -6% (95% CI: NR; p=0.72) **Hospital admission (reported as re-admission)** Intervention 1: 87% Intervention 2: 42% Incremental (2−1): -45% (95% CI: NR; p=0.001) **Days between discharge and re-admission** Intervention 1: 37 days Intervention 2: 78 days Incremental (2−1):41 days (95% CI: NR; p=0.005)	**ICER (Intervention 2 versus Intervention 1):** n/a **Analysis of uncertainty:** No sensitivity analysis reported

Study	Aimonino-Ricauda 2008[9]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
	Intervention 2: (n=52) Admission to a physician-led, substitutive clinical unit model at a geriatric home under the care of a team of geriatricians, nurses, physiotherapists, social workers and counsellors (hospital-at-home). Hospital-at-home patients are considered hospital patients and the hospital, which retains legal and financial responsibility, provides all services.	Staff time (geriatricians, nurses, counsellors, dieticians, social workers) Hospital stay (beds, staff, examinations, medications, rehabilitation, miscellaneous expenses) ED visits	**Change in geriatric depression scale** Intervention 1: 0.7 Intervention 2: -3.1 Incremental (2−1): -2.6 (95% CI: NR; p=0.00) **Change in Nottingham health profile score** Intervention 1: 0.8 Intervention 2: 3.6 Incremental (2−1): 2.8 (95% CI: NR; p=0.04) **Change in activities of daily living score** Intervention 1: -0.6 Intervention 2: -1.4 Incremental (2−1): -0.8 (95% CI: NR; p=0.10) **Change in mini mental state examination score** Intervention 1: -0.5 Intervention 2: -0.4 Incremental (2−1): 0.1 (95% CI: NR; p=0.88) **Change in mini-nutritional assessment score** Intervention 1:-1.2 Intervention 2:-1.7 Incremental (2−1): -0.5	

Study	Aimonino-Ricauda 2008[9]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
			(95% CI: NR; p=0.59) **Change in relatives' stress scale score** Intervention 1:2.6 Intervention 2:4.6 Incremental (2−1):2.0 (95% CI: NR; p=0.16) **Satisfaction very good/excellent at discharge** Intervention 1:88% Intervention 2: 94% Incremental (2−1): 6% (95% CI: NR; p=0..83)	
Data sources				
Health outcomes: RCT study with baseline characteristics ascertained at randomisation. Follow-up visit at 6 months with health outcomes recorded. Data were also collected from the hospital medical records for hospitalisation, mortality, resource use and costs. **Quality-of-life weights:** not used (CCA). **Cost sources:** Resource use and unit costs were based on the hospital medical records data.				
Comments				
Source of funding: Public funding **Applicability and limitations:** QALYs are not used as an outcome measure. Some uncertainty regarding the applicability of Italian resource use (2005) and unit costs (2005) to the NHS context. Within-trial analysis; so does not reflect all the evidence available for this comparison. Local unit costs from hospital records were used; so may not reflect the National unit costs. Uncertainty was not appropriately addressed and no sensitivity analysis undertaken.				
Overall applicability[(b)]: partially applicable **Overall quality[(c)]:** potentially serious limitations				

Abbreviations: CCA: cost–consequence analysis; 95% CI: 95% confidence interval; COPD: chronic obstructive pulmonary disease; ED: emergency department; ICER: incremental cost-effectiveness ratio; NA: not applicable; NR: not reported; QALYs: quality-adjusted life years.

(a) Converted using 2005 purchasing power parities.[223]

(b) Directly applicable/Partially applicable/Not applicable.

(c) Minor limitations/Potentially serious limitations/Very serious limitations.

Study	Mendoza 2009[202]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA (health outcome: various health outcomes) **Study design:** RCT **Approach to analysis:** Analysis of individual level data for health outcomes and resource use. Unit costs applied. **Perspective:** Spain direct medical costs **Follow-up** 12 months **Discounting:** Costs: n/a; Outcomes: n/a	**Population:** elderly patients (>65 years) presenting to the ED with decompensated heart failure (HF) **Cohort: (n=71)** Mean age (SD): Intervention 1: 79.9 (6.3) Intervention 2: 78.1 (6.2) Male: 29.8% **Intervention 1: (n=34)** Inpatient hospital care (IHC) **Intervention 2: (n=37)** Hospital at home (HaH)	**Total costs (mean per patient):** **Index episode** Intervention 1: £4,096 Intervention 2: £2,297 Incremental (2−1): -£1,772 (95% CI: NR; p<0.001) **Follow-up (12 months)** Intervention 1: £4,175 Intervention 2: £3,095 Incremental (2−1): -£1,080 (95% CI: NR; p<0.001) **Currency & cost year:** 2008 Euros (presented here as 2008 UK pounds[(a)]) **Cost components incorporated:** Hospital stay for index episode Medications Diagnostic tests Consumables Transport Visits to HF clinic Visits to primary care physician	**Mortality:** Intervention 1: 3 (8.8%) Intervention 2: 2 (5.4%) Incremental (2−1): -3.4% (95% CI: NR; p=0.67) **Readmission for HF:** Intervention 1: 17 (50%) Intervention 2: 15 (40.5%) Incremental (2−1): -9.5% (95% CI: NR; p=0.42) **Combined clinical outcome:** Intervention 1: 19 (55.9%) Intervention 2: 20 (54.1%) Incremental (2−1): -4.8% (95% CI: NR; p=0.88) **Functional status (variation in BI):** Intervention 1: 4.7 (95% CI: -2.2; 11.5) Intervention 2: 4.0 (95% CI: -0.9; 8.9) Incremental (2−1): -0.7 (95% CI: NR; p=0.21) **health-related quality of life (HRQoL) [Idem SF-36 physical component]** Intervention 1: 2.2 (95% CI: --1.9; 6.4) Intervention 2: 3.6 (95% CI: --0.5; 7.7) Incremental (2−1): 1.4 (95% CI: NR; p=0.47)	**ICER (Intervention 2 versus Intervention 1):** NA **Analysis of uncertainty:** No sensitivity analysis conducted.

Study	Mendoza 2009[202]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
		Visits to ED Re-admissions	**HRQoL [Idem SF-36 mental component]** Intervention 1: 2.8 (95% CI: -2.4; 8.0) Intervention 2: 4.0 (95% CI: -0.9; 8.9) Incremental (2−1): 1.2 (95% CI: NR; p=0.38)	
Data sources				
Health outcomes: Baseline: nursing and clinical evaluation, laboratory tests and ECG undertaken and functional status (BI) and HRQoL (SF-36) data collected. Follow-up: clinical data collected from patients at months 1, 3, 6 and 12, blood tests, functional status (BI) and HRQoL (SF-36) re-assessed at 12 months. **Cost sources:** using data collected from hospital records and using questionnaires administered during follow-up. Unit costs were based on compensation charged by Basque Health Service-Osakidetza (for hospital stays, visits and diagnostic tests) and hospital pharmacy reference prices (medications).				
Comments				
Source of funding: Grant from Caja Vital Kutxa (financial institution). **Applicability and limitations:** QALYs are not used as outcome measure. Spanish resource use data (2006-2007) and unit costs (2008), so some uncertainty about the applicability of resource use and costs to current NHS context. RCT-based analysis, so from one study by definition therefore not reflecting all evidence in area. Some local costs used; so there is uncertainty as to whether these will reflect national costs. Some uncertainty about whether time horizon is sufficient to capture all benefits and costs.				
Overall applicability[(b)]: partially applicable **Overall quality[(c)]:** potentially serious limitations				

Abbreviations: CCA: cost–consequences analysis; 95% CI: 95% confidence interval; da: deterministic analysis; ED: emergency department; HF: Heart failure; HRQoL: Health-Related quality of life; ICER: incremental cost-effectiveness ratio; NA: not applicable; NR: not reported; pa: probabilistic analysis; QALYs: quality-adjusted life years; SF-36: Short-Form 36.
(a) Converted using 2008 purchasing power parities.[223]
(b) Directly applicable/Partially applicable/Not applicable
(c) Minor limitations/Potentially serious limitations/Very serious limitations.

Study	Richards 2005[242]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA (health outcome: various outcomes)	**Population:** Patients presenting to the ED at Christchurch Hospital, New Zealand with a clinical	**Total costs (mean per patient):** Intervention 1: £665 Intervention 2: £495	**From clinical review:** **Duration until discharge:** Intervention 1: 2 days (range 0-10)	**ICER (Intervention 2 versus Intervention 1):** NA **Analysis of uncertainty:** No sensitivity

Study	Richards 2005[242]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Study design: RCT **Approach to analysis:** Within-trial analysis with individual patient data on both costs and outcomes collected and analysed using univariate analysis. **Perspective:** New Zealand funder's perspective (direct medical costs) **Follow-up:** 6 weeks **Discounting:** Costs: n/a; Outcomes: n/a	diagnosis of community acquired pneumonia (CAP) that is mild to moderately severe and who has been assessed as low risk (CURB-65 score of 0-2, corresponding to mortality risk of 0.7-9.2%). **Cohort settings: (n=55 (ITT), 49 (PP))** Mean age: Intervention 1: 49.8 years Intervention 2: 50.1 years Male: Intervention 1: 13/25 (52%) Intervention 2: 13/24 (54.2%) **Intervention 1: (n=25)** Standard treatment with antibiotics in hospital following initiation of treatment at the ED. **Intervention 2: (n=24)** Treatment at home delivered by primary care teams under the Extended Care @Home (EC@H) program which provides extended medical	Incremental (2−1): -£171 (95% CI: NR; p=NR) **Currency & cost year:** 2003 New Zealand Dollars (presented here as 2003 UK pounds[(a)]) **Cost components incorporated:** Staff time Transport Equipment Pharmaceuticals Support services (such as home help) Administration Laboratory tests Radiological examinations	Intervention 2: 4 days (range 1-14) Incremental (2-1): 2 days (95% CI: NR; p=0.004) **Duration of IV antibiotic administration:** Intervention 1: 2 days Intervention 2: 3 days Incremental (2-1): 1 day (95% CI: NR; p=0.22) **Duration of oral antibiotic administration:** Intervention 1: 7 days Intervention 2: 9 days Incremental (2-1): 2 days (95% CI: NR; p=0.22) **Functional outcomes (SF-12 mental component):** At 2 weeks Intervention 1: 48.6 Intervention 2: 48.3 Incremental (2-1): -0.3 (95% CI: NR; p=0.91) At 6 weeks Intervention 1: 51 Intervention 2: 50.4	analysis reported No significant difference was observed in patient rated symptoms at 2 weeks. There was significant difference in sleep disturbance in favour of hospital treatment (p<0.001) at two weeks which did not persist at 6 weeks. There was also no significant difference in time to resolution of fever, tachycardia and tachypnoea.

Study	Richards 2005[242]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
	and nursing care to patients in their home. The team provides IV antibiotic service using standard cannula, home support service, short-term home nursing and mobile diagnostic testing. The patients had a daily visit from the GP and at least twice daily visit from a nurse. Patients' Chest X-ray was reviewed initially by a respiratory physician. Patients were given a 24-hour telephone number to contact in case of emergency.		Incremental (2-1): -0.6 (95% CI: NR; p=0.81) **Functional outcomes (SF-12 physical component):** At 2 weeks Intervention 1: 40.2 Intervention 2: 38.1 Incremental (2-1): -2.1 (95% CI: NR; p=0.45) At 6 weeks Intervention 1: 45.8 Intervention 2: 42.2 Incremental (2-1): -3.6 (95% CI: NR; p=0.18) **Adverse events:** See clinical review **Patient satisfaction:** Intervention 1: 60% "very happy" with their care Intervention 2: 100% "very happy" with their care Incremental (2-1): 40% (95% CI: NR; p=0.001)	
Data sources				
Health outcomes: Randomised controlled trials with baseline data collected at trial entry. Outcome measures included general functioning (SF-12 score), duration to				

Study	Richards 2005[242]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
discharge, duration of IV antibiotics and subsequent oral antibiotics administration, self-rated symptom severity, complications and patient satisfaction. Data on self-rated symptom severity, general functioning and adverse events were recorded daily. Data on duration of admission and antibiotics were extracted from the case records. Patients were contacted by telephone at 2 and 6 weeks after presentation to record satisfaction, self-rated symptom severity, and functional outcome (SF-12).**Quality-of-life weights:** SF-12 utility data were collected from patients but not combined with costs in a full cost-utility analysis. **Cost sources:** resource use data were collected from the EC@H data for the home care group patients. Victorian DRG costs were used for the hospital treatment group.				
Comments				
Source of funding: NR. **Applicability and limitations:** There is uncertainty about the applicability of resource use (2002-2003) and unit costs (2003) from New Zealand to the NHS context. QALYs were not used as an outcome measure. Within-trial analysis so does not reflect all the evidence available for this comparison. The short time horizon (6 weeks) may not reflect all potential differences in costs and outcomes. Unit costs from EC@H service records were used to calculate the costs for patients in the home treatment group. It is not clear whether these costs are national level. Univariate analysis was used in the comparison and no sensitivity analysis was undertaken.				
Overall applicability[(b)]: partially applicable **Overall quality[(c)]:** potentially serious limitations				

Abbreviations: CCA: cost–consequence analysis; 95% CI: 95% confidence interval; ED: emergency department; ICER: incremental cost-effectiveness ratio; NR: not reported; QALYs: quality-adjusted life years; SF-12: short form-12.
(a) Converted using 2003 purchasing power parities.[223]
(b) Directly applicable/Partially applicable/Not applicable.
(c) Minor limitations/Potentially serious limitations/Very serious limitations.

Study	Tibaldi 2009[296]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA (health outcome: various including mortality, quality of life, depression, functional, nutritional and cognitive status) **Study design:** RCT **Approach to analysis:** Within-trial analysis of costs and outcomes.	**Population:** Patients, 75 years or older, with a pre-existing diagnosis of CHF and persistent functional impairment indicative of New York Heart Association (NYHA) class III or IV. **Cohort settings: n=101** Mean age:	**Total costs (mean per patient):** Intervention 1: £1,554 Intervention 2: £1,337 Incremental (2−1): -£217 (95% CI: NR; p<0.001) **Cost per day (mean per patient):** Intervention 1: £206 Intervention 2: £81	**Mortality (6-months):** Intervention 1: 15% Intervention 2: 15% Incremental (2−1): 0 (95% CI: NR; p=0.83) *See clinical review for the other health outcomes*	**ICER (Intervention 2 versus Intervention 1):** n/a **Analysis of uncertainty:** No sensitivity analysis is reported. The authors reported that a proportion of patients in the GMW arm were institutionalised on discharge (16%) for an average of 26 days at a mean cost per day of £115. Adding this cost to the GHHS arm

Parametric tests (paired and unpaired t-test was used for analysing costs. **Perspective:** Italian Healthcare system **Follow-up:** 6 months **Treatment effect duration[(a)]:** 6 months **Discounting:** Costs: n/a; Outcomes: n/a	Intervention 1: 80.1 years Intervention 2: 82.2 years Male: Intervention 1: 57% Intervention 2: 46% **Intervention 1: (n=53)** Routine hospital care in a general medical ward (GMW) **Intervention 2: (n=48)** Hospital-led geriatric hospital-at-home service (GHHS) provided by a multidisciplinary team (4 geriatricians, 13 nurses, 3 physiotherapists, 1 social worker, 1 counsellor).	Incremental (2−1): -£125 (95% CI: NR; p=NR) **Currency & cost year:** 2005 Euros (presented here as 2005 UK pounds[(b)]) **Cost components incorporated:** Hospital costs (including costs for beds, staff time, examinations, medications and rehabilitation, non-sanitary and administrative costs were also included. GHHS costs included the cost of staff time, transportation of equipment and patients to and from hospital and administrative costs		would increase the saving in mean total cost per patient from £217to £226.
Data sources				
Health outcomes: Within trial analysis with data on quality of life, depression, functional and nutritional status and clinical symptoms collected at baseline and at 6 months follow-up. Six-month mortality was also reported. **Quality-of-life weights:** n/a. **Cost sources:** hospital cost data were collected from the official hospital medical cost database.				
Comments				
Source of funding: NR. **Applicability and limitations:** Cost-consequences analysis, so QALYs are not used as outcome. Some uncertainty about the applicability of resource use and unit costs from Italy in 2005 to the current NHS context. RCT-based analysis so from one study by definition therefore not reflecting all evidence in area. There is also some uncertainty about whether time horizon is sufficient to reflect all the possible downstream differences in costs and outcomes. The sources of unit costs are not clearly described, so not clear whether they are local or national unit costs. No sensitivity analysis is reported.				
Overall applicability[(c)]: Partially applicable **Overall quality [(d)]:** Potentially serious limitations				

Abbreviations: CCA: cost–consequence analysis; CHF: Chronic heart failure; 95% CI: 95% confidence interval; ICER: incremental cost-effectiveness ratio; NR: not reported; QALYs: quality-adjusted life years.

(a) For studies where the time horizon is longer than the treatment duration, an assumption needs to be made about the continuation of the study effect. For example, does a difference in utility between groups during treatment continue beyond the end of treatment and if so for how long.

(b) Converted using 2005 purchasing power parities.[223]

(c) Directly applicable/Partially applicable/Not applicable.
(d) Minor limitations/Potentially serious limitations/Very serious limitations.

Study	**Thornton 2005[292] and Elliott 2005[102]**			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CEA (health outcome: proportion of patients with ≤ 0% decline in FEV_1) **Study design:** Retrospective observational study **Approach to analysis:** Individual patient data analysis for both costs and outcomes. **Perspective:** UK NHS Trust (secondary care provider) **Time horizon/Follow-up:** one year **Treatment effect duration[(a)]:** one year **Discounting:** Costs: n/a; Outcomes: n/a	**Population:** Adults (≥ 16 years) with confirmed cystic fibrosis (CF) who experienced at least one respiratory exacerbation during the study period, identified from Manchester Adult CF Centre. **Cohort settings: (n=116)** Mean age: Intervention 1: 26 years Intervention 2: 26 years Intervention 3: 25 years Male: Intervention 1: 58.8% Intervention 2: 36.2% Intervention 3: 61.1% **Intervention 1: (n=51)** Hospital treatment with intravenous (IV) antibiotics, where the patient received >60% of the treatment courses at hospital **Intervention 2: (n=47)** Home treatment with IV antibiotics, where the patient received >60% of	**Total costs (mean per patient):** Intervention 1: £22,609 Intervention 2: £13,528 Intervention 3: £19,927 Incremental (2−1): -£9,081 (95% CI: NR; p=NR) **Currency & cost year:** 2002 UK pounds. **Cost components incorporated:** Hospital stay, clinic appointments, laboratory tests, standard home kits, staff time, IV antibiotics	**proportion of patients with ≤ 0% decline in FEV1:** Intervention 1: 58.8% Intervention 2: 42.6% Intervention 3: 50% Incremental (2−1): -16.2% (95% CI: NR; p=NR) **proportion of patients with ≤ 2% decline in FEV1:** Intervention 1: 62.7% Intervention 2: 42.6% Intervention 3: 55.6% Incremental (2−1): -20.1% (95% CI: NR; p=0.045)	**ICER (Intervention 2 versus Intervention 1):** £46,098 per extra patient with ≤ 0% decline in FEV_1 95% CI: -£362,472 to £374,044 £37,885 per extra patient with ≤2% decline in FEV_1 95% CI: £1,236 to £269,023 **Analysis of uncertainty:** Bootstrapping of cost data was used to calculate CIs and represent uncertainty

Study	Thornton 2005[292] and Elliott 2005[102]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
	the treatment courses at home. **Intervention 3: (n=18)** Both home and hospital treatment with IV antibiotics, where the patient received almost equal amounts of home and hospital treatment			
Data sources				
Health outcomes: Observational data analysis using univariate tests (independent samples t-test, ANOVA and Chi-Sqaure). **Quality-of-life weights:** NA. **Cost sources:** resource use data collected from hospital records, ward diaries and a time and motion study. Unit costs were based on both national and local sources including BNF, hospital supplies catalogue and hospital finance records.				
Comments				
Source of funding: institutional funding. **Applicability and limitations:** CEA, so QALYs are not used as outcome. The perspective is that of an NHS trust only and does not include personal and social services. Some uncertainty about the applicability of resource use and unit costs from 2002 to the current NHS context. Retrospective observational study, so by definition not reflecting all evidence in this area. Univariate analysis was used, so results subject to confounding. Some uncertainty about whether time horizon is sufficient to reflect all differences in costs and outcomes. Both local and National unit costs used, so some uncertainty regarding whether the local costs reflect national averages. Limited sensitivity analysis presented. **Other:**				
Overall applicability[(b)]: partially applicable **Overall quality[(c)]:** potentially serious limitations				

Abbreviations: CEA: cost-effectiveness analysis; 95% CI: 95% confidence interval; CF: cystic fibrosis; EV_1: Fixed expiratory volume in 1 second; ICER: incremental cost-effectiveness ratio; IV: Intravenous; NHS: National Health Service; NR: not reported; QALYs: quality-adjusted life years.
(a) For studies where the time horizon is longer than the treatment duration, an assumption needs to be made about the continuation of the study effect. For example, does a difference in utility between groups during treatment continue beyond the end of treatment and if so for how long.
(b) Directly applicable/Partially applicable/Not applicable.
(c) Minor limitations/Potentially serious limitations/Very serious limitations.

Study	Vianello 2013[304]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA	**Population:**	**Total costs (mean per**	**Mortality-3months:**	**ICER (Intervention 2 versus Intervention 1):**

(health outcome: mortality, treatment failure, time to recovery) **Study design:** RCT **Approach to analysis:** within trial analysis of health outcomes and resource use. Unpaired t-test was used to compare costs in both arms. **Perspective:** Italian health care provider **Follow-up:** 3 months **Treatment effect duration[(a)]:** 3 months **Discounting:** Costs: n/a; Outcomes: n/a	Adult neuromuscular patients with respiratory tract infection requiring hospital admission **Cohort settings: (n=59)** Mean age: Intervention 1:46.7 years Intervention 2: 44.6 years Male: Intervention 1: 88.9% Intervention 2: 65.4% **Intervention 1: (n=27)** Admission to hospital for inpatient treatment of respiratory tract infection **Intervention 2: (n=26)** Treatment at home under the care of a Hospital-at-home service. The service was delivered primarily by a district nurse with follow-up from a pulmonologist and respiratory therapist.	**patient):** Intervention 1: £7,875 Intervention 2: £480 Incremental (2−1): £7,395 (95% CI: NR; p<0.001) **Currency & cost year:** 2010 Euros (presented here as 2010 UK pounds[(b)]) **Cost components incorporated:** Home visits by pulmonologist, district nurse and respiratory therapist. Daily rental costs for mechanical cough assist and portable ventilator, antibiotic prescriptions and telephone calls. Hospital stays	Intervention 1: 14.8% Intervention 2: 11.5 % Incremental (2−1):- 3.3% (95% CI: NR; p=0.42)	n/a **Analysis of uncertainty:** no sensitivity analysis reported
Data sources				
Health outcomes: Within trial analysis with baseline data collected using clinical and functional measure. Data on mortality were collected 3 months. **Quality-of-life weights:** n/a. **Cost sources:** both local and national unit cost sources were used.				
Comments				
Source of funding: NR. **Applicability and limitations:** Cost-consequences analysis, so QALYs are not used as outcome. Some uncertainty about the applicability of resource use and unit costs from Italy in 2010 to the current NHS context. RCT-based analysis so from one study by definition therefore not reflecting all evidence in area. It is not clear whether the cost of hospitalisation is included for those patients in the hospital at home arm who failed treatment and required hospitalisation. Unit				

costs from both local and national sources so may not be completely reflective of national unit costs. No sensitivity analysis is reported.	
Overall applicability[c]: partially applicable	**Overall quality[d]:** potentially serious limitations

Abbreviations: CCA: cost–consequence analysis; 95% CI: 95% confidence interval; ICER: incremental cost-effectiveness ratio; NR: not reported; QALYs: quality-adjusted life years.
(a) For studies where the time horizon is longer than the treatment duration, an assumption needs to be made about the continuation of the study effect. For example, does a difference in utility between groups during treatment continue beyond the end of treatment and if so for how long.
(b) Converted using 2010 purchasing power parities.[223]
(c) Directly applicable/Partially applicable/Not applicable.
(d) Minor limitations/Potentially serious limitations/Very serious limitations.

E.1.2 Early discharge

Study	**Goossens 2013[118]**			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CUA (health outcome: QALYs). NB CEA also but not presented in this table. **Study design:** RCT (Going Home under Early Assisted Discharge trial)- – associated clinical papers Utens 2012, Utens 2013 and Uten 2014[300,302,303] **Approach to analysis:** Analysis of individual patient-level data. Unit costs applied. EQ-5D data analysed using multivariable analysis, adjusting for baseline score. Cost data analysed	**Population:** Patients (40 years or older) admitted to one of the participating hospitals for a COPD exacerbation **Cohort settings: (n=139)** Start age: Intervention 1: 67.8 years (SD=11.3) Intervention 2: 68.3 years (SD=10.3) Male: Intervention 1: 55.1% Intervention 2: 68.9% **Intervention 1: (n=69)** Continuation of inpatient	**Total cost of initial admission plus follow-up (mean per patient):** Intervention 1: £3,350 Intervention 2: £3,219 Incremental (2−1): -£131 (95% CI: -£977 to £719; p=NR) **Costs of initial admission:** Intervention 1: £1,140 Intervention 2: £950 Incremental (2−1): -£190 (95% CI: -£246 to £131; p=NR) **Currency & cost year:** 2009 Euros (presented here as 2009 UK pounds[(b)])	**QALYs (mean per patient):** Intervention 1: 0.175 Intervention 2: 0.170 Incremental (2−1): -0.005 (95% CI: -0.021 to 0.0095; p=NR)	**ICER (Intervention 2 versus Intervention 1):** £24,252 per QALY lost 95% CI: NR Probability Intervention 2 cost saving: 61.2% Probability Intervention cost-effective at 20K/30K threshold): 58%/55%[(c)] **Analysis of uncertainty:** Bootstrapping of cost and outcome data was used to address uncertainty. SAs conducted included: Using different unit cost per inpatient hospital day instead of micro-costing study estimate: from Dutch Manual for Costing Studies, using the most costly and the least costly hospital and the most costly and the least costly patient estimates. Early supported discharge was cost saving all

Study	Goossens 2013[118]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
using linear repeated-measures model with correlated error terms. Intention to treat analysis with missing values handled using repeated measures model. **Perspective:** Netherland health care perspective (societal also analysed but not presented here) **Follow-up[(a)]:** 3 months **Discounting:** Costs: n/a; Outcomes: n/a	hospital treatment (HOSP) for COPD exacerbation for 4 days, after an initial 3 days under usual hospital treatment **Intervention 2: (n=70)** Early supported discharge (ESD) scheme (hospital-at-home) after an initial 3 days under usual hospital treatment involving treatment and supervision at home for the remaining 4 days by a community nurse who is generically trained (not specialist). The community nurse visited the patient once to three times on the day of discharge and the three following days. This care package is delivered by community-based home-care organisation which could support the patient in their daily activities (for example washing and dressing). The general practitioner was informed of the early discharge but the respiratory physician of the hospital kept the final	**Cost components incorporated:** Hospital stay Physician visits Community nursing care Hospital admissions Emergency department visits Visits/contact with: pulmonologist or other, specialist physicians, GP and other health care professionals Number of ambulance rides Medication use		SAs. The ICER ranged from £1,444 per QALY lost to £211,342 per QALY lost for all SAs. The probability that ESD was cost saving ranged from 50% to 99.8%. Using the inpatient hospital day cost from the Dutch Manual for Costing Studies (National unit cost) resulted in the best case scenario for ESD, resulting in an ICER of £211,342 per QALY lost and probability that ESD was cost saving of 99.8%.

Study	Goossens 2013[118]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
	responsibility			
Data sources				
Health outcomes: Within RCT analysis. Clinical outcome data were collected from patients after 7 days (end of initial admission) and 3 months (initial follow-up). Quality-of-life assessment using EQ-5D took place at the end of follow-up (3 months) **Quality-of-life weights:** EQ-5D Dutch tariff (scores range from -0.329 (worst possible state) to 1 (perfect health)]. **Cost sources:** resource use data for hospital-at-home patients recorded using 4-day diary during initial admission and weekly diary during follow-up. Standard unit costs from the Dutch Manual for Costing Studies and the official list of drug prices were used as the source of unit costs. A micro-costing study was also conducted to determine the cost of an inpatient hospital day.				
Comments				
Source of funding: Institutional funding. **Applicability and limitations:** Some uncertainty regarding the applicability of resource use (2007-2011) and unit costs (2009) from the Netherlands. RCT-based analysis, so from one study by definition therefore not reflecting all evidence in area that compares early supported discharge versus inpatient admission. Micro-costing study was used to calculate the cost of inpatient bed day cost in the base case analysis, which does not reflect the national unit cost for inpatient hospital day. Some uncertainty about whether time horizon of 3 months is sufficient to capture all benefits and costs.				
Overall applicability[(d)]: Partially applicable **Overall quality[(e)]:** Potentially serious limitations				

Abbreviations: CEA: Cost-effectiveness analysis; 95% CI: 95% confidence interval; CUA: cost–utility analysis; EQ-5D: Euroqol 5 dimensions (scale: 0.0 [death] to 1.0 [full health], negative values mean worse than death); ESD: Early supported discharge; ICER: incremental cost-effectiveness ratio; NR: not reported; pa: probabilistic analysis; QALYs: quality-adjusted life years; SA: sensitivity analysis.

(a) An assumption is made about the continuation of the intervention effect beyond the 4-day treatment period.

(b) Converted using 2009 purchasing power parities.[223]

(c) Estimated from graph.

(d) Directly applicable/Partially applicable/Not applicable.

(e) Minor limitations/Potentially serious limitations/Very serious limitations.

E.1.3 Both admission avoidance and early discharge

Study	Bakerly 2009[23]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CC (health outcome: N/A) **Study design:** matched case-control, with retrospective controls matched on age, sex and post code **Approach to analysis:** Means and mean differences, with bias-corrected bootstrap analysis used to calculate 95% CIs around the mean estimates. **Perspective:** UK NHS **Follow-up** 12 months **Treatment effect duration[(a)]:** 12 months **Discounting:** Costs: NR; Outcomes NR:	**Population:** Patients admitted to a university hospital with acute exacerbation of COPD (AECOPD) **Cohort settings: (n=225)** Mean age: Intervention 1: 68 years Intervention 2: 70 years Male: Intervention 1: 56% Intervention 2: 55% **Intervention 1: (n=95)** Usual inpatient care for AECOPD, where patients stayed in hospital for the whole length of the admission. **Intervention 2: (n=130)** Care delivered by an acute COPD assessment service (ACAS), which provided an integrated care model. *	**Total costs (mean per patient):** Intervention 1: £2,256 Intervention 2: £1,653 Incremental (2−1): -£600 (95% CI: NR; p<0.001) **Currency & cost year:** 2007 UK pounds **Cost components incorporated:** Specialist nurse visits Emergency department visits Emergency home visits Contacts with other health care professionals (GP, district nurse, occupational therapist) Emergency ambulance transfers Hospital admissions and length of stay Outpatient clinic visits	N/A (3-month readmission rate was assumed equal)	**ICER (Intervention 2 versus Intervention 1):** N/A 95% CI: N/A Probability Intervention 2 cost-effective (£20K/30K threshold): N/A **Analysis of uncertainty:** Bootstrapping was used to calculate 95% CI around the mean cost estimates. Total costs: Intervention 1: 95% CI: £2,126 to £2,407 Intervention 2: 95% CI: £1,521 to £1,802
Data sources				
Health outcomes: N/A (3-month readmission rate was assumed equal). **Quality-of-life weights:** N/A. **Cost sources:** the unit costs were derived from national sources (NHS reference costs and PSSRU)				

Comments
Source of funding: Local, non-commercial funding (local respiratory research fund). **Applicability and limitations:** The model evaluated in the study is an integrated care model, with hospital at home representing one component of the model. Some uncertainty exists regarding the applicability of resource use and costs from 2007 to the current NHS context. QALYs were not used as an outcome measure as the study compares costs only. Observational, matched case control study with no adjustment for possible confounders other than the matching variables. So, so does not reflect all the evidence available for this comparison. One year follow-up; so may not capture the long-term consequences of the intervention. The study compares costs only and no health outcomes are considered. No sensitivity analysis is reported.
Overall applicability[(b)]: partially applicable **Overall quality [(c)]:** potentially serious limitations

** The ACAS team comprised 3 full-time specialist respiratory nurses and middle-grade physician (0.4 whole time equivalent) assessing AECOPD admissions daily. Suitable patients received the following interventions: early discharge (with support at home, available 7-days a week from 9:00 am to 5:00 pm.), patient's education and clinic assessment 60 days from the index episode, where a clinical management plan is agreed and communicated to the patient's GP. Patients' could also refer themselves or be referred by their GP to the ACAS service (avoiding admissions)*
Abbreviations: CC: comparative costing; COPD: Chronic obstructive pulmonary disease; 95% CI: 95% confidence interval; ICER: incremental cost-effectiveness ratio; NR: not reported; QALYs: quality-adjusted life years.
(a) For studies where the time horizon is longer than the treatment duration, an assumption needs to be made about the continuation of the study effect. For example, does a difference in utility between groups during treatment continue beyond the end of treatment and if so for how long.
(b) Directly applicable/Partially applicable/Not applicable.
(c) Minor limitations/Potentially serious limitations/Very serious limitations.

Study	**Patel 2008[229]**			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CUA (health outcome: QALYs) **Study design:** Within –trial analysis (RCT) **Approach to analysis:** Analysis of individual level data for resource use. Unit costs applied. **Perspective:** Not reported (appears to be Swedish healthcare system) **Follow-up:** 12 months	**Population:** Patients seeking care for deterioration of chronic heart failure identified within 24-48 hours after admission from three medical facilities: ED, Heart failure outpatient clinic and a medical ward. **Cohort settings: (n=31)** Start age: Intervention 1: 78 years (SD=8)	**Total costs (mean per patient):** Intervention 1: £3,671 Intervention 2: £1,711 Incremental (2−1):- £1,960 (95% CI: NR; p=0.05) **Currency & cost year:** Assumed to be 2006 Euros[(presented here as 2006 UK pounds[(a)])] **Cost components incorporated:** Specialist nurses' time	**QALYs (mean per patient):** EQ-5D visual analogue scale: Intervention 1: 0.43 Intervention 2: 0.44 Incremental (2−1): 0.01 (95% CI: NR; p=NR) SG utilities: Intervention 1: 0.64 Intervention 2: 0.71 Incremental (2−1): 0.01 (95% CI: NR; p=NR)	**ICER (Intervention 2 versus Intervention 1):** 2 dominates 1 **Analysis of uncertainty:** SA using last value carried forward for people lost to follow-up: EQ-5D QALYs for the intervention 1 group 0.5 SG QALYs for the intervention 1 group: 0.75 QALYs calculation using the following alternative assumptions (Not clear which one is base case): Any change in HRQoL between two measurement points occurred immediately after the first measurement point

Study	Patel 2008[229]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Discounting: Costs: n/a; Outcomes: n/a	Intervention 2: 77 years (SD=10) Male: Intervention 1: 83% Intervention 2: 46% **Intervention 1: (n=18)** Hospital admission/conventional care (CC) **Intervention 2: (n=13)** Home care under the direction of a specialist nurse (HC)	(including home visits, administration, transportation) Physicians' time (including consultations, prescriptions, referrals) Laboratory tests IV diuretics Emergency visits Hospitalisations due to HF Telephone contacts with HF clinic Visits to HF clinic		Any change in HRQoL occurred immediately before the second measurement point Any change occurred in HRQoL exactly half-way between the two measurement points No differences were observed **Costs:** Difference in the cost of initial intervention was significant (p<0.001) Difference in total costs was significant (p=0.04) Differences in total costs including HF clinic was significant (p=0.05) **Outcomes**: No significant difference in QALYs gained
Data sources				
Health outcomes: patients completed four follow-up sets of questionnaires at 1, 4, 8 and 12 months. Patients' clinical status was documented and information about clinical events was elicited through patient interviews and complemented by the patients' medical records. **Quality-of-life weights:** EQ-5D visual analogue scale values rather than tariff utilities were used. SG utilities were also measured. **Cost sources:** resource use data was recorded using patient interviews and patients' medical records. Costs were based on the hospital's financial department records.				
Comments				
Source of funding: NR. **Applicability and limitations:** Some uncertainty about the applicability of resource use and costs (2004-2006) from Sweden. QALYs are calculated using the VAS values. RCT-based analysis so from one study by definition therefore not reflecting all evidence in area. Local costs are used; some uncertainty as to whether these reflect national costs. Some uncertainty regarding whether time horizon is sufficient (12 months follow-up). Limited number of deterministic sensitivity analyses presented.				
Overall applicability[(b)]: Partially applicable **Overall quality[(c)]:** potentially serious limitations				

Abbreviations: 95% CI: 95% confidence interval; CUA: cost–utility analysis; ED: Emergency department; EQ-5D: Euroqol 5 dimensions (scale: 0.0 [death] to 1.0 [full health], negative values mean worse than death); HF: heart failure; ICER: incremental cost-effectiveness ratio; NR: not reported; pa: probabilistic analysis; QALYs: quality-adjusted life years; SA: sensitivity analysis; SG: Standard gamble; VAS: Visual analogue scale.
(a) Converted using 2006 purchasing power parities.[223]
(b) Directly applicable/Partially applicable/Not applicable.
(c) Minor limitations/Potentially serious limitations/Very serious limitations.

Study	Puig-Junoy 2007[235]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CC (health outcome: n/a) **Study design:** RCT (linked to Hernandez 2003[141] (see clinical review) **Approach to analysis:** Resource use data collected from patient medical records and using resource use instruments. Cost data collected within-trial were analysed using multiple regression analysis with log transformation and bias correction **Perspective:** Spanish public health insurer (third party payer) **Follow-up** 8 weeks **Discounting:** Costs: n/a; Outcomes: n/a	**Population:** Patients presenting to ED with acute exacerbation of COPD. **Cohort settings: (n=180)** Mean age: 70.8 years Male:97.8% **Intervention 1: (n=77)** Conventional care in hospital (CC) **Intervention 2: (n=103)** Nurse-led hospital-at-home involving up to 5 visits from specialist respiratory nurse and phone consultation whenever needed. Patients were followed up for 8 weeks then discharged.	**Total costs (mean per patient, adjusted):** Intervention 1: £1,560 Intervention 2: £1,000 Incremental (2−1): -£560 (95% CI: NR; p< 0.01) **For patients with low severity COPD:** Incremental (2−1): -£397 (95% CI: NR; p=NR) **For patients with moderate severity COPD:** Incremental (2−1): -£671 (95% CI: NR; p=NR) **For patients with severe COPD:** Incremental (2−1): -£1229 (95% CI: NR; p=NR) **Currency & cost year:** 2000 Euros (presented here as 2000 UK pounds[(a)])] **Cost components incorporated:** Hospital stays (initial hospitalisation and readmission), ED visits, Outpatient visits Primary care physician visits, Visits for social support, Nurse visits at home, Ambulatory treatment prescriptions, Phone calls, Transportation services	n/a (CC)	**ICER (Intervention 2 versus Intervention 1):** NA **Analysis of uncertainty:** No sensitivity analysis reported
Data sources				
Health outcomes: n/a (data on health outcomes from this RCT were reported in another paper (Hernandez 2003[141]); however, the analysis set for the cost analysis is				

different from that in Hernandez 2003[141]. **Quality-of-life weights:** n/a **Cost sources:** Labour cost market prices including value added taxes and overheads were used to calculate costs of nurse visits at home, phone calls and transportation services. Hospital unit costs per in-hospital stay and visits were calculated as average observed tariffs for COPD patients in a public insurance company covering the civil servants of the City Council of Barcelona (PAMEM).

Comments

Source of funding: NR. **Applicability and limitations:** Uncertainty regarding the applicability of resource use (1999-2000) and unit costs (2000) from Spain to the UK NHS context. Comparative cost analysis, assuming equivalent outcomes, so QALYs are not used as an outcome measure. Short time horizon (8 weeks) which might not capture all the differences in costs. Within-trial comparative costing analysis so does not reflect all the evidence in this area. The authors assumed equivalent health outcomes despite a previous publication from the same trial reporting favourable outcomes for hospital-at-home. Uncertainty was not appropriately addressed and no sensitivity analysis undertaken.

Overall applicability[(b)]: partially applicable **Overall quality[(c)]:** potentially serious limitations

Abbreviations: 95% CI: 95% confidence interval; CC: comparative costing; COPD: chronic obstructive pulmonary disease; CUA: cost–utility analysis; ED: emergency department; ICER: incremental cost-effectiveness ratio; NR: not reported; QALYs: quality-adjusted life years.

(a) Converted using 2000 purchasing power parities.[223]

(b) Directly applicable/Partially applicable/Not applicable.

(c) Minor limitations/Potentially serious limitations/Very serious limitations.

Study	Teuffel 2011[288]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CUA (health outcome: quality-adjusted febrile neutropenia episodes [QAFNE]) **Study design:** Probabilistic decision analytic model **Approach to analysis:** The analysis was based on a decision-tree model **Perspective:** **Time horizon[(a)]:** One FN episode (maximum follow-up of 30 days)	**Population:** Adult cancer patients low risk FN receiving antibiotic treatment **Cohort settings:** hypothetical cohort Start age: NR Male: NR **Intervention 1:** treatment in hospital with intravenous antibiotics (combination of piperacillin and tazobactam, plus tobramycin) (HospIV)	**Total costs (mean per patient):** Intervention 1: £7,366 Intervention 2: £3,322 Intervention 3: £2,273 Intervention 4: £1,885 *For incremental analysis see cost effectiveness column* **Currency & cost year:** 2009 Canadian dollars (presented here as 2009 UK	**Quality-adjusted FN episodes (QAFNEs):** Intervention 1: 0.62 Intervention 2: 0.66 Intervention 3: 0.72 Intervention 4: 0.65 *For incremental analysis see cost effectiveness column*	**ICER:** Int | Inc cost | Inc QAFNE | ICER 1 | Dominated 2 | Dominated 3 | £387 | 0.07 | £5,534 4 | Baseline reference Early discharge and with hospital intravenous treatment were dominated, as they were more expensive and less effective than another strategy. At a threshold of ~ £2000 per QAFNE (calculated to be corresponding to a cost-effectiveness threshold of £27,000 per QALY:

Study	Teuffel 2011[288]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Discounting: Costs: n/a; Outcomes: n/a	**Intervention 2:** Early discharge after 48 hours in-patient observation with IV antibiotics (combination of piperacillin and tazobactam, plus tobramycin), followed by oral out-patient treatment (EarlyDC) **Intervention 3:** Entire out-patient management with intravenous antibiotics (combination of piperacillin and tazobactam, plus tobramycin) (HomeIV) **Intervention 4:** Out-patient management with oral antibiotics (ciprofloxacin plus the combination of amoxicillin and clavulanate)(HomePO) Treatment duration was 6 days for all strategies	pounds[(b)])] **Cost components incorporated:** Hospitalisations, initial consultation, out-patient visits, home nursing, and medications.		Intervention 4 (HomePO) was cost-effective in 54% of simulations, while intervention 3 (HomeIV) was cost-effective in 38% of simulations. Intervention 2 (EarlyDC) was cost-effective in 8% of simulations and intervention 1 was cost-effective in less than 1% of simulations. **Analysis of uncertainty:** PSA was used. The results were sensitive to variations in the costs of in-patient stay, out-patient visits, and home nurse visits. The duration of treatment and some utility assumptions were also key inputs. In some scenarios, home intravenous treatment was the preferred strategy, but the in-patient treatments were never cost-effective.
Data sources				
Health outcomes: Systematic review of effectiveness evidence was conducted as part of the study and only RCTs were included. Further data were from observational studies. **Quality-of-life weights:** preference elicitation study conducted with 77 adult cancer patients receiving treatment in hospital using VAS and the values transformed into SG utilities using power function. **Cost sources:** The resource quantities were mostly from published studies. Unit costs were from the Ontario Health Insurance Schedule of Benefits and Fees, the local finance offices, and the Department of Pharmacy at Princess Margaret Hospital.				
Comments				

Study	Teuffel 2011[288]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Source of funding: Institutional funding. **Applicability and limitations:** Some uncertainty regarding the applicability of resource use and unit costs from Canada (2009). The outcome used is not QALYs, but rather a quality adjusted FN episode. The short time horizon used (30 days) might not reflect all differences between strategies in terms of costs and outcomes. Some local costs were used to calculate the costs of hospital fees/charges and home care nurse visits. The baseline probability of health care-associated infection was based on data from observational studies. It was not reported how these studies were identified. The cost-effectiveness threshold used in the PSA was arbitrary and may not have a meaningful interpretation.				
Overall applicability[(c)]: Partially applicable **Overall quality[(d)]:** Potentially serious limitations				

Abbreviations: CCA: cost–consequence analysis; CEA: cost-effectiveness analysis; 95% CI: 95% confidence interval; CUA: cost–utility analysis; da: deterministic analysis; EQ-5D: Euroqol 5 dimensions (scale: 0.0 [death] to 1.0 [full health], negative values mean worse than death); ICER: incremental cost-effectiveness ratio; IV: intravenous; NR: not reported; pa: probabilistic analysis; QALYs: quality-adjusted life year; SA: sensitivity analysis; SG: standard gamble; VAS: visual analogue scale.

(a) It is not clear if an assumption of continuous treatment effect beyond initial treatment duration is used in the analysis.

(b) Converted using 2009 purchasing power parities.[223]

(c) Directly applicable/Partially applicable/Not applicable.

(d) Minor limitations/Potentially serious limitations/Very serious limitations.

E.2 Step-up/Step-down

Study	Monitor 2015[204]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CC **Study design:** Discrete event simulation model **Approach to analysis:** Simulation model of individual patients flowing through a local health economy based on input data including patient characteristics, system capacity and referral pattern. Comparison of capacity used with and without a scheme with unit costs applied, broken down into fixed, semi-fixed and variable. **Perspective:** UK NHS (societal also included) **Time horizon[(a)]:** 5 years **Discounting:** Costs: n/a; Outcomes: n/a	**Population:** Simulated hospital inpatients. **Cohort settings:** n/a **Intervention 1:** Usual hospital care. **Intervention 2:** Short-term treatment to patients who are not suffering a hyper-acute episode in a community hospital setting. Patients referred by GP or ambulance, receiving treatment within two hours from a multidisciplinary team led by a consultant, seven days a week.	**Total cumulative costs over five years:** Intervention 1: NR Intervention 2: NR Incremental (2−1): £1m (95% CI: NR; p=NR) **Cost of patient spell in fifth year of the scheme:** Intervention 1: £674 Intervention 2: £559 Incremental (2−1): -£115 (95% CI: NR; p=NR) **Currency & cost year:** UK pounds; year NR **Cost components incorporated:** Setup, fixed, semi-fixed and variable costs.	**N/A**	Results show the scheme will not break even over five years. However, in the fifth year, uptake of the service is high enough to see it be cost saving. **Analysis of uncertainty:** Estimated that a similar scheme would need to cost around £550 to £600 per patient intervention to be cost saving compared to treating patients in the acute setting.
Data sources				
Health outcomes: NA **Quality-of-life weights:** NA **Cost sources:** Bottom-up costs reviewed through data requests to providers running similar schemes and used to build costs models identifying the workforce, variable and setup costs of schemes. Identified key factors that influence cost structure of schemes and then test with other providers and clinicians. Acute pathway costs from a combination of patient-level information and costing systems, cost data and ward staffing model.				

Study	Monitor 2015[204]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Comments				
Source of funding: NHS England **Applicability and limitations:** Not enough detail around methodology and modelled cohort. Costs not explicitly reported as per patient value. Cost year not reported for comparison. Full breakdown of cost inputs and outputs not reported.				
Overall applicability[(b)]: Partially applicable **Overall quality[(c)]:** Potentially serious limitations				

Abbreviations: CC: Comparative costing analysis; 95% CI: 95% confidence interval; CUA: cost–utility analysis; EQ-5D: EuroQol 5 dimensions (scale: 0.0 [death] to 1.0 [full health], negative values mean worse than death);; ICER: incremental cost-effectiveness ratio; NR: not reported; pa: probabilistic analysis; QALYs: quality-adjusted life years; SA: sensitivity analysis.

(a) One year modelling with extrapolation for further 4 years.

(b) Directly applicable/Partially applicable/Not applicable.

(c) Minor limitations/Potentially serious limitations/Very serious limitations.

Study	O'Reilly 2008[220]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CUA (health outcome: QALYs) **Study design:** RCT **Approach to analysis:** Within-trial analysis of individual patient level cost and outcome data. Resource use data collected from hospital patient administration system and via questionnaires. Data collected from patient questionnaires were corroborated against a community database and agreement ascertained. Missing values were	**Population:** Elderly patients requiring rehabilitation following hospital admission with an acute illness **Cohort settings: (n=490)** Mean age: NR Male: NR **Intervention 1: (n=210)** General hospital care **Intervention 2: (n=280)** Community hospital care	**Total costs (mean per patient):** Intervention 1: £8,226 Intervention 2: £8,946 Incremental (2−1): £720 (95% CI: -£523 to £1,964; p=NR) **Currency & cost year:** 2001-2002 UK pounds **Cost components incorporated:** Hospital admissions, visits to emergency department, day hospitals, day centres, general practitioners, outpatient visits, out-of-hours services, home visits	**QALYs (mean per patient):** Intervention 1: 0.298 Intervention 2: 0.340 Incremental (2−1): 0.048 (95% CI: -0.028 to 0.123; p=0.214)	**ICER (Intervention 2 versus Intervention 1):** £16,324 per QALY gained (pa) 95% CI: NR Probability Intervention 2 cost-effective (£10k/30K threshold): 47%/50% **Analysis of uncertainty:** Bootstrapping was used to assess the impact of uncertainty. Costs of initial hospital admission, subsequent readmission and institutional care costs were explored in sensitivity analyses which gave similar results to the base case analysis. A threshold analysis showed that when the per diem cost of the community hospital is reduced by over 30%, the mean cost per patient treated at a community hospital

imputed using the mean value for the treatment group. **Perspective:** UK NHS and PSS **Follow-up:** 6 months **Treatment effect duration[(a)]:** 12 months **Discounting:** Costs: n/a; Outcomes: n/a		by health or social care staff, residential and nursing homes, equipment and adaptation.		becomes lower than at a general hospital.
Data sources				
Health outcomes: Within-trial analysis with EQ-5D data collected at baseline, at one week after discharge. And 3 and 6 months after randomisation. **Quality-of-life weights:** EQ-5D UK tariff was used to calculate QALYs. **Cost sources:** Resource use data were collected one week after discharge, and 3 and 6 months following randomisation using an interviewer-completed questionnaire administered to the patients and their carers. Hospital inpatient use data were obtained from the hospital patient administration system. Both local and national sources including PSSRU and NHS Reference Costs and NHS Purchasing and Supply Agency were used to calculate costs. Cost of hospital stay was based on data from the hospitals' finance departments and included both direct and indirect costs. Costs were calculated net of patients' contribution, where this occurred (for example in case of some community services such as chiropody and home care).				
Comments				
Source of funding: Government and charity funding. **Applicability and limitations:** Some uncertainty regarding the applicability of resource use and unit costs from 2001-2002 to current NHS context. Within-trial analysis so does not reflect all the evidence available for this comparison between care at a community hospital and at a district general hospital setting. The short time horizon (6 months) may not reflect all potential differences in costs and outcomes. An assumption was also made about the persistence of effect up to 1 year, which was not supported by evidence. Both local and national unit costs were used for the analysis. It is not clear whether the local unit costs used for some of the community care resources would be representative of national unit costs. Additionally, only a limited number of assumptions was tested in sensitivity analysis.				
Overall applicability[(b)]: partially applicable **Overall quality[(c)]:** minor limitations				

Abbreviations: 95% CI: 95% confidence interval; CUA: cost–utility analysis; EQ-5D: Euroqol 5 dimensions (scale: 0.0 [death] to 1.0 [full health], negative values mean worse than death); ICER: incremental cost-effectiveness ratio; NR: not reported; pa: probabilistic analysis; QALYs: quality-adjusted life years.

(a) For studies where the time horizon is longer than the treatment duration, an assumption needs to be made about the continuation of the study effect. For example, does a difference in utility between groups during treatment continue beyond the end of treatment and if so for how long.

(b) Directly applicable/Partially applicable/Not applicable.

(c) Minor limitations/Potentially serious limitations/Very serious limitations.

E.3 Virtual wards

Study	Monitor 2015[204]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CC **Study design:** Discrete event simulation model **Approach to analysis:** Simulation model of individual patients flowing through a local health economy based on input data including patient characteristics, system capacity and referral pattern. Comparison of capacity used with and without a scheme with unit costs applied, broken down into fixed, semi-fixed and variable. **Perspective:** UK NHS (societal also included) **Time horizon[(a)]:** 5 years **Discounting:** Costs: n/a; Outcomes: n/a	**Population:** Simulated hospital inpatients. **Cohort settings:** n/a **Intervention 1:** Usual hospital care. **Intervention 2:** 24 hour remote triaging, advice and treatment to patients through video link. Aim to prevent unwell patients from attending hospital. Scheme provided by senior nurses to primarily frail elderly living in nursing homes.	**Total cumulative costs over five years:** Intervention 1: NR Intervention 2: NR Incremental (2−1): £0m (95% CI: NR; p=NR) **Cost of patient spell in fifth year of the scheme:** Intervention 1: £690 Intervention 2: £286 Incremental (2−1): -£404 (95% CI: NR; p=NR) **Currency & cost year:** UK pounds; year NR **Cost components incorporated:** Setup, fixed, semi-fixed and variable costs.	**N/A**	Results show the scheme will not break even over five years. However, in the fifth year, uptake of the service is high enough to see it be cost saving. **Analysis of uncertainty:** Estimated that a similar scheme would need to cost around £4,000 to £4,300 per patient intervention to be cost saving compared to treating patients in the acute setting.

Study	Monitor 2015[204]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Data sources				
Health outcomes: NA **Quality-of-life weights:** NA **Cost sources:** Bottom-up costs reviewed through data requests to providers running similar schemes and used to build costs models identifying the workforce, variable and setup costs of schemes. Identified key factors that influence cost structure of schemes and then test with other providers and clinicians. Acute pathway costs from a combination of patient-level information and costing systems, cost data and ward staffing model.				
Comments				
Source of funding: NHS England **Applicability and limitations:** Not enough detail around methodology and modelled cohort. Costs not explicitly reported as per patient value. Cost year not reported for comparison. Full breakdown of cost inputs and outputs not reported.				
Overall applicability[(b)]: Partially applicable **Overall quality[(c)]:** Potentially serious limitations				

Abbreviations: CC: Comparative costing analysis; 95% CI: 95% confidence interval; CUA: cost–utility analysis; EQ-5D: Euroqol 5 dimensions (scale: 0.0 [death] to 1.0 [full health], negative values mean worse than death);; ICER: incremental cost-effectiveness ratio; NR: not reported; pa: probabilistic analysis; QALYs: quality-adjusted life years; SA: sensitivity analysis.

(a) One year modelling with extrapolation for further 4 years.

(b) Directly applicable/Partially applicable/Not applicable.

(c) Minor limitations/Potentially serious limitations/Very serious limitations.

E.4 Rapid response

Study	Monitor 2015[204]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CC **Study design:** Discrete event simulation model **Approach to analysis:** Simulation model of individual patients flowing through a local health economy based on input data including patient characteristics, system capacity and referral pattern. Comparison of capacity used with and without a scheme with unit costs applied, broken down into fixed, semi-fixed and variable. **Perspective:** UK NHS (societal also included) **Time horizon[(a)]:** 5 years **Discounting:** n/a	**Population:** Simulated hospital inpatients. **Cohort settings:** n/a **Intervention 1:** Usual hospital care. **Intervention 2:** Rapid response and early supported discharge scheme. Scheme ran by a single consultant-led multidisciplinary team, seven days a week within patients own home. Scheme targets patients identified in acute inpatient wards, often recovering from an operation.	**Total cumulative costs over five years:** Incremental (2−1): £4m (95% CI: NR; p=NR) **Cost of patient spell in fifth year of the scheme:** Intervention 1: £618 Intervention 2: £502 Incremental (2−1): -£116 (95% CI: NR; p=NR) **Currency & cost year:** UK pounds; year NR **Cost components incorporated:** Setup, fixed, semi-fixed and variable costs.	**N/A**	Results show the scheme will not break even over five years. However, in the fifth year, uptake of the service is high enough to see it be cost saving. **Analysis of uncertainty:** Estimated that a similar scheme would need to cost around £350 per patient intervention to be cost saving compared to treating patients in the acute setting.
Data sources				
Health outcomes: NA **Quality-of-life weights:** NA **Cost sources:** Bottom-up costs reviewed through data requests to providers running similar schemes and used to build costs models identifying the workforce, variable and setup costs of schemes. Identified key factors that influence cost structure of schemes and then test with other providers and clinicians. Acute pathway costs from a combination of patient-level information and costing systems, cost data and ward staffing model.				
Comments				
Source of funding: NHS England **Applicability and limitations:** Not enough detail around methodology and modelled cohort. Costs not explicitly reported as per patient value. Cost year not reported for comparison. Full breakdown of cost inputs and outputs not reported.				
Overall applicability[(b)]: Partially applicable **Overall quality[(c)]:** Potentially serious limitations				

Abbreviations: CC: Comparative costing analysis; 95% CI: 95% confidence interval; n/a: not applicable; NR: not reported;

(a) One year modelling with extrapolation for further 4 years.

(b) Directly applicable/Partially applicable/Not applicable.

(c) Minor limitations/Potentially serious limitations/Very serious limitations.

Appendix F: GRADE tables

Table 12: Clinical evidence profiles- Alternatives compared with hospital care

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Alternatives	Hospital care	Relative (95% CI)	Absolute		
Mortality - early discharge - Hospital at home led by primary care												
5	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[1]	None	17/309 (5.5%)	6.9%	RR 0.9 (0.47 to 1.71)	7 fewer per 1000 (from 37 fewer to 49 more)	⊕⊕OO LOW	CRITICAL
Length of stay (initial inpatient days) - early discharge - Hospital at home led by primary care												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[1]	None	121	101	-	MD 2.44 lower (3.34 to 1.54 lower)	⊕⊕⊕O MODERATE	CRITICAL
Admissions - early discharge - Hospital at home led by primary care												
6	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[1]	None	96/317 (30.3%)	36.7%	RR 0.92 (0.73 to 1.15)	29 fewer per 1000 (from 99 fewer to 55 more)	⊕⊕OO LOW	IMPORTANT
Presentations to ED - early discharge - Hospital at home led by primary care												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[1]	None	11/121 (9.1%)	20.8%	RR 0.44 (0.22 to 0.86)	116 fewer per 1000 (from 29 fewer to 162 fewer)	⊕⊕⊕O MODERATE	IMPORTANT
Quality of life (high score is good) - early discharge - HAH led by primary care (SGRQ; change score; reversed)												

2	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[1]	None	151	131	-	MD 3.49 higher (0.38 lower to 7.36 higher)	⊕⊕⊕O MODERATE	CRITICAL
Quality of life (higher values better QoL) - early discharge - HAH led by primary care (COOP chart; change score; reversed)												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[1]	None	38	37	-	SMD 0.17 higher (0.29 lower to 0.62 higher)	⊕⊕⊕O MODERATE	CRITICAL
Patient Satisfaction (continuous-higher values more satisfied) - early discharge - Hospital at home primary care												
2	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None	150	135	-	SMD 0.25 higher (0.01 to 0.48 higher)	⊕⊕⊕⊕ HIGH	CRITICAL
Patient satisfaction (dichotomous) - early discharge - Hospital at home led by Primary care												
1	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	None	25/27 (92.6%)	88.9%	RR 1.04 (0.88 to 1.24)	36 more per 1000 (from 107 fewer to 213 more)	⊕⊕⊕O MODERATE	CRITICAL
Carer satisfaction (dichotomous) - early discharge - Hospital at home led by primary care												
1	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	None	18/20 (90%)	92.9%	RR 0.97 (0.79 to 1.19)	28 fewer per 1000 (from 195 fewer to 177 more)	⊕⊕⊕O MODERATE	CRITICAL
Quality of life (high score is good) - early discharge - HAH led by primary care (EQ-5D; change score)												
1	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[1]	None	54	47	-	MD 0.04 higher (0.07 lower to 0.16 higher)	⊕⊕OO LOW	CRITICAL
Mortality - early discharge - Hospital at home led by secondary care												
1	randomised trials	very serious[2]	no serious inconsistency	no serious indirectness	very serious[1]	None	2/13 (15.4%)	11.1%	RR 1.38 (0.22 to 8.59)	42more per 1000 (from 87 fewer to 842 more)	⊕OOO VERY LOW	CRITICAL

Re-Admissions early discharge- Hospital at home led by secondary care												
1	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	very serious[1]	None	1/42	12.7%	RR 0.50 (0.05 to 5.31)	64 fewer per 1000 (121 fewer to 547 more)	⊕OOO VERY LOW	IMPORTANT
Mortality - early discharge - Hospital at home led by both primary and secondary care												
4	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	very serious[1]	None	56/476 (11.8%)	14%	RR 1.02 (0.72 to 1.44)	3 more per 1000 (from 39 fewer to 62 more)	⊕OOO VERY LOW	CRITICAL
Readmissions (30 days) - early discharge - Hospital at home led by both primary and secondary care												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[1]	None	30/143 (21%)	12.7%	RR 1.66 (0.97 to 2.83)	84 more per 1000 (from 4 fewer to 232 more)	⊕⊕⊕O MODERATE	IMPORTANT
Admissions - early discharge - Hospital at home led by both primary and secondary care												
5	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	None	99/448 (22.1%)	20%	RR 0.94 (0.74 to 1.2)	12 fewer per 1000 (from 52 fewer to 40 more)	⊕⊕⊕O MODERATE	IMPORTANT
Length of stay (days in treatment) - early discharge - Hospital at led by primary and secondary care (Better indicated by lower values)												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[1]	None	143	142	-	MD 3.1 higher (1.81 to 4.39 higher)	⊕⊕⊕O MODERATE	CRITICAL
Carer satisfaction (dichotomous) - early discharge - Hospital at home led by both primary and secondary care												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[1]	None	46/69 (66.7%)	41.4%	RR 1.61 (1.14 to 2.28)	253 more per 1000 (from 58 more to 530 more)	⊕⊕⊕O MODERATE	CRITICAL
Patient Satisfaction (continuous-higher values more satisfied) - early discharge - Hospital at home led by primary and secondary care												

1	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	None	140	141	-	SMD 0.25 higher (0.01 to 0.48 higher)	⊕⊕⊕O MODERATE	CRITICAL
Quality of life (high score is good) - early discharge - HAH led by primary and secondary care (final score; SF-36; physical)												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None	121	120	-	MD 0.4 higher (2.2 lower to 3 higher)	⊕⊕⊕⊕ HIGH	CRITICAL
Patient satisfaction (dichotomous) - early discharge - Hospital at home led by both primary and secondary care												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[1]	None	93/112 (83%)	72.5%	RR 1.15 (1 to 1.32)	109 more per 1000 (from 0 more to 232 more)	⊕⊕⊕O MODERATE	CRITICAL
Quality of life (high score is good) - early discharge - HAH led by primary and secondary care (final score; SF-36; mental)												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None	121	120	-	MD 1.3 higher (1.55 lower to 4.15 higher)	⊕⊕⊕⊕ HIGH	CRITICAL
Mortality - early discharge - Step up/down care												
3	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[1]	None	124/542 (22.9%)	21.5%	RR 0.88 (0.71 to 1.1)	26 fewer per 1000 (from 62 more to 22 more)	⊕⊕OO LOW	CRITICAL
Length of stay (initial inpatient days) - early discharge - Step up/down care (Better indicated by lower values)												
2	randomised trials	serious risk of bias[2]	very serious[3]	no serious indirectness	serious[1]	None	258	260	-	MD 3.59 higher (1.23 to 5.95 higher)	⊕OOO VERY LOW	CRITICAL
Readmissions - early discharge - Step up/down care												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[1]	None	14/72 (19.4%)	35.7%	RR 0.54 (0.31 to 0.96)	164 fewer per 1000 (from 14 fewer to 246 fewer)	⊕⊕⊕O MODERATE	IMPORTANT
Mortality- early discharge- virtual wards												

1	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[1]	None	3/29 (10.3%)	14.3%	RR 0.72 (0.18 to 2.95)	40 fewer per 1000 (from 117 more to 279 more)	⊕⊕OO VERY LOW	CRITICAL
Quality of life -early discharge- virtual wards (EQ-5D summary index; change score)												
1	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	None	29	28	-	MD 0.00 higher (0.15 lower to 0.15 higher)	⊕⊕⊕O MODERATE	CRITICAL
Mortality - Admission avoidance - Hospital at home led by primary care												
2	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[1]	None	26/149 (17.4%)	30.9%	RR 0.82 (0.53 to 1.29)	56 fewer per 1000 (from 145 fewer to 90 more)	⊕⊕⊕O MODERATE	CRITICAL
Admissions(>30 days) - Admission avoidance - Hospital at home led by primary care												
2	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[1]	None	23/125 (18.4%)	10.3%	RR 1.29 (0.73 to 2.29)	30 more per 1000 (from 28 fewer to 133 more)	⊕⊕OO LOW	IMPORTANT
Adverse events - Admission avoidance - Hospital at home led by primary care												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[1]	None	10/24 (41.7%)	32%	RR 1.3 (0.62 to 2.73)	96 more per 1000 (from 122 fewer to 554 more)	⊕⊕OO LOW	CRITICAL
Days to discharge (hazard ratio) - Admission avoidance - Hospital at Home Primary Care (Hazard Ratio)												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[1]	None	0/98 (0%)	0%	HR 0.95 (0.71 to 1.27)	-	⊕⊕OO LOW	IMPORTANT
Patient satisfaction (dichotomous) - Admission avoidance - Hospital at home led by Primary care												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None	87/91 (95.6%)	98.9%	RR 0.97 (0.92 to 1.02)	30 fewer per 1000 (from 79 fewer to 20 more)	⊕⊕⊕⊕ HIGH	CRITICAL

Readmissions (< 30 days) - Admission avoidance - Hospital at home led by primary care												
2	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None	15/145	10.3%	RR 4.68 (1.53 to 14.31)	114 more per 1000 (from 16 more to 413 more)	⊕⊕⊕⊕ HIGH	IMPORTANT
Quality of life (high score is good) - Admission avoidance - HAH led by primary care (final score; SF-12; mental)												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[1]	None	24	25	-	MD 0.6 lower (5.46 lower to 4.26 higher)	⊕⊕OO LOW	CRITICAL
Quality of life (high score is good) - Admission avoidance - HAH led by primary care (final score; SF-12; physical)												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[1]	None	24	25	-	MD 3.6 lower (8.78 lower to 1.58 higher)	⊕⊕⊕O MODERATE	CRITICAL
Mortality - Admission avoidance - Hospital at home led by secondary care												
4	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[1]	None	21/163 (12.9%)	15%	RR 0.8 (0.47 to 1.35)	30 fewer per 1000 (from 80 fewer to 53 more)	⊕⊕OO LOW	CRITICAL
Admissions(>30 days) - Admission avoidance - Hospital at home led by secondary care												
3	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[1]	None	40/126 (31.7%)	50%	RR 0.56 (0.42 to 0.75)	220 fewer per 1000 (from 125 fewer to 290 fewer)	⊕⊕OO LOW	IMPORTANT
Length of stay (days in treatment) - Admission avoidance - Hospital at home led by secondary care (Better indicated by lower values)												
2	randomised trials	serious[2]	serious[4]	no serious indirectness	no serious imprecision	None	85	87	-	MD 4.69 higher (2.86 to 6.52 higher)	⊕⊕OO LOW	IMPORTANT
Quality of life (high score is good) - Admission avoidance - HAH led by secondary care (change score; SF-36; mental)												
1	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[1]	None	37	34	-	MD 1.2 higher (1.46 lower to 3.86 higher)	⊕⊕OO LOW	CRITICAL

Patient satisfaction (dichotomous) - Admission avoidance - Hospital at home led by secondary care											
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None	49/52 (94.2%)	88.5%	RR 1.07 (0.95 to 1.2)	62 more per 1000 (from 44 fewer to 177 more)	⊕⊕⊕⊕ HIGH	CRITICAL
Quality of life (high score is good) - Admission avoidance - HAH led by secondary care (NHP, change score; reversed)											
2	randomised trials	no serious risk of bias	serious[5]	no serious indirectness	no serious imprecision	None	100	105	-	MD 1.13 higher (0.29 to 1.97 higher)	⊕⊕⊕O MODERATE	CRITICAL
Quality of life (high score is good) - Admission avoidance - HAH led by secondary care (change score; SF-36; physical)											
1	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[1]	None	37	34	-	MD 1.4 higher (2.38 lower to 5.18 higher)	⊕⊕OO LOW	CRITICAL
Adverse events - Admission avoidance - Hospital at home led by both primary and secondary care											
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[1]	None	6/51 (11.8%)	16.3%	RR 0.72 (0.27 to 1.93)	46 fewer per 1000 (from 119 fewer to 152 more)	⊕⊕OO LOW	CRITICAL
Admissions(>30 days) - Admission avoidance - Hospital at home led by both primary and secondary care											
2	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[1]	None	44/151 (29.1%)	22.1%	RR 1.14 (0.74 to 1.74)	31 more per 1000 (from 57 fewer to 164 more)	⊕⊕OO LOW	IMPORTANT
Mortality - Admission avoidance - Hospital at home led by both primary and secondary care											
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[1]	None	9/100 (9%)	8%	RR 1.12 (0.36 to 3.47)	10 more per 1000 (from 51 fewer to 198 more)	⊕⊕OO LOW	CRITICAL
Patient Satisfaction (continuous-higher score is good) - Admission avoidance - Hospital at home led by primary and secondary care (reversed scale)											
1	randomised	no serious	no serious	no serious	very serious[1]	None	40	20	-	SMD 1.98 higher	⊕⊕OO	CRITICAL

	trials	risk of bias	inconsistency	indirectness						(1.33 to 2.64 higher)	LOW	
Carer satisfaction (continuous) - Admission avoidance - Hospital at home led by primary and secondary care												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None	28	13	-	SMD 1.55 higher (0.8 to 2.29 higher)	⊕⊕⊕⊕ HIGH	CRITICAL
Quality of life (high score is good) - Admission avoidance - HAH led by primary and secondary care (SGRQ; change score; reversed)												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[1]	None	34	16	-	MD 2.83 lower (11.75 lower to 6.09 higher)	⊕⊕⊕O MODERATE	CRITICAL
Length of stay (initial inpatient days) - Admission avoidance - Step up/down care (Better indicated by lower values)												
1	randomised trials	serious[2]	no serious inconsistency	no serious indirectness	serious[1]	None	78	77	-	MD 4.1 lower (8.58 lower to 0.38 higher)	⊕⊕OO LOW	IMPORTANT
Mortality - Admission avoidance - Step up/down care												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[1]	None	8/78 (10.3%)	20.8%	RR 0.49 (0.22 to 1.09)	106 fewer per 1000 (from 162 fewer to 19 more)	⊕⊕⊕O MODERATE	CRITICAL
Mortality - Admission avoidance - Virtual wards												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[1]	None	40/958 (4.2%)	4.9%	RR 0.85 (0.56 to 1.28)	7 fewer per 1000 (from 22 fewer to 14 more)	⊕⊕OO LOW	CRITICAL
Readmissions (30 days) - Admission avoidance - Virtual wards												
1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None	182/961 (18.9%)	21.3%	RR 0.89 (0.74 to 1.06)	23 fewer per 1000 (from 55 fewer to 13 more)	⊕⊕⊕⊕ HIGH	IMPORTANT
Presentations to ED - Admission avoidance - Virtual wards												

1	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	None	270/961 (28.1%)	29.6%	RR 0.95 (0.82 to 1.09)	15 fewer per 1000 (from 53 fewer to 27 more)	⊕⊕⊕⊕ HIGH	IMPORTANT

[1] Downgraded by 1 increment if the confidence interval crossed 1 MID point, and downgraded by 2 increments if the confidence interval crossed 2 MID points.
[2] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias.
[3] Downgraded by 1 or 2 increments because heterogeneity, I^2=92%, unexplained by sub-group analysis.
[4] Downgraded by 1 or 2 increments because heterogeneity, I^2=88%, unexplained by sub-group analysis.
[5] Downgraded by 1 or 2 increments because heterogeneity, I^2=50%, unexplained by sub-group analysis.

Appendix G: Excluded clinical studies

Table 13: Studies excluded from the clinical review

Reference	Reason for exclusion
Abernethy 2013[2]	Data presented 'per patient' and not overall
Abou el senoun 2014 [3]	Incorrect population and intervention. Planned home versus hospital management for women with preterm pre-labour rupture of membranes
Adib-hajbaghery 2013 [4]	Incorrect intervention. Effect of post-discharge follow-up on re-admission of patients with heart failure
Adler 1978[5]	Not relevant: patients following elective surgery
Aimonino2000[9]	Conference abstract; later published as Ricauda 2004[240]
Aimonino 2001[8]	Patients not treated for acute medical emergency (advanced dementia patients)
Alder 1978[10]	Incorrect population- Patients following elective surgery (hernia and varicose veins)
Allen 1999[11]	Not RCT; description of a website
Anderson 2000A[12]	Included in community rehab review
Anderson 2002B[13]	Not RCT; Systematic review
Anderson 2002A[14]	No clinical outcomes; Costs only
Andrei 2011[15]	Abstract
Anonymous 1982B[1]	Not relevant comparison
Armstrong 2008B[17]	Not RCT; Retrospective single arm study
Askim 2009[18]	conference abstract
Aujesky 2011[19]	RCT but no community care (self- administered injections)
Avlund 2002[20]	Incorrect intervention. comprehensive geriatric assessment with follow-up by interdisciplinary geriatric team after discharge from hospital compared to existing discharge procedures
Bajwah 2015[22]	Not relevant intervention. Palliative care for patients with advanced fibrotic lung disease. Study to be considered for community palliative review
Bai 2013[21]	Not RCT; systematic review
Bakken 2012[24]	No RCT; not relevant
Balaban 2008[25]	Incorrect intervention. The study evaluated a discharge transfer intervention designed to improve communication between inpatient and outpatient care teams.
Barnes 2003[26]	Not RCT; review
Beech 2004[27]	Not RCT; service evaluation
Bernhaut 2002[28]	Not RCT, service evaluation
Bethell 1990[29]	Not substitute for usual care; control group received no intervention, only advice what exercises they could do by themselves
Beynon 2009[30]	Not RCT; literature review
Biese 2014[31]	Incorrect intervention-post-discharge telephone call follow-up by a nurse among older adults discharged home from the emergency department
Blackburn 2000[32]	Not RCT; not relevant; costs only

Reference	Reason for exclusion
Blair 2011[33]	Not RCT; systematic review
Board 2000[34]	Not relevant; costs only
Booth 2004[35]	Not relevant; patients following bypass surgery
Boston 2001[36]	Not RCT; prospective non-randomised comparative study
Boter 2004 [37]	Incorrect intervention. Study to be considered in the community nursing review.
Bowman 1998[39]	Not RCT; review
Brooks 2002[40]	Not RCT; retrospective case study
Brooks 2003[41]	Not RCT; retrospective documentary analysis
Brunner 2008[42]	Not RCT; other experimental design
Bryan 2010[43]	Not RCT; literature review
Buus 2013[44]	Protocol only; no study data
Campbell 2001[45]	No clinical outcomes; costs only
Caplan 2006[48]	Included in community rehab review
Caplan 2012[49]	Not RCT; systematic review
Caplan 2004[50]	Comparison is not hospital-based care
Carroll 2005[51]	Not RCT; review
Cassel 2010[52]	Not RCT; review
Chan 2011[53]	Not RCT; Cochrane review, but NO included studies as none met the criteria
Chan 2013[54]	Not RCT; Cochrane review, but NO included studies as none met the criteria
Chappell 1993[55]	Not relevant; retrospective cost analysis
Chard 2006[56]	Not RCT; review
Chen 2012A[57]	Not relevant; costs associated with acquired brain injury
Chumbler 2015[58]	Not relevant intervention -multifaceted stroke tele-rehabilitation intervention on falls-related self-efficacy and satisfaction with care. Study to be considered in the community rehab review
Coast [59]	Not relevant; majority of patients with trauma and elective surgery
Cobelli 1996[60]	Not RCT; review
Coburn 1989[61]	Not RCT; quasi-experimental; cost
Cohen 1994[62]	Not RCT; review
Colprim 2012[64]	Not RCT; quasi-experimental study
Colprim 2014[63]	Not RCT; prospective cohort study
Conley 2016[65]	Systematic review- screened for relevant references
Cowie 2014[69]	Not RCT; economic analysis
Craig 2014[70]	Not RCT; review
Crawford-Faucher 2010[71]	Not RCT; systematic review - screened for relevant references
Crotty 2002[75]	RCT but not relevant as trauma patients only (hip fracture)
Crotty 2000[73]	Not RCT; audit of trauma patients
Crotty 2000A[72]	RCT but not relevant as trauma patients only (hip fracture)
Crotty 2003[74]	RCT but not relevant as trauma patients only
Cunliffe 2002[76]	Not RCT; qualitative study; abstract only
Dalal 2003[77]	Not RCT; non-randomised prospective study

Reference	Reason for exclusion
Daly 2013[78]	Intervention incorrect. Set in outpatient setting
Deutsch 2006[81]	Not RCT; retrospective study
Dey[82]	RCT; but unpublished data only. We have no access to paper and information in Cochrane review (Hospital at home early discharge) is insufficient to categorise the intervention
Dias 2013 [84]	RCT but not relevant (does not compare to inpatient rehabilitation)
Dickson 1999[85]	Letter to the editor
DiMartino [86] 2014	Not RCT; systematic review- screened for relevant references
Dolansky 2010[87]	Not RCT
Dombi 2009[88]	Not RCT; commentary on costs
Donaldson 1982[90]	Not RCT; retrospective study
Donath 2001[91]	Not RCT; Commentary
Donlevy 1996A[92]	Not relevant; article is on cross-training to provide care at home on discharge
Donnelly 2002[93]	Included in community rehab review
Dorney-Smith 2011[94]	Not RCT; case study of the cost of nurse-led hostels for the homeless
Dow 2004[95]	Not RCT; case study
Dow 2007[96]	Not RCT; qualitative study
Duffy 2010[97]	RCT but wrong comparison (control group not in hospital)
Dyar 2012[98]	Incorrect intervention. Only discussions of end of life
ECHEVARRIA2016[99]	Systematic review- checked for relevant references
Eldar 2000A[100]	Not RCT; review
Elder 2001[101]	Not RCT; literature review
Emme 2014[103]	RCT; but no relevant outcomes
Emme 2014A[104]	RCT; but no relevant outcomes
Eron 2004[105]	Not RCT; no data
Feltner 2014[106]	Not RCT; systematic review
Fenton 1984[107]	Incorrect intervention- cost- effectiveness of home and hospital psychiatric treatment
Franklin 2012[108]	Not relevant intervention- multifactorial cardiac rehabilitation programme for MI patients. Study to be considered for community rehab review
Gaspoz 1994[111]	Not RCT; prospective cohort study
Ghanem 2010[112]	Not relevant intervention -home based pulmonary rehab programme for COPD. Study to be considered in community rehab review
GJELSVIK2014[113]	Study already included in the community rehab evidence review
Gladman 1994[114]	Not relevant intervention -follow-up of a controlled trial of domiciliary stroke rehabilitation (DOMINO Study). Study to be considered for community rehab review
Glasby 2008[115]	Not RCT; qualitative study
Glick 1998[116]	Not relevant – observing outcome of aneurysmal subarachnoid haemorrhage
Gobbi 2004[117]	Not RCT; and not relevant
Gracey 1992[119]	Not RCT; case studies
Graham 2013[120]	Not RCT; description of organisation of rehabilitation services
Grande 2004[121]	RCT on bereavement. Not relevant.

Reference	Reason for exclusion
Graverholt 2014 [122]	Not RCT; review
Greer 2012[123]	Intervention incorrect and no outcomes that match protocol
Gregory 2010[124]	Not RCT; Cross-sectional study
Gregory 2009[125]	Not RCT; retrospective study
Griffiths 2000[128]	Not RCT; exploratory analyses
Griffiths 2005[131]	Not RCT; systematic review- screened for relevant references
Griffiths 2001[127]	RCT but not relevant comparison; both arms in-patient care (nurse led versus consultant managed)
Griffiths 2006A[126]	Not RCT; review
Griffiths 2006[130]	Not RCT; review
Griffiths 2000A[129]	RCT but not relevant comparison (in-patients only)
Gunnell 2000[132]	Not relevant; majority of patients with trauma and elective surgery
Hackett 2002[133]	Not relevant intervention -home based rehab for stroke patients. Study to be considered in community rehab review
Hamlet 2010[134]	Not RCT; uses secondary data. Focus is telemedicine
Hannan 2003[135]	Not RCT
Hansen 1992[136]	Incorrect intervention. The study evaluated a model for follow-up by home visits after discharge from hospital of persons aged 75 years or more.
Hardy 2001[137]	Not RCT; description of a service; and mainly trauma patients
Hansen 1992[136]	Cochrane excluded list: Hospital at home early discharge (study did not evaluate hospital at home, but a model for follow-up visits at home after discharge from hospital)
Hauser 1991[139]	Not RCT; retrospective study
Herr 2012[143]	Not RCT; retrospective study
Heseltine 2001[144]	Not RCT; review on cost
Hernandez 2015[142]	Not relevant intervention -community-based integrated care in frail COPD patients. Study included in the Integrated care review
Hill 1978[146]	RCT but not relevant to today's approach of managing MI as thrombolytic therapy made admission necessary (Cochrane)
Hill 2013[145]	Incorrect intervention. The study aimed to evaluate the effect of providing tailored falls prevention education for older patients in hospital
Hofstad 2014[147]	Not relevant intervention. Study included in early supported discharge review
Hudson 2013[148]	Incorrect intervention; preparation of caregivers for home palliative acre with education and discussion
Hudson 2013[149]	Incorrect intervention; preparation of caregivers for home palliative acre with education and discussion
Hughes 1990[150]	RCT but has wrong comparison (not in hospital)
Hunger 2015[151]	Not relevant intervention- nurse based case management for aged myocardial infarction patients. Study to be considered in the nurse led review.
Huo 2014[152]	Not RCT; retrospective study. No outcomes of interest
Hwang 2013[153]	Not RCT; observational study. Large sample, but set in Taiwan
Indredavik 1999[155]	Included in community rehab review
Indredavik 2008[156]	RCT but no relevant outcomes
Jackson 2012[157]	Not relevant intervention -in-home, tele-rehabilitation programme for

Reference	Reason for exclusion
	intensive care unit survivors. Study to be considered in community rehab review
Jakobsen 2013[158]	Methodology of RCT only
Jolly 2005[161]	RCT but study aborted prematurely due to language barriers with participants. No data
Jones 1999[162]	Costs only
Jones 2014[163]	Not RCT; case study with little data
Kenny 2002[166]	Not RCT and not relevant
Kinley 2014[167]	Not RCT; retrospective observational study
Konrad 2012[168]	Not RCT; retrospective study
Koopman1996[169]	RCT but excluded as home care was self-administered
Kornowski 1995[170]	Not RCT; observational study
Kortke 2006[171]	Not RCT; open clinical study (non-randomised)
Korzeniowska-Kubacka 2014[172]	Not RCT; prospective observational study
Langhorne 2000[174]	Cochrane systematic review withdrawn from publication and superseded by Shepperd 2008[271]
Langhorne 2005[175]	Not RCT; review
Lappegard 2012[176]	Not RCT; retrospective study
Last 2000[177]	Not RCT, service description
Langhorne 2000[174]	Paper withdrawn from publication
Leon 2011[179]	RCT, but patient group and outcomes not relevant (stable HIV patients)
Leppert 2014[180]	Not RCT
Latour 2006[178]	Not relevant intervention. Study evaluated the impact of post-discharge, nurse-led, home-based case management intervention. Study to be considered in community nurse review
Lewis 2007[182]	Not RCT; commentary
Lewis 2011[183]	Not RCT; research protocol only
Lewis 2012[185]	Not RCT; commentary/conceptual paper
Lewis 2013[184]	Not RCT; case studies without data
Lewis 2013[186]	Not RCT; propensity matched controls study based on observational study data
Lim 2003[187]	RCT but not relevant comparison
Linertova 2011[188]	Not RCT; Systematic review- screened for relevant references
Leung 2015[181]	Incorrect study design- quasi experimental study (RCT evidence available)
Liu 2014[189]	Not relevant intervention-home-based pulmonary rehabilitation for patients with chronic obstructive pulmonary disease. Study to be considered for community rehab review.
Martin 1994[190]	Wrong comparison
Mason 2003[191]	Not RCT; description of a service
Mather 1976[192]	No description of the type of service patients at home received (excluded by Cochrane too)
Matukaitis 2005[193]	Not RCT. Pilot study and no comparison study
Mayhew 2006[194]	Not RCT; health economics only
Mayo 1998[195]	Conference abstract of study protocol only; duplicate of full paper Mayo 2000[196]
McKegney 1981[197]	No outcomes of interest

Reference	Reason for exclusion
McNamee 1998[198]	Health economic evaluation
McWhinney 1994[199]	No outcome data reported. Authors describe the challenges of conducting a trail in this area
Melin 1992[200]	Not relevant: patients with long-term care needs were recruited. Hospital at Home was substitute for long-term care and not necessarily in-hospital
Melin 1993[201]	Cost evaluation
Meyer 2009[203]	Not RCT; case studies
Muijen 1992[205]	RCT but patients treated for acute, severe mental illness (psychiatric ward versus home); not relevant to AME guideline
Murphy 2005[206]	Not relevant intervention -home exercise programme immediately after hospitalisation for an exacerbation of COPD. Study to be considered in the community rehab review.
Mussi 2013[207]	Not relevant intervention-educative nursing intervention composed of home visits and phone calls. Study to be considered for inclusion in community nursing review
Nicholson 2001[215]	Health economics only
Nissen 2007[217]	Not in English (Danish)
Nordly 2014[218]	Protocol only; no study data
Nyatanga2014[219]	Not RCT; commentary/conceptual paper
Palmer Hill 2000[224]	Not relevant: patients recovering from knee replacement
Pandian2013[226]	Trial register only; no data
Pandian 2014[227]	Conference abstract
Patel 2004[228]	Health economic evaluation
Penque 1999[230]	Not RCT; retrospective study
Pittiglio 2011[231]	Not RCT; not relevant
Plochg 2005[232]	Not RCT; process evaluation
Pozzilli 2002[233]	RCT BUT not relevant (Multiple Sclerosis patients)
Prior2012 [234]	Not RCT
Puig-Junoy 2007[235]	Health economic evaluation
Qaddoura 2015[236]	Systematic review. Checked and ordered relevant references
Ram 2009[237]	Cochrane review- all 7 studies in the review have been included in our evidence review.
Raphael 2015[238]	Incorrect study design. Observational study (RCT evidence available)
Richards 1998 [244]	Not relevant; majority of patients with trauma and elective surgery
Richards 1998A[243]	Not relevant; correction to excluded trial with majority of patients with trauma and elective surgery
Richardson 2001 [245]	Health economic evaluation
Robinson 2009[246]	Not RCT; description of new model of acute care
Rodriguez-Cerrillo 2010[248]	Not RCT; Non-randomised prospective study
Rodriguez-Cerrillo 2012A[247]	Not RCT; no comparison group to home treatment
Round 2004[250]	Not RCT; prospective cohort study
Rosbotham-Williams 2002[249]	Not RCT; review
Rout 2011[251]	Not RCT; review
Rowley 1984[252]	Not RCT. No comparison group
Ruckley 1978[253]	Not relevant: patients following elective surgery

Reference	Reason for exclusion
Rudkin 1997[254]	No service provided in community
Santana 2016[255]	Study considered for inclusion in the community rehab review
Sartain 2002[256]	Paediatric patient population
Saysell 2004[257]	Not RCT; pilot study of intermediate palliative care in care home
Schachter 2014[258]	Not RCT; study protocol only
Scheinberg 1986[259]	RCT but does not state what the control group intervention is
Schneller 2012[260]	Not RCT; case study
Schraibman 2001[262]	Incorrect intervention. Home versus in-patient treatment for deep vein thrombosis
Schou 2014[261]	RCT; but no relevant outcomes
Scott 2010[263]	Not RCT; literature review
Senaratne 1999[264]	Cost evaluation
Shepperd 2005[270]	Cochrane review updated in 2008 (Shepperd 2008 which is included in our evidence review)
Shepperd2016 [274]	Cochrane review- relevant references ordered
Subirana Serrate 2001[283]	Not RCT; health economics evaluation
Shepperd 1998[269]	Not RCT; systematic review
Shepperd 2005A[266]	Not RCT; editorial
Shepperd 2009A[272]	Not RCT; systematic review- screened for relevant references
Shepperd 1998A[267]	Costs only; no clinical outcomes
Sidebottom 2015[275]	In-patient care only considered. No alternative.
Sinclair 2005[276]	Not relevant intervention - home-based nurse intervention after suspected myocardial infarction. Study to be considered for community nursing review
Stephenson 1984[278]	Not RCT; conceptual paper
Steventon 2012[279]	Not RCT; retrospective analysis
Stewart 1999[280]	RCT but control group not in hospital.
Stromberg 2003[282]	RCT but only nurse-led follow up appointments in hospital. No actual community care given
Suijker 2012[284]	Protocol only; incorrect intervention
Suwanwela 2002[285]	RCT but not comparable to UK setting as home treatment was managed by Red Cross Volunteers and family members (Thailand)
Teng 2003[287]	Health economic evaluation
Tibaldi 2004[295]	RCT but no relevant outcomes (carer stress data incomplete)
Tistad 2015[297]	Non-RCT; observational
Thomas 1999[290]	conference abstract
Thorne 2001[291]	Not RCT; service description
Trappes-Lomax 2006[298]	RCT but comparison group not appropriate; did not receive 'usual' hospital care.
Upton 2014[299]	No RCT; not relevant
Utens 2010[301]	Study protocol of RCT only
Walshe 2010 [308]	Not RCT; review of qualitative papers
Wakefield 2008[307]	RCT but all self-care; wrong comparison
Widen Holmqvist 1996[310]	Health economic evaluation
Widen Holmqvist 1995[309]	Not RCT; observational study

Reference	Reason for exclusion
Widen-Holmqvist 1998[311]	Superseded by Thorsen 2005[293], 2006[294] and Von Koch 2000[306],2001[305]
Winkel 2008[315]	Not RCT; systematic review- screened for relevant references
Wolfe 2000[316]	RCT but excluded from Cochrane because intervention does not substitute for inpatient care; not valid comparison
Woodend 2008[317]	RCT but wrong control group; both at home with no actual care provided.
Woodhams 2012[318]	Not RCT; literature review
Young 2003B[320]	Not RCT; audit
Young 2005B[321]	Not RCT; quasi-experimental study
Young 2010B[319]	RCT but not relevant outcomes
Young 2010[323]	Incorrect intervention; not palliative
Ytterberg 2009[324]	conference abstract

Appendix H: Excluded economic studies

Table 14: Studies excluded from the economic review

Reference	Reason for exclusion
Step-up/step-down	
Armstrong 2008[17]	This study was selectively excluded as it was a partial economic evaluation only looking at costs, based on non-randomised, non-UK evidence. Given that RCTs and UK evidence were included in the review it was felt more applicable evidence was available to inform the review.
Kameshwar 2016[165]	This study was selectively excluded as it was a partial economic evaluation only looking at costs, based on non-randomised non-UK evidence. Given that RCTs and UK evidence were included in the review it was felt more applicable evidence was available to inform the review.
O'Reilly 2006[221]	This study was assessed as partially applicable with minor limitations. However, given that a more applicable UK analysis by O'Reilly 2008[220] was available, this study was selectively excluded.
Palmieri2013[225]	This study was selectively excluded as it was a partial economic evaluation only looking at costs, based on non-randomised non-UK evidence. Given that RCTs and UK evidence were included in the review it was felt more applicable evidence was available to inform the review.
Raphael 2005[239]	This study was assessed as partially applicable with very serious limitations. The study was a partial economic evaluation only looking at costs, based on non-randomised, observation evidence of a very small cohort of patients.
Virtual wards	
Lewis 2013[186]	This study was assessed as partially applicable with serious limitations. The study is a case-control comparative costing study. QALYs were not used as an outcome and the follow-up was very short (6 months) and does not capture all the difference in costs. The intervention as defined by the study protocol was virtual wards, however, the authors report that after the initial pilot, the service delivered was actually case management rather than virtual wards, so it was difficult to ascertain the nature of the intervention. The comparator used for the controls was not clearly specified.