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The clinical effectiveness and cost-effectiveness of home-based, nurse-led health promotion for older people: a systematic review

P Tappenden, F Campbell, A Rawdin, R Wong and N Kalita

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The clinical effectiveness and cost-effectiveness of home-based, nurse-led health promotion for older people: a systematic review

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Abstract

The clinical effectiveness and cost-effectiveness of home-based, nurse-led health promotion for older people: a systematic review

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Background: In older age, reduction in physical function can lead to loss of independence, the need for hospital and long-term nursing or residential home care, and premature death. Home-visiting programmes for older people, carried out by nurses and other health-care professionals (e.g. occupational therapists and physiotherapists), aim to positively affect health and functional status, and may promote independent functioning of older people.
Objective: The main research question addressed by this assessment is 'What is the clinical effectiveness and cost-effectiveness of home-based, nurse-led health promotion intervention for older people in the UK?'
Data sources: A comprehensive literature search was undertaken across 12 different databases and research registries from the year 2001 onwards (including MEDLINE, MEDLINE in Process & Other Non-Indexed Citations, EMBASE, Science Citation Index Expanded, Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, NHS Health Economic Evaluation Database, Health Technology Assessment Database, Database of Abstracts of Reviews of Effects, Cumulative Index to Nursing and Allied Health Literature). Published systematic reviews were also hand searched to identify other trials previously published.
Review methods: Potentially relevant studies were sifted by one reviewer, and inclusion decisions were agreed among the broader research team. The methodological quality of included studies was assessed using the Cochrane Risk of Bias tool. The results of included studies were synthesised using narrative and statistical methods. A separate systematic search was undertaken to identify existing health economic analyses of home-based, nurse-led health promotion programmes. Included studies were critically appraised using a published checklist. Owing to resource constraints, a de novo health economic model was not developed.
Results: Eleven studies were included in the systematic review of clinical effectiveness. There was considerable heterogeneity among the studies with respect to the nature of the intervention, the nurses delivering the programmes and the populations in which the interventions were assessed. Overall, the quality of the included studies was good: all but one of the included studies were judged to be at medium or low risk of bias. Meta-analysis of eight studies suggested a statistically significant mortality benefit for the home-based health promotion groups, whereas a meta-analysis of four studies suggested non-significant benefits in terms of fewer falls in the intervention groups than in the control groups. Positive outcomes for home-based, nurse-led health promotion interventions were also reported within individual studies across several other outcomes. Only three economic studies met the criteria for inclusion in the review of cost-effectiveness. This evidence base

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consists of one non-randomised cost minimisation analysis and two economic evaluations undertaken alongside randomised controlled trials. Two of these studies involved an intervention targeted specifically at patients with a known underlying incurable disease, whereas the third study examined the clinical effectiveness and cost-effectiveness of early discharge in patients with a range of conditions, including fractures, neurological conditions and cardiorespiratory conditions. Each study indicated some likelihood that home-based, nurse-led health promotion may offer cost savings to the NHS and associated sectors, such as social services. However, one study did not report any comparison of health outcomes and instead simply assumed equivalence between the intervention and comparator groups, whereas the other two studies suggested at best a negligible incremental benefit in terms of preference-based health-related quality-of-life measures.

Limitations: The evidence base for clinical effectiveness is subject to considerable heterogeneity. The UK economic evidence base is limited to three studies.

Conclusions: On the basis of the evidence included in this systematic review, home-based, nurse-led health promotion may offer clinical benefits across a number of important health dimensions. However, it is generally unclear from the available studies which components of this type of complex intervention contribute towards individual aspects of benefit for older people. Given the limitations of the current evidence base, it remains unclear whether or not home-based health promotion interventions offer good value for money for the NHS and associated sectors. Given the considerable uncertainties in the available evidence base, it is difficult to isolate the key areas in which future research would be valuable or the exact study design required. Although this report does not identify specific studies that should be undertaken, it does set out a number of key considerations for the design of future research in this area.

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Contents

Glossary vii

List of abbreviations ix

Executive summary xi

1. Background 1
Description of the health problem 1
Current service provision 1
Description of the intervention under assessment 2

2. Description of decision problem 3
Research question 3
Aims and objectives of this assessment 3

3. Assessment of clinical effectiveness 5
Introduction 5
Methods for reviewing clinical effectiveness 5
Results 7
Assessment of clinical effectiveness 14
Statement of principal findings 18

4. Assessment of cost-effectiveness 21
Introduction 21
Methods for reviewing cost-effectiveness 21
Identification of studies 21
Critical appraisal methods 22
Results of the cost-effectiveness review 22
Critical assessment of included studies 23
Statement of principal findings 30
Conclusions of the health economic review 32

5. Discussion 33
Statement of principal findings 33
Recommendations for future research 34

6. Other factors relevant to the NHS 39
The appropriate level of nurse training 39
Composition and frequency of home-based nursing visits 39
Targeting of population groups who have the capacity to benefit 39

Acknowledgements 41

References 43

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Appendix 1 Search strategies 49

Appendix 2 Excluded papers 57

Appendix 3 Protocol 59

Health Technology Assessment programme 67

Glossary

Technical terms and abbreviations are used throughout this report. The meaning is usually clear from the context, but a glossary is provided for the non-specialist reader.

Barthel Index A tool to measure an individual's level of daily functioning, specifically relating to the activities of daily living and mobility. The instrument includes 10 items, such as feeding, bathing, mobility, dressing and toilet use. Total scores are calculated as the simple sum of scores across all dimensions. Using the modified index, scores range from 0 to 20, with lower scores indicating lower functioning.

Beck Depression Inventory An instrument used to measure patient depression. The inventory consists of 21 items associated with psychological and physical symptoms of depression, such as sadness, agitation, concentration, loss of pleasure, self-dislike, tiredness and fatigue, and changes in appetite. Total scores range from 0 to 63, with higher total scores indicating more severe depressive symptoms.

Caregiver Strain Index An instrument used to measure perceptions of strain in carers. The instrument consists of 13 questions across domains including employment, financial, physical, social and time. Total scores range from 0 to 13, with higher scores indicating a greater level of stress.

European Quality of Life-5 Dimensions (EQ-5D) A five-dimension preference-based health status measure used to estimate health utility. A score of 1 represents a notional state of 'perfect health', whereas a score of 0 represents a notional state of 'death'. Scores < 0 (as low as –0.594) represent states worse than death.

General Health Questionnaire (GHQ) An instrument for identifying psychiatric illness specifically in general practice. The questionnaire covers recent physical and psychiatric symptoms experienced by patients. The original version of this measure included 60 items, but modified versions include fewer items. Each item includes four possible outcomes. Total scores depend on whether the adopted scoring method is bimodal (0–0–1–1) or adopts a Likert-type scoring scale (1–2–3–4). Higher scores indicate a greater severity of symptoms.

Health promotion The process of enabling people to increase control over, and to improve, their health.

I^2-statistic A measure of statistical heterogeneity between studies.

Meta-analysis A statistical method by which the results of a number of studies are pooled to give a combined summary statistic.

Nottingham Health Profile An instrument used to measure patient perceptions of general health, including emotional health, social isolation, pain, mobility, energy and sleep. The tool includes six main dimensions with subquestions for each. Scores range from 0 to 100 for each section, with higher scores indicating a worse level of general health.

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Short-form 36 (SF-36) questionnaire A general short-form questionnaire with 36 items consisting of eight scaled scores. These dimensions include vitality, physical functioning, bodily pain, general health perceptions, physical/emotional/social role functioning, and mental health. Each scale is transformed to a score from 0 to 100 and is given equal weight, with the total score also ranging from 0 to 100. Lower scores indicate a lower level of quality of life.

List of abbreviations

ACAS	Acute COPD Assessment Service
CI	confidence interval
CINAHL	Cumulative Index to Nursing and Allied Health Literature
COPD	chronic obstructive pulmonary disease
CRN	UK Clinical Research Network Portfolio Database
DARE	Database of Abstracts of Reviews of Effects
EDRS	Early Discharge and Rehabilitation Service
EQ-5D	European Quality of Life-5 Dimensions
GHQ	General Health Questionnaire
GP	general practitioner
HEED	Health Economic Evaluations Database
HRQoL	health-related quality of life
HTA	Health Technology Assessment
ICER	incremental cost-effectiveness ratio
ITT	intention to treat
LTFU	lost to follow-up
MIMS	*Monthly Index of Medical Specialities*
NHS EED	National Health Service Economic Evaluation Database
OR	odds ratio
PDQ-39	Parkinson's Disease Questionnaire
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PSS	Personal Social Services
QALY	quality-adjusted life-year
RCT	randomised controlled trial
SD	standard deviation
SF-36	Short Form questionnaire-36 items
US-NIH	United States-National Institutes of Health

All abbreviations that have been used in this report are listed here unless the abbreviation is well known (e.g. NHS), or it has been used only once, or it is a non-standard abbreviation used only in figures/tables/appendices, in which case the abbreviation is defined in the figure legend or in the notes at the end of the table.

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Executive summary

Background

In older age, reduction in physical function can lead to loss of independence, the need for hospital and long-term nursing or residential home care, and premature death. The importance of physical, functional, psychological and social factors in realising a healthy old age is recognised by older people, health-care professionals, policy advisors and decision-making organisations. The needs of older people are expected to be an increasingly important health issue as the number of older people increases. Home-visiting programmes for older people, carried out by nurses and other health-care professionals (e.g. occupational therapists and physiotherapists), aim to positively affect health and functional status, and may promote independent functioning of older people. Such programmes may also aim to reduce hospital and nursing home admissions. Systematic reviews of the benefits of home-based nursing interventions have previously been undertaken; however, these have not specifically considered the benefits of nurse-led health promotion, nor have they been focused on practice within the UK. Consequently, there remain outstanding questions concerning whether or not, and under which circumstances, and for whom, such programmes may confer health benefits, and whether or not this form of intervention may offer value for money for the NHS and associated sectors.

Objectives

The main research question addressed by this assessment is 'What is the clinical effectiveness and cost-effectiveness of nurse-led health promotion intervention delivered at home for older people at risk of admission to hospital, residential or nursing care in the UK?' The specific objectives of this assessment are to:

- evaluate the clinical effectiveness of home-based, nurse-led health promotion programmes in the UK
- review existing health economic evaluations of home-based, nurse-led health promotion programmes from the perspective of the NHS and Personal Social Services (PSS)
- explore, as far as existing evidence allows, those elements of this form of complex intervention that may contribute to its clinical effectiveness, and
- identify key gaps in current evidence and to identify areas in which future research may be warranted.

Methods

This report comprises two related systematic reviews: a review of clinical effectiveness studies and a systematic review of existing cost-effectiveness studies. The literature searches for the clinical and economic studies were undertaken between February and March 2011.

Clinical effectiveness review methods

The inclusion criteria for the review were as follows:

- *Population* Older people (> 75 years) at risk of admission to hospital, residential or nursing care.

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- *Interventions* Structured home-based, nurse-led health promotion.
- *Comparators* Standard care, including joint health and social assessment. Health promotion delivered in a different setting or not delivered by a nurse.
- *Setting* Interventions delivered in the home setting, undertaken in the UK.
- *Outcomes* Admission to hospital, residential or nursing care, mortality, morbidity including depression, falls, accidents, deteriorating health status, patient satisfaction.
- *Study design* Randomised controlled trials (RCTs).

A comprehensive literature search was undertaken across 12 different databases (for example MEDLINE, EMBASE, Science Citation Index Expanded, Database of Abstracts of Reviews of Effects, etc.) and research registries from the year 2001 onwards. Previously published systematic reviews of home-based visiting interventions were also hand-searched according to the inclusion criteria to identify other trials that were published before this cut-off date. Potentially relevant studies were sifted by one reviewer, and inclusion decisions were agreed amongst the broader research team. The methodological quality of included studies was assessed using the Cochrane Risk of Bias tool. The results of included studies were synthesised using both narrative and statistical methods.

Health economic review methods

A separate systematic search was undertaken to identify existing health economic analyses of home-based, nurse-led health promotion programmes. The inclusion criteria for the clinical review were also applied to the search results with two additions: (1) studies were included if they presented a comparative economic evaluation and presented results in terms of both costs and health outcomes; and (2) studies had to be undertaken from the perspective of the UK NHS and PSS. Included studies were sifted and appraised by two reviewers using a published checklist.

Owing to resource constraints for the review, a de novo health economic model was not developed as part of this study.

Results

Results of the clinical effectiveness review

Eleven studies were included in the systematic review of clinical effectiveness. There was considerable heterogeneity among studies with respect to the nature of the intervention, the nurses delivering the programmes and the populations in whom the interventions were assessed. Overall, the quality of the included studies was good: all but one of the included studies were judged to be at a medium or low risk of bias.

Meta-analysis of eight studies suggested a statistically significant mortality benefit for the home-based health promotion groups, whereas a meta-analysis of four studies suggested non-significant benefits in terms of fewer falls in the intervention groups than in the control groups. Positive outcomes for home-based, nurse-led health promotion interventions were also reported within individual studies: these outcomes included the Barthel Index (although this finding was not consistent across all studies), leg ulcer recurrence, the Nottingham Health Profile, the Caregiver Strain Index, the General Health Questionnaire and a global health question. Significant benefits were not demonstrated in terms of reduced admissions to hospital or numbers of subjects moving into residential care, Short Form questionnaire-36 items quality of life or the Beck Depression Inventory.

Results of the review of health economic evaluations

The available evidence for home-based, nurse-led health promotion included within the economic review was much narrower than that for the clinical effectiveness review. Only three economic studies met the inclusion criteria. This evidence base consists of one non-randomised cost minimisation analysis and two economic evaluations undertaken alongside RCTs. Two of these studies involved an intervention targeted specifically at patients with a known underlying incurable disease [one study of chronic obstructive pulmonary disease (COPD) and one study of Parkinson's disease], whereas the third study examined the clinical effectiveness and cost-effectiveness of early discharge in patients with a range of conditions including fracture, neurological conditions and cardiorespiratory conditions.

Each of the three studies indicated some likelihood that home-based, nurse-led health promotion may offer cost savings to the NHS and associated sectors such as social services. However, one study did not report any comparison of health outcomes and, instead, simply assumed equivalence between the intervention and comparator groups, whereas the other two studies suggested at best a negligible incremental benefit in terms of preference-based health-related quality-of-life measures. Within these last two studies, there appears to be a marked possibility that the intervention offers no discernible health benefits. Where assessed, the level of uncertainty surrounding health outcomes also suggests a possibility that the home-based, nurse-led interventions assessed may result in a lower aggregate level of health gain than standard care.

Discussion

Three previous systematic reviews have reported meta-analyses of available trial evidence. These were reviews of home- or community-based interventions to support older people. However, these reviews did not use the same inclusion criteria as those adopted here, as they were neither limited to nurse-led interventions nor specifically focused on the UK setting. Two of these reviews did not demonstrate a significant reduction in mortality. However, the results of the third study (Elkan *et al.* Effectiveness of home based support for older people: systematic review and meta-analysis. *BMJ* 2001;**323**:719–24B) are consistent with the findings of this review, as the authors also reported a significant reduction in mortality (odds ratio = 0.76, 95% confidence interval 0.64 to 0.97). Two of these reviews also reported statistically significant benefits for the intervention group in terms of reduced nursing home admission, risk of hospital admissions, falls and functional decline. One study indicated that the effect on functional decline depended on the number of home visits performed during follow-up. The positive effects seen in these reviews are mirrored in our clinical review, supporting the conclusion that home visits to older people can reduce mortality and appear to improve certain dimensions of health and well-being.

There is, however, a substantial gap in terms of the availability of economic studies to support the generally positive case arising from the clinical effectiveness review. Overall, there appears to be a dearth of good-quality economic studies available to inform decisions about the cost-effectiveness of home-based, nurse-led health promotion in older people in the UK. Where evidence is available, studies are subject to a number of methodological problems that cloud the conclusions arising from them. There remain substantial gaps in evidence concerning whether or not, and for whom, home-based health promotion programmes may be cost-effective.

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Conclusions

On the basis of the evidence included in this systematic review, home-based, nurse-led health promotion may offer clinical benefits across a number of important health dimensions. However, it is generally unclear from the available studies which components of this type of complex intervention contribute towards individual aspects of benefit for older people. Given the limitations of the current evidence base, it remains unclear whether or not home-based health promotion interventions offer good value for money for the NHS and associated sectors.

Future work recommendations

The prevalent gaps in knowledge surrounding the clinical effectiveness and cost-effectiveness of home-based nursing give rise to a number of potentially relevant policy questions. For instance, would it be more effective to target such a programme at all older people or to limit the intervention to specific disease groups? Would it be better to focus on prevention of disease events, for example COPD exacerbations or falls, or focus on the healthy population? Should the intervention be led solely by nurses or within multidisciplinary teams? Given these considerable uncertainties it is difficult to isolate the key areas in which future research would be valuable or the exact study design required.

Study registration

PROSPERO number: CRD42012002133.

Funding

Funding for this study was provided by the Health Technology Assessment programme of the National Institute for Health Research.

Chapter 1

Background

Description of the health problem

In old age, reduction in physical function can lead to loss of independence, the need for hospital and long-term nursing home care, and premature death. The importance of physical, functional, psychological and social factors in realising a healthy old age is recognised by older people,[1] health-care professionals,[2] policy advisors[3] and decision-makers.

As the number of older people increases, the needs of older people are expected to become an increasingly important health issue. It has been estimated that by the year 2025, around 20% of the population in industrial countries will be aged 65 years and over as a consequence of people living longer. Changing family structures and greater mobility in the working population mean that many more older people will be living alone, and social isolation and loneliness are likely to become increasingly widespread. It has been suggested that the number of older people with mental health problems will also grow; estimates suggest that, by the year 2021, more than 1 in every 15 people will be an older person experiencing a mental health problem.[4]

The objective of enabling older people to remain in their own homes has been a cornerstone of government policy for several decades. In recent years, considerable emphasis has been placed on health promotion and other preventative measures as a means of delaying the onset of illness and dependency that eventually lead older people to need long-term care.[5]

Home-based health promotion programmes for older people, carried out by nurses and other health-care professionals (such as occupational therapists and physiotherapists), have the potential to positively affect health and functional status, and may promote independent functioning of older people. Such programmes may also aim to reduce hospital and nursing/residential home admissions. A substantial number of studies have examined the effects of preventative home-visiting programmes on older people living in the community. Since 2000, 10 systematic reviews of the clinical effectiveness of home- or community-based programmes have been published.[6–15] However, these reviews have reported inconsistent and conflicting results. Subgroup analyses of the largest published meta-analysis suggested that effective home-visiting programmes include multidimensional assessment and numerous follow-up visits and were targeted at individuals who were at lower risk of death.[8] However, none of the existing reviews included an assessment of the cost-effectiveness of home-visiting programmes nor did they limit the analysis to the UK context. This assessment seeks to address these gaps and to explore what is known about the factors that may contribute to the effectiveness of this type of complex intervention.

Current service provision

Older people potentially have a great deal to gain from effective preventative programmes and from health promotion. Prevention services may lead to better health outcomes and a more efficient use of resources over the long term, with decreased demand on costly acute and social care services. However, there is evidence of an uneven uptake of health-promoting services such

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as immunisation and screening programmes in older people.[16] Furthermore, general practitioners (GPs) may be less likely to discuss lifestyle changes such as weight reduction, smoking, alcohol and safe drinking with older people than with younger people.[17]

Nurses may play an important role in promoting health and preventing ill health in older people, who may experience a range of health and social care problems. The NHS Improvement Plan[18] described a new clinical role for nurses. Known as community matrons, these experienced skilled nurses use case management techniques with patients who meet criteria denoting very high-intensity use of health care. With special intensive help, these patients are able to remain at home longer and to have more choice about their health care. Community nurses, including practice nurses, health visitors (public health nurses) and district nurses, are also well placed to promote health in older people. A recent survey of community nurses suggested that they recognise health promotion as part of their role but may be limited by a range of factors including organisational constraints, the absence of specific training, variable knowledge and the unplanned approach to this area of work, suggesting that nurses working in primary care may currently be ill equipped to enable older people to increase or maintain their levels of physical activity and function.[19]

Description of the intervention under assessment

The World Health Organization defines health promotion as 'the process of enabling people to increase control over, and to improve, their health. It moves beyond a focus on individual behaviour towards a wide range of social and environmental interventions' (www.who.int/topics/health_promotion/en/). Health promotion can take a variety of forms including provision of advice and education for improving health and avoiding ill health, the implementation of service improvements and policy agenda-setting. Hubley and Copeman[20] have put forward a framework for describing the range of activities that may be encompassed within health promotion programmes. This is comprised of three main types of activity: (1) health education, which involves communication directed at individuals, families and communities to influence; (2) service improvement, which involves quality and quantity of service; and (3) advocacy, which involves agenda-setting for healthy public policy.

Given the range of possible ways of implementing a home-based, nurse-led health promotion programme, the intervention under consideration within this assessment would be best described as a complex intervention, in that it that may comprise multiple, potentially interacting components. The focus within this assessment is principally on nurse-led health promotion activities undertaken within the subject's home. It should be noted, however, that within several of the studies included within this assessment, the home-based intervention did not consist solely of health promotion activities for the prevention of illness, but also extended to treatment and other care-related elements of nursing activity.

Chapter 2

Description of decision problem

Research question

The commissioning brief for the assessment sought to address the following questions:

1. Do home-based, nurse-led interventions work, and if so what do they prevent or promote?
2. If these interventions work effectively, what features of the intervention are crucial to their effectiveness and how much will the beneficial effects cost?

Aims and objectives of this assessment

The main research question addressed by this study is 'What is the clinical effectiveness and cost-effectiveness of nurse-led health promotion intervention delivered at home for older people at risk of admission to hospital, residential or nursing care in the UK?' The specific objectives of this assessment are to:

- evaluate the clinical effectiveness of home-based, nurse-led health promotion programmes in the UK
- review existing health economic evaluations of home-based, nurse-led health promotion programmes from the perspective of the NHS and Personal Social Services (PSS)
- explore, as far as existing evidence allows, those elements of this form of complex intervention that may contribute to its clinical effectiveness and
- identify key gaps in current evidence and to identify areas in which future research may be warranted.

The main facets of the decision problem addressed by the review are detailed below:

- *Intervention* Structured home-based, nurse-led health promotion.
- *Population* Older people > 75 years of age with long-term medical or social needs at risk of admission to hospital, residential or nursing care.
- *Setting* Interventions delivered at home, relating to a UK context.
- *Comparator* Standard care including joint health and social assessment. Health promotion delivered in a different setting or not delivered by a nurse.
- *Design* This assessment report includes two related systematic reviews: (1) a systematic review of clinical effectiveness studies (see *Chapter 3*) and (2) a systematic review of cost-effectiveness studies (see *Chapter 4*). A de novo cost-effectiveness model was not developed as part of this study.

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Chapter 3

Assessment of clinical effectiveness

Introduction

This chapter presents the methods and results of a systematic review of the clinical effectiveness of home-based, nurse-led health promotion programmes.

Methods for reviewing clinical effectiveness

Identification of studies

A comprehensive literature search was undertaken across 12 different databases and research registers between February and March 2011. Information on the provider and coverage dates of the sources are detailed in *Table 1*.

Where applicable, sensitive search filters were applied to identify three study designs: (1) randomised controlled trials (RCTs), (2) systematic reviews and (3) economic evaluations (*Table 2*; see also *Appendix 1*). MEDLINE and MEDLINE in Process & Other Non-Indexed Citations, EMBASE and the Web of Science were searched for all three study designs. Completed and unpublished studies were identified through searches in the Health Technology Assessment (HTA) database and two web-based research registers, including the UK Clinical Research Network (CRN) Portfolio Database and ClinicalTrials.gov. Searches for economic evaluations were supplemented by searching MEDLINE and EMBASE, HTA database, NHS Health Economic Evaluation Database (NHS EED), Database of Abstracts of Reviews of Effects (DARE) and Cumulative Index to Nursing and Allied Health Literature (CINAHL).

It was agreed among the research team that the searches would be limited by date from 2001 onwards and that an English-language limit would also be applied as only UK-specific studies

TABLE 1 Database searches undertaken

Database	Provider/interface	Coverage
MEDLINE and MEDLINE in Process & Other Non-Indexed Citations	Ovid	1948–present
EMBASE	Ovid	1980–present
Science Citation Index Expanded (SCIE)	Web of Science	1899–present
Cochrane Database of Systematic Reviews (CDSR)	Wiley InterScience	1996–present
Cochrane Central Register of Controlled Trials (CCRCT)	Wiley InterScience	1898–present
NHS Health Economic Evaluation Database (NHS EED)	Wiley InterScience	1995–present
Health Technology Assessment database (HTA)	Wiley InterScience	1995–present
Database of Abstracts of Reviews of Effects (DARE)	Wiley InterScience	1995–present
Cumulative Index to Nursing and Allied Health Literature (CINAHL)	EBSCO	1982–present
UK Clinical Research Network (CRN) Portfolio Database[a]	National Institute for Health Research (NIHR)	2001–present
ClinicalTrials.gov	United States-National Institutes of Health (US-NIH)	2000–present
Health Economics Evaluations Database (HEED)	OHE-IFPMA database	1967–present

a The UK CRN Portfolio Database includes all studies from the National Research Register (NRR) archive.

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TABLE 2 Use of search filters within specific electronic databases

Database	Study design		
	RCTs	Systematic reviews	Economic evaluations
MEDLINE and MEDLINE in Process & Other Non-Indexed citations	✓	✓	✓
EMBASE	✓	✓	✓
SCIE	✓	✓	✓
CDSR	×	✓	×
HTA and DARE	✓	–	✓
CCRCT	✓	–	×
NHS EED	×	×	✓
CINAHL	✓	✓	✓
UK CRN	✓	×	×
ClinicalTrials.gov	✓	×	×
HEED	×	×	✓

CCRCT, Cochrane Central Register of Controlled Trials; CDSR, Cochrane Database of Systematic Reviews; HEED, Health Economics Evaluations Database; SCIE, Science Citation Index Expanded.

were relevant to the scope of the assessment. Other studies published prior to this date were identified by hand-searching existing systematic reviews. RCT filters were not applied to searches in The Cochrane Library [HTA and Cochrane controlled trials reports (CCTR)] and research registers (UK CRN and ClinicalTrials.gov), as these are trial-based sources. Similarly, the economic evaluation filter was not applied to the NHS EED and the Health Economic Evaluations Database (HEED) as these constitute the largest collection of economic evaluations. Given that the largest number of records was retrieved from the RCT searches compared with the systematic reviews and economic evaluation searches, a geographic filter was applied to identify studies that were related to the UK setting.

All citations were imported into Reference Manager, version 12 (Thomson Reuters, Philadelphia, PA, USA) software and duplicates were removed. Titles and abstracts of all unique citations were then screened by one reviewer (FC) using the inclusion criteria outlined in *Chapter 3* (see *Inclusion/exclusion criteria*). Any uncertainty regarding possible inclusion of studies was resolved by discussion between the members of the research team, or through retrieval and subsequent examination of the full study publication. The full papers of all potentially relevant citations were retrieved to enable an in-depth assessment concerning study inclusion in the review. In the event that published papers did not report potentially relevant data, corresponding authors were contacted by e-mail; where further relevant data were made available through this route, they were included in the analysis.

Inclusion/exclusion criteria

The inclusion criteria for the systematic review of clinical effectiveness were as follows:

- *Population* Older people (> 75 years or > 70 years when considered a vulnerable population on the basis of age) with long-term medical or social needs at risk of admission to hospital, residential or nursing care.
- *Interventions* Structured home-based, nurse-led health promotion.
- *Comparators* Standard care including joint health and social assessment. Health promotion delivered in a different setting or not delivered by a nurse.
- *Setting* Interventions delivered in the home setting, undertaken in the UK.

- *Outcomes* Admission to hospital, residential or nursing care, mortality, morbidity including depression, falls, accidents, deteriorating health status, patient satisfaction.
- *Study design* RCTs.

Studies were excluded from the review if the effectiveness of the intervention was not assessed within a UK setting, if the intervention was not predominantly delivered by nurses, if the population did not include a substantial proportion of individuals aged over 75 years, or if the intervention did not include any discernible elements of health promotion. In instances whereby all inclusion criteria were met except for the age-restriction criterion, this was sometimes relaxed based on subjective judgement and discussions among the research team. Non-randomised studies were also excluded from the review.

Data extraction strategy

Data were extracted independently by one reviewer using a standardised data extraction form.

Quality assessment strategy

The methodological quality of studies included in the review was assessed using the Cochrane Risk of Bias tool (available from www.cochrane.org/). In particular, consideration of study quality included the following factors:

1. timing, duration and length of follow-up of the study
2. method of randomisation
3. method of allocation concealment
4. blinding
5. numbers of participants randomised, excluded and lost to follow-up (LTFU)
6. whether or not intention-to-treat (ITT) analysis has been performed.

Methods of analysis and evidence synthesis

Data from included studies were tabulated and discussed in a narrative review. Where appropriate, statistical meta-analysis was undertaken to estimate a summary measure of effect on relevant outcomes based on ITT analyses. Meta-analysis was undertaken using random-effects models using Review Manager (RevMan) software, version 5.0 (The Cochrane Collaboration, Nordic Cochrane Centre, Copenhagen, Denmark). The results of these analyses were reported as odds ratios (ORs). Heterogeneity was explored through consideration of the study populations, methods and interventions, by visualisation of analysis results and through consideration of the I^2-statistic.

Results

Quantity and quality of research available

Following the removal of duplicate citations, the systematic searches for RCTs and systematic reviews identified 2068 potentially relevant records. Of these, 38 were retrieved for a more detailed inspection. Of these, 26 studies were excluded from the review. In total, 11 studies were included in the final review of clinical effectiveness. This information is summarised in the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram presented in *Figure 1*.

Characteristics of included studies

Eleven studies[21–31] were included in this review, with the number of participants ranging from 51 to 1286. The total number of participants was 5761. All of the included studies were conducted in the UK. The characteristics of the included studies in terms of study subjects and interventions

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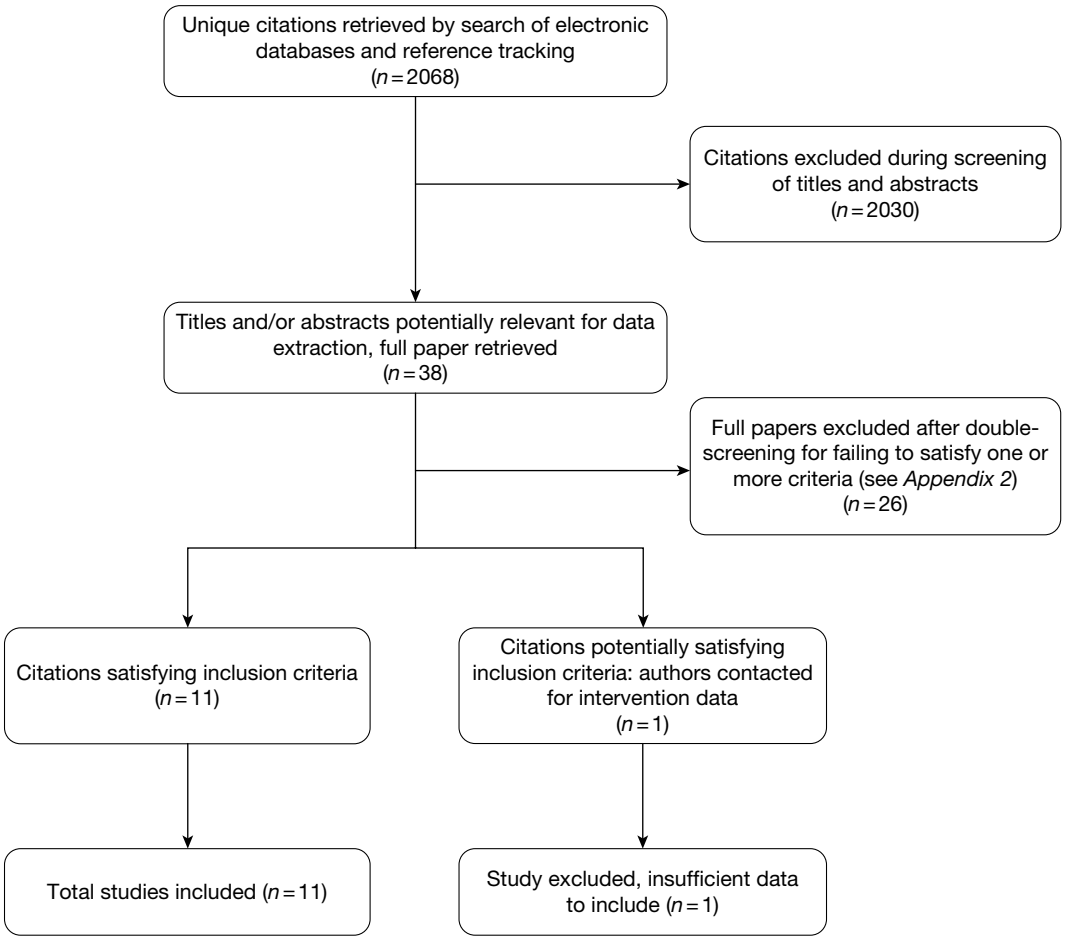

FIGURE 1 The PRISMA flow diagram.

are reported in *Tables 3* and *4*, respectively. The 11 studies included RCTs which differed in terms of the target population and the purpose of the health promotion intervention. Four studies were designed to evaluate home-based, nurse-led interventions for particular groups of older people with existing morbidities; these included patients populations with chronic heart failure,[21] Parkinson's disease[22] or venous leg ulcers,[23] and individuals who had suffered a stroke.[24] The focus of health promotion was to slow or prevent further deterioration or complications of the conditions. Four studies[25–28] focused on preventing falls in older people by providing home-based nursing assessment and health promotion. Two studies[29,30] evaluated programmes that provided home-based screening and health promotion by nurses to older populations. One study[31] assessed the effectiveness of a home-based rehabilitation programme.

The mean age of participants, where reported in the paper, ranged from 71.9 years to 83 years across the included studies. The health status of participants at baseline was not directly comparable between studies. Three studies[26,28,31] recorded Barthel Index scores (a tool designed to assess independence with a 0 to 20 score range) at baseline; these studies reported average scores of 19,[26] 18[28] and 18[31] (see *Glossary*). Three studies[21,28,31] reported the number of older people living alone. These results also suggested fairly similar populations, with the proportion of older people living alone ranging from 33.2% to 46%. The number of male participants ranged from 25.8% to 58%, with greater proportions of men in the groups with a pre-existing morbidity.[21–24]

TABLE 3 Characteristics of study subjects within included studies

Author	*n*	Mean age (years)	Living alone	Health condition	No. (%) male
Blue *et al.*[21]	165	I, 74.4 (8.6); C, 75.6 (7.9)	76/165 (46.1%)	Patients with heart failure	95/165 (57.6%)
Brooks *et al.*[23]	51	80	NR	Patients had suffered from venous leg ulcers	22/51 (43.1%)
Burton and Gibbon[24]	176	75.3	NR	Patients discharged from hospital following a stroke	92/176 (52.3%)
Jarman *et al.*[22]	1859	NR but 577/1836 (31.4%) aged >77, 649/1836 (35.3%) aged 70–77 and 610/1836 (33.2%) aged <70	NR	Patient's with Parkinson's disease	1044/1859 (56.2%)
Lightbody *et al.*[28]	348	Median 75 (IQR range 70–81)	153/348 (44.0%)	Patients discharged from A&E, Barthel Index (SD): I, 19 (2.0)/171; C, 19 (2.3)/177	89/348 (25.6%)
Kingston *et al.*[27]	109	71.9	NR	Patients who had attended an A&E department following a fall	NR
Vetter *et al.*[25]	674	Patients >70 recruited	NR	41% no disability	NR
Vetter *et al.*[30]	1286	Patients >70 recruited	NR	General elderly	NR
Spice *et al.*[26]	516	C, 83 (6.6)/159; I1, 83 (6.7)/136; I2: 81 (6.6)/210	NR	Median Barthel Index (IQR): I1, 18 (11 to 20); C, 18 (5 to 20)	133/516 (25.8%)
McEwan *et al.*[29]	296	NR	NR	Nottingham Health Profile: Mobility: I, 17.5 (SD)/132; C, 21.8 (SD)/130	NR
Cunliffe *et al.*[31]	370	Median (IQR) 80 (73–85)	123/370 (33.2%)	Median Barthel Index (IQR):18 (17–20)	114/370 (30.1%)

A&E, accident and emergency department; C, comparator group; I, intervention group; IQR, interquartile range; NR, not reported; SD, standard deviation.

Description of the interventions

The interventions were delivered by nurses, although the background experience and additional training requirements required for the practitioners was not consistently described in the included studies. In three RCTs,[25,27,30] the intervention was delivered by health visitors; these are public health nurses, working in the community, whose role concerns the protection and promotion of health. In two studies[26,29] community nurses were given additional training before the study commenced. In one study,[24] a specialist stroke nurse was given additional training to provide continuity of care in the community following the study subjects' discharge from hospital. In five studies, the authors simply state that nurses were given additional training but do not provide further information with respect to their grade or level of qualification.[21–23,28,31] In one study,[31] the nurse worked within a multidisciplinary team including physiotherapists and occupational therapists (not doctors). In the other 10 studies,[21–30] the nurses worked independently, referring to other health- and social-care professionals as necessary.

The number of home visits made by the nurses also varied between the studies; this quantity was not consistently reported within the study publications. Those home-based interventions delivered to older people discharged from hospital with an existing morbidity received the most visits. In the study reported by Cunliffe *et al.*,[31] up to four visits were made per day, 7 days per week, for up to 4 weeks. Burton and Gibbon[24] reported an average of three visits per patient. Blue *et al.*[21] did not report how many visits were made to each patient, but these were of decreasing frequency over time and were supplemented by telephone contact as judged necessary. In other studies[26,28–30] single visits were made, with additional visits as judged necessary, but follow-up continued over 12 months. In four studies,[22,23,25,27] the number of visits was not reported.

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TABLE 4 Interventions assessed with the included studies

Author	*n*	Study purpose	Intervention	Nurse	No. of visits	Control	Duration of intervention
Blue *et al.*[21]	165	To determine whether or not specialist nurse intervention improves outcomes in patients with chronic heart failure	Nurses provided education about heart failure and its treatment, optimisation of drug treatments, diet, exercise, monitoring electrolyte concentrations, teaching self-monitoring and management. Nurses liaised with other health-care and social workers as required and provided psychological support. They also provided booklets containing an explanation of heart failure and its treatment, dietary advice, contact details for the heart failure nurses, a list of their drugs, weights, blood test results and details of planned visits (dates and times)	Training for nurses in role before start of the study	Planned home visits of decreasing frequency, supplemented by telephone contact as needed	Usual care, managed by the admitting physician and subsequently the GP	12 months
Burton and Gibbon[24]	87	The study aimed to test the hypothesis that expanding the stroke nurse role to provide continuity in care to stroke survivors and carers after discharge from hospital would improve recovery from stroke	Experimental groups received a follow-up visit from the stroke nurse at the place of discharge within 2 days of discharge. A holistic assessment was undertaken, with the stroke nurse specifically reviewing 'health promotion'. Subsequent input was flexible, determined by the stroke nurse in consultation with the patient and carer	A bespoke training programme was provided for the stroke nurse prior to the study	The average number of contacts between the patient and stoke nurse was three (range 0–28). Contact was typically maintained every 2 months (range 0–12 months)	Control group members received usual care on discharge from the rehabilitation unity. Those in the control group did not receive home visit or any further intervention from the stroke nurse	12 months
Brooks *et al.*[23]	51	The study evaluated the effects of a structured nurse-led education programme that aimed to improve patient concordance and prevent venous leg ulcer recurrence	Qualified nurses and nursing auxiliaries in this group attended a 3-hour education session that focused on enhancing patient concordance on leg ulcer prevention. Patients were given information leaflets on prevention and exercise leaflets developed by the researcher. These explained seven key ways that they could prevent ulcer recurrence. The nurses emphasised the importance of the prevention strategies described in the leaflets. This was reinforced every 3 months. Where possible, relatives and carers were also encouraged to reinforce concordant behaviour	Qualified nurses and nursing auxiliaries in this group attended a 3-hour education session that focused on enhancing patient concordance with leg ulcer prevention	NR	Patients received 'usual' care. Qualified nurses caring for this group received mandatory 1-day training for leg ulcer management. Compression hosiery used in both groups was changed weekly and replaced every 3 months	Data were collected weekly for 52 weeks

Author	*n*	Study purpose	Intervention	Nurse	No. of visits	Control	Duration of intervention
Jarman *et al.*[22]	1859	The study aimed to determine the effects of community-based nurses specialising in Parkinson's disease on health outcomes and health-care costs	Nine nurses who were trained in meeting the special needs of people with Parkinson's disease and their carers. Nurses were advisory to the GP. Each nurse was supplied with a leased car and a mobile telephone, and assumed areas of responsibility under the guidance of a nurse manager. Nurses' roles included counselling and educating patients and carers about Parkinson's disease in their homes, at health centres, and GP clinics, in hospital outpatients departments, and via telephone; providing information on drugs; monitoring clinical well-being and response to treatment; instigating respite/day hospital care where appropriate; assessing entitlement to social security benefit; and liaising with local multidisciplinary primary care teams for ongoing assessment and therapy	Nurses were given additional training	NR	Patients in the control group were not provided with additional services until the end of the 2-year intervention. They were subsequently offered one assessment by a nurse specialist	2 years
Lightbody *et al.*[28]	348	The study aimed to assess a nurse-led intervention for older people discharged from the A&E department, requiring a single visit, through which action on falls, risk factor modification could be taken through usual channels	The intervention group was assessed for risk factors for falls at home by the falls nurse 2–4 weeks after the index fall. Medication, ECG, blood pressure, cognition, visual acuity, hearing, vestibular dysfunction, balance, mobility, feet and footwear were assessed using adapted versions of the falls checklist. The environmental assessment identified inadequate lighting, tripping hazards and education about safety in the home, and simple modifications were made with consent. Risk factors requiring further action were referred to relatives, community therapy services, social services and/or the primary care team. Direct referrals were not made to hospital outpatients or day hospital	Nurses were given criteria for initial assessment and onward referral developed in consultation with therapists and clinicians	Single visit	Usual care	6 month follow-up
Kingston *et al.*[27]	109	The study aimed to test the hypothesis that a health-visiting intervention delivered within 5 working days of attending an A&E department with a fall would improve the medium-term self-reported functional status of older women who had fallen	The health visiting intervention included pain control and medication, including advice on appropriate analgesia. Advice from the health visitor also included the type of analgesics to use and the correct times at which they should be taken; how to get up after a fall; individuals were also educated about risk factors for falls both in terms of environmental risks and risk factors related to drugs, alcohol, etc. Patients were also given advice on diet and exercise. The intervention group received a rapid health visiting intervention within 5 working days of the index fall. All individuals within the intervention group were care managed on an individual requirement basis for 12 months post fall	Health visitor	NR	The control group received standard post-fall treatment administered in the A&E. This consisted of a letter from the A&E department to their GP detailing the clinical event, and any follow-up	12 months

continued

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TABLE 4 Interventions assessed with the included studies (*continued*)

Author	*n*	Study purpose	Intervention	Nurse	No. of visits	Control	Duration of intervention
Spice *et al.*[26]	516	The study examined two interventions in community-dwelling older recurrent fallers, who had not attended an A&E department for their most recent fall, comparing effectiveness in preventing falls against usual care within a cluster RCT design	*Group 1*: Primary care intervention group participants received an assessment by a designated trained nurse to identify risk factors for falls. If problems were identified referrals to appropriate professionals in primary or secondary care were made *Group 2*: Secondary care intervention group participants attended a one-stop multidisciplinary clinic with referral for investigations, interventions (including home check) and follow-up if necessary Intervention assessments in the primary and secondary groups were standardised: further management of each participant was then individualised	Designated trained nurse working in the community, using a risk factor review and subsequent targeted referral to other professionals	Not described – appears to be one-off assessment	The usual care group received a baseline assessment but were managed by their primary care team without specific guidance: referral to routine services made was at the discretion of the primary care clinicians	Unclear
Vetter *et al.*[25]	674	RCT. Households, rather than individuals were randomised	A health visitor was employed in the practice with the task of reducing the incidence of fractures within the intervention group. This was to be achieved by visiting the households at least once per year for those not presenting any problems, assessing patients risk of falls or fractures and intervening in those who had obvious risk characteristics or who had a history of such problems. Those older people who had problems were visited as often as deemed necessary by the health visitor. The health visitor also referred people with problems to other professionals. The health visitor first obtained a history of illness and then concentrated on four factors: 1. *Nutrition*: Help was given with dietary advice to those with poor dietary intake or signs of undernourishment. This sometimes included taking venous blood samples for testing for haemoglobin or dietary constituents if necessary. Advice was also given about smoking and on the sensible use of alcohol 2. *Medical conditions*: The subject was checked for a history or signs of heart block, vasovagal attacks, or other drop attacks. Medication was checked for inappropriate doses or mixtures that might cause falls or dizziness 3. *Environment*: Environmental hazards were looked for and corrected with the help of local voluntary agencies. Pressure was put on local authorities specifically to grit areas where these people were living when there was ice or snow 4. *Assessment and improvement of general muscle tone and fitness*: Physiotherapist-led fitness classes were provided	Health visitor	Older people who had problems were visited as often as was thought necessary by the health visitor	Usual care	4 years

Author	*n*	Study purpose	Intervention	Nurse	No. of visits	Control	Duration of intervention
Vetter *et al.*[30]	1286	The study assessed the effectiveness of using health visitors to visit and monitor of a caseload of older individuals within their respective general practices	Health visitors were instructed to interview patients and to keep notes according to usual health visiting practice. In addition, a problem sheet and procedure form had to be completed at each interview. These were copied on to a card which was placed in the patients practice notes and this acted as a means of communication between the practitioners and the health visitor. No major changes in either the membership of the general practices or of their policies with regard to older patients occurred during the study	Health visitors, already working with older people	Health visitors made one unsolicited visit a year. They followed up patients who were in trouble at that visit and they were also alerted by the other professionals in the practice if one of their patients had any difficulties	Usual care	2 years
McEwan *et al.*[29]	296	This study evaluated the effectiveness of a primary care-linked screening programme to resolve health and related problems and to improve the quality of life of older people	Home visit from one of the care plan nurses. An assessment lasting about 45 minutes was undertaken, which included the following: activities of daily living, social functioning, sensory functions, mental and emotional assessment, current medical problems, measurement of blood pressure, urinalysis and haemoglobin level, and apparent compliance with medication. The requirements for care were decided on the basis of the findings at this consultation and appropriate referrals were made. The intervention consisted of a special screening assessment and referrals and/or advice based on the results. A booklet which described the health social and voluntary services available locally for older people was left with each test group participant	Community nurse trained in interviewing techniques	Single visit	The control group received the usual pattern of care from the primary care team	Not described. Follow-up at 20 months
Cunliffe *et al.*[31]	370	This study examined the effect of an EDRS in Nottingham, UK	The ERDS was staffed by two occupational therapists, two physiotherapists, three nurses, a community care officer (liaising with social services), seven rehabilitation assistants, and secretarial support. There were no doctors in the EDRS: medical care was provided by the hospital team while in hospital and by the GP when at home. The EDRS aimed to assess the patient and arrange discharge as soon as possible. Up to four visits per day could be provided, up to 7 days per week, between the hours of 8 AM and 10 PM. The package of care could last up to 4 weeks and was tailored to individual needs. Some patients when assessed in hospital by the EDRS were deemed not to require any further input. All standard after-care services were available, if required for those allocated to the EDRS	Part of team with occupational therapists, rehabilitation assistants and physiotherapists	Up to four visits per day, 7 days per week	Usual care – patients were managed in hospital until fit for home, using existing after-care services as required. After-care services comprised hospital outpatient rehabilitation, geriatric day hospitals and usual social services	Up to 4 weeks

A&E, accident and emergency department; ECG, electrocardiograph; EDRS, Early Discharge and Rehabilitation Service; NR, not reported.

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Control interventions were consistently described as usual care. In all of the 11 studies[21–30] this was care managed by the GP once the patient was discharged from hospital and did not involve a home visit from a nurse. The nature of 'usual care' may have differed considerably between studies, but there is insufficient information to evaluate the heterogeneity of care in the control groups between studies.

The nature of the health promotion intervention itself also varied between the included studies (*Table 4*). For those home-based interventions delivered to patients with existing morbidities, the focus of the intervention was related to managing and monitoring their condition to prevent exacerbation of their disease. The intervention also focused on improving recovery and therefore regaining health following discharge from hospital. Education about medications, recognising symptoms, ensuring appropriate follow-up, encouraging concordance with medications, and health advice and providing advice about healthy lifestyle were features of the intervention in those studies in which the subjects had existing morbidities;[21–24,31] in these instances the focus of the intervention was concerned with promoting recovery. Information was delivered verbally but also supported by written information[21,23,29] and contact by telephone.[22] The nurses' roles also included supporting the carers, and where necessary, instigating respite and day hospital care.[28] The nurses' roles could also involve other health-promoting activities, such as assessing entitlement to social security benefit.[22] Those interventions targeting older people who had experienced falls were designed to reduce risk of future falls and involved in-depth assessments of health state and environmental hazards with appropriate referral to other services.[25–29] This might include working with local councils to raise awareness of local hazards for older people.

Quality of the included studies

Quality assessment of the included studies is presented in *Table 5*. Seven studies[21,22,24–26,30,31] were judged to be at low risk of bias. These studies adopted appropriate methods of randomisation, described the numbers of participants lost to follow-up, reported ITT analyses and reported well-balanced patient groups at study baseline. Two studies[24,31] attempted to overcome the challenges of blinding by ensuring that outcome assessors were blinded to the allocation groups of the participants. Two studies[27,28] that did not adopt an ITT analysis were judged to be at medium risk of bias. Only one study, by Brooks *et al.*,[23] was judged to be at high risk of bias, as it failed to use a randomisation process; in particular, this introduces the possibility of selection biases that may influence the observed effectiveness of the intervention. It appears in this study that subjects within the experimental group were in a better health state at baseline; however, the potential impact of this imbalance was not examined statistically.

Assessment of clinical effectiveness

Mortality

Eight studies[21,22,25–31] reported mortality rates, with a total of 4583 participants included in the analysis. Random-effects meta-analysis (*Figure 2*) suggests that the intervention significantly reduced the risk of death [odds ratio (OR) = 0.80, 95% confidence interval (CI) 0.68 to 0.95]. There was little heterogeneity present in this analysis ($I^2 = 9\%$).

Exclusion of the two studies – Cunliffe *et al.*[31] and Vetter *et al.*[30] – from the above random-effects meta-analysis (*Figure 3*) did not differ significantly in reducing the overall risk of death (OR = 0.80, 95% CI 0.65 to 0.99). However, the degree of heterogeneity increased in this analysis ($I^2 = 16\%$).

TABLE 5 Quality assessment

Author	Randomisation procedure	Allocation concealment	Blinding	ITT/LTFU	Baseline comparability	Risk of bias
Blue *et al.*[21]	Central computerised randomisation	Yes	No	Yes *Withdrawals* Details given. Only one withdrawal from the intervention group C: Six died before discharge I: One died before discharge and one died after discharge to a hospice	Yes	Low
Burton and Gibbon[24]	Randomisation was stratified by admitting hospital, first or subsequent stroke, destination on discharge and levels of functional dependence on discharge. Randomisation used a computer database	Yes	Yes, of outcome assessors	Yes ITT: 12 months *Withdrawals* I, 6/87; C, 5/89 *Died* I, 7/87; C, 8/89 *LTFU* I, 10/87; C, 14/89	Yes	Low
Brooks *et al.*[23]	Allowed manipulation and some controls, but not random assignment of individual subjects to treatment conditions. Patients in the two arms were from six regions in Oxfordshire, which were divided to produce two demographically similar groups	No	Staff were unaware the trial had two arms		Experimental group appear in a better health state at baseline. No randomisation. No test of similarity	High
Lightbody *et al.*[28]	Consecutive block randomisation	No	NR	No Four patients LTFU	There were no differences between intervention and usual care groups in baseline characteristics except total number of medications	Medium
Jarman *et al.*[22]	438 general practices in nine randomly selected English health authority areas. Health authorities were stratified by three factors that influence service organisation and accessibility: size, population density and area deprivation score. Randomisation was performed centrally by an independent organisation. Patients were randomised within practice using block randomisation lists that reflected the randomisation ratio of the health authority area	NR	NR	Yes *LTFU* I, $n=163$; C, $n=116$	No differences observed between treatment groups for age, sex, accommodation, social class, disease duration, disease severity or drugs	Low

continued

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TABLE 5 Quality assessment (*continued*)

Author	Randomisation procedure	Allocation concealment	Blinding	ITT/LTFU	Baseline comparability	Risk of bias
Kingston *et al.*[27]	NR	NR	NR	No 17 patients LTFU	Both intervention and the control group had the same mean age (71.9 years) and could undertake the same activities of daily living before the fall. However, the control group reported significantly greater levels of treatment for depression ($p=0.04$) and angina ($p=0.04$) in the 12 months prior to the fall	Medium
Vetter *et al.*[25]	RCT randomisation by household. A group practice of five GPs took part in the study. Randomisation was undertaken using random number tables with subjects study numbers and without direct contact with the subjects	NR	NR	Yes	Similar age and gender distributions. Greater degree of disability in the intervention group was different from that in the control group: 159 (45%) of the intervention group and 117 (36%) of control subjects had no initial disability	Low
Vetter *et al.*[30]	Method not described	Method not described	NR	NR	No significant differences in physical disability, scores for anxiety	Unclear
Spice *et al.*[26]	Cluster RCT. Practices were stratified into urban and rural and randomly allocated to the three arms, in blocks of three, using a random number generator	NR	Blinding to the intervention group of those collecting and analysing data were impractical, but all data collected were entered without alteration	Yes	Groups were very similar but more participants were recruited to the secondary care arm owing to differences in the underlying demography of participating practices	Low
McEwan *et al.*[29]	296 people were stratified into the age–sex groups 75–84 years and ≥95 years, then randomly allocated to the test (151 patients) and control groups (145 patients)	NR	NR	No I, LTFU $n=17$; C, LTFU $n=11$	No significant differences in mental test scores, in the proportion living alone, in sheltered housing or residential care and the proportion consulting a general practitioner in the last 6 months	Medium
Cunliffe *et al.*[31]	Telephone randomisation services were used for allocation using computer-generated balanced randomisation within strata. Stratification was by diagnostic group and by Barthel Index at randomisation	NR	Outcomes were assessed blind	Yes	Well matched at baseline	Low

I, intervention; C, comparator; NR, not reported.

Study or subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	OR M–H, Random, 95% CI
Blue 1991[21]	25	84	25	81	5.7%	0.95 (0.49 to 1.84)
Cunliffe 2004[31]	34	185	32	185	8.7%	1.08 (0.63 to 1.83)
Jarman 2002[22]	169	696	146	558	31.2%	0.90 (0.70 to 1.17)
Lightbody 2002[28]	11	171	7	171	2.7%	1.61 (0.61 to 4.26)
McEwan 1990[29]	16	151	23	145	5.4%	0.63 (0.32 to 1.25)
Spice 2009[26]	11	187	17	147	4.1%	0.48 (0.22 to 1.05)
Vetter 1984[30]	80	577	105	571	22.1%	0.71 (0.52 to 0.98)
Vetter 1992[25]	88	350	106	324	20.1%	0.69 (0.49 to 0.97)
Total (95% CI)		**2401**		**2182**	**100.0%**	**0.80 (0.68 to 0.95)**
Total events	434		461			

Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = 7.65$, df = 7 ($p = 0.36$): $I^2 = 9\%$
Test for overall effect: $z = 2.64$ ($p = 0.008$)

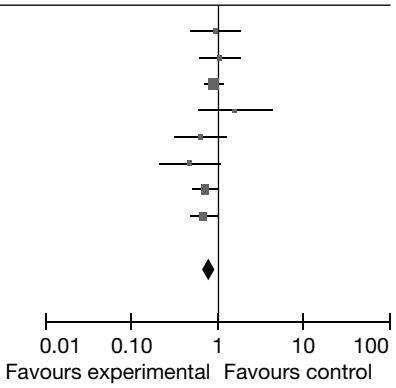

FIGURE 2 Random-effects meta-analysis results for mortality.

Study or subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	OR M–H, Random, 95% CI
Blue 1991[21]	25	84	25	81	9.4%	0.95 (0.49 to 1.84)
Jarman 2002[22]	169	696	146	558	41.1%	0.90 (0.70 to 1.17)
Lightbody 2002[28]	11	171	7	171	4.6%	1.61 (0.61 to 4.26)
McEwan 1990[29]	16	151	23	145	9.0%	0.63 (0.32 to 1.25)
Spice 2009[26]	11	187	17	147	6.8%	0.48 (0.22 to 1.05)
Vetter 1992[25]	88	350	106	324	29.0%	0.69 (0.49 to 0.97)
Total (95% CI)		**1639**		**1426**	**100.0%**	**0.80 (0.65 to 0.99)**
Total events	320		324			

Heterogeneity: $\tau^2 = 0.01$; $\chi^2 = 5.96$, df = 5 ($p = 0.31$): $I^2 = 16\%$
Test for overall effect: $z = 2.04$ ($p = 0.04$)

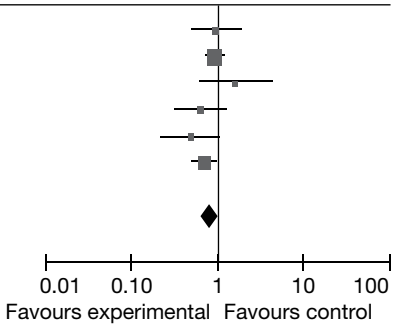

FIGURE 3 Random-effects meta-analysis results for mortality (excluding Cunliffe *et al.*[31] and Vetter *et al.*[30]).

Falls

Four studies[25–28] reported the number of falls experienced within the intervention and control groups. Assessment of risk and health promotion activities designed to reduce future falls were objectives of these studies. A total of 1392 participants were included in this analysis (*Figure 4*). Although there appears to be a trend favouring the intervention, with fewer falls occurring in the intervention group compared with usual care, this difference was not statistically significant at the 95% level (OR = 0.51, 95% CI 0.19 to 1.36). There was evidence of considerable heterogeneity in this analysis ($I^2 = 89\%$).

Measures of independence

Four studies[24,26,28,31] reported outcomes using the Barthel Index (*Table 6*). The results were not presented in sufficient detail across the trials to enable meta-analysis to be performed. Two studies[24,28] reported a significant difference, with those participating in the intervention group demonstrating greater independence than those in the control group. Spice *et al.*[26] and Cunliffe *et al.*[31] did not report a significant difference between the intervention and control groups. The differences in these findings are not attributable to the baseline conditions of the participants or the frequency of contact with the nurse during the intervention period.

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Study or subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	OR M–H, Random, 95% CI
Kingston 2001[27]	3	60	3	49	16.4%	0.81 (0.16 to 4.19)
Lightbody 2002[28]	89	155	145	159	27.1%	0.13 (0.07 to 0.25)
Spice 2009[26]	118	136	133	159	27.0%	1.28 (0.67 to 2.46)
Vetter 1992[25]	79	350	106	324	29.5%	0.60 (0.43 to 0.84)
Total (95% CI)		**701**		**691**	**100.0%**	**0.51 (0.19 to 1.36)**
Total events	289		387			

Heterogeneity: $\tau^2 = 0.81$; $\chi^2 = 26.78$, df = 3 ($p < 0.00001$): $I^2 = 89\%$
Test for overall effect: $z = 1.35$ ($p = 0.18$)

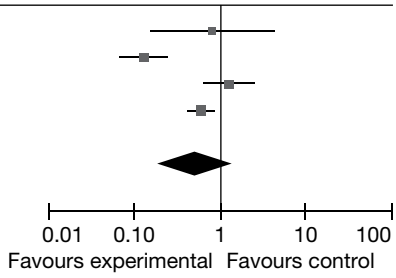

FIGURE 4 Random-effects meta-analysis results for incidence of falls.

TABLE 6 Barthel Index results

Study	Time of measurement (months)	Intervention, mean (SD)	Control, mean (SD)	Significance
Burton and Gibbon[24]	12	Median 17, IQR 10 ($n=63$); change score from 3–12 months 0.0 (2.0) ($n=63$)	13 (7.25) ($n=62$); change score from 3–12 months: 0.0 (1.0) ($n=62$)	NS ($p=0.049$)[a]
Lightbody *et al.*[28]	6	18.5 (2.37) ($n=155$)	17.8 (3.6) ($n=159$)	$p<0.04$
Spice *et al.*[26]	12	Difference from the control group at 12 months: 0.07 (–0.54 to –0.67)	NR	$p=0.824$
Cunliffe *et al.*[31]	12	Mean difference at 12 months 0.2 (–0.7 to 1.1)	NR	NS

IQR, interquartile range; NS, not significant; SD, standard deviation.
a The intervention reduced deterioration in physical dependence from 3 to 12 months.

Other outcomes

A number of other outcomes were measured and recorded in the included studies (*Table 7*). These included admission to hospital, moving to residential care, leg ulcer recurrence, the Nottingham Health Profile, the Beck Depression Inventory, Caregiver Strain Index, the General Health Questionnaire (GHQ) and Short Form questionnaire-36 items (SF-36). Brooks *et al.*[23] found a significant reduction in leg ulcer recurrence in participants in the intervention group (4% vs 36%, $p=0.004$). During the intervention, participants were encouraged to perform leg exercises and to keep his or her legs elevated for a prescribed period during the day. Interventions were also successful in improving Nottingham Health Profile scores,[24] reducing caregiver strain,[24] improving health and well-being as measured by the GHQ,[31] and using a global health question.[22]

Statement of principal findings

Eleven studies[21–31] with a total of 5761 participants were included in the clinical effectiveness review. The studies varied in the nature of the interventions: four[21–24] targeted participants with pre-existing morbidities (heart disease, Parkinson's disease, stroke, venous leg ulcers), one[31] provided care at home for patients recently discharged from hospital, two[29,30] undertook assessment visits of older people and four[25–28] delivered interventions to older people with the purpose of preventing falls. The nature of the interventions varied, with some delivered by nurses visiting more frequently over a limited period of time, whereas others included one

TABLE 7 Summary of other outcome measures reported within the included studies

Study	Time of measurement	Intervention	Control	Significance
Admission to hospital				
Blue *et al.*[21]	12 months	47/84 (56%)	49/81 (60%)	$p=0.27$
No. moving to residential care				
Spice *et al.*[26]	12 months	3/113 (3%)	7/133 (5%)	$p=0.39$
Leg ulcer recurrence				
Brooks *et al.*[23]	12 months	1/25 (4%)	15/42 (36%)	$p=0.004$
Nottingham Health Profile (higher scores reflect greater difficulty)				
Burton and Gibbon[24]	12 months	Median (IQR): 134.9 (133.47)/63	Median (IQR): 177.51 (184.05)	$p=0.012$
McEwan *et al.*[29]	20 months	97.4 (SD)/101	130 (SD)/92	NR
Beck Depression Inventory				
Burton and Gibbon[24]	12 months	Median (IQR): 8(6)/61	Median (IQR): 10 (7)/56	$p=$NS
Caregiver Strain Index				
Burton and Gibbon[24]		Median (IQR): 4 (3.5)/37	Median (IQR): 5.5 (3.8)/36	Significant when measured as change from 3 to 12 months
Global health question				
Jarman *et al.*[22]	24 months	Mean (SD) 4.79 (1.50)/696	Mean (SD) 5.02 (1.38)/558	$p=0.008$
GHQ (high score unfavourable)				
Cunliffe *et al.*[31]	3 months			Mean difference at 2.4 (–4.1 to 0.7) favouring intervention
SF-36 (36–0)				
Kingston *et al.*[27]	12 weeks	1.6 (SD)	3.1 (SD)	$p=0.81$

IQR, interquartile range; NR, not reported; NS, not significant; SD, standard deviation.

visit, with future visits as deemed necessary, and patients being followed up for a longer period of time. The background training and experience of the nurses also varied between studies. Some interventions were delivered by health visitors, stroke nurse specialists or nurses who had been given training specific to the role required for delivering the intervention. Interventions comprised information provision, reinforcement of prescribed treatment and health behaviour, healthy lifestyle information, support for carers, psychological support and referral to other health- and social-care professionals.

Ten[21,22,24–31] of the studies were judged to be of medium or low risk of bias. The consistency of high methodological quality in the studies facilitated meta-analysis using a random-effects model.

Eight studies[21,22,25,26,28–31] reported mortality rates. These results were pooled in the meta-analysis, using a random-effects model owing to the heterogeneous nature of the intervention and participants. Home-based nursing significantly reduced the risk of death (OR = 0.80, 95% CI 0.68 to 0.95). There was little heterogeneity present in this analysis ($I^2 = 9\%$). Four studies[25–28] reported the number of falls experienced by participants; a random-effects meta-analysis found a non-significant trend to improved outcomes in the intervention group, but the results were

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not statistically significant (OR = 0.51, 95% CI 0.19 to 1.36). There was evidence of considerable heterogeneity in this analysis (I^2 = 89%). Other outcomes were measured and reported differently between studies preventing meta-analysis. Barthel Index scores were reported in four studies.[24,26,28,31] Two[26,28] of these reported a statistically significant effect favouring the intervention, whereas the other two[24,31] found no evidence of beneficial effect. Other outcomes measured showing a statistically significant effect favouring the intervention included leg ulcer recurrence,[23] Nottingham Health Profile,[24,29] Caregiver Strain Index,[24] the GHQ[31] and a global health question.[22] The following outcomes failed to demonstrate a statistically significant difference: admission to hospital,[21] number of individuals moving into residential care,[26] the SF-36[27] and the Beck Depression Inventory.[24]

Four existing systematic reviews[8,10,14,32] incorporated meta-analysis. These were reviews of home- or community-based interventions to support older people. The reviews were not limited to nurse-led interventions and were not focused on the UK context. Three of these reviews[8,14,32] did not find a significant reduction in mortality. However, the results from the review by Elkan *et al.*[10] concur with the findings of the meta-analyses presented here. They found a significant reduction in mortality (OR = 0.76, 95% CI 0.64 to 0.97). Stuck *et al.*[8] and Beswick *et al.*[14,32] both reported statistically significant benefits for the intervention group in terms of reduced nursing home admission, risk of hospital admissions, falls and functional decline. Stuck *et al.*[8] found, however, that the effect on functional decline was dependent on the number of home visits performed during follow-up. The positive effects seen in these reviews are mirrored in our review, supporting the conclusion that home visits to older people can reduce mortality and appear to improve the health and well-being in older people.

Chapter 4

Assessment of cost-effectiveness

Introduction

This chapter presents the methods and results of a systematic review of existing UK-based economic evaluations of home-based, nurse-led health promotion programmes.

Methods for reviewing cost-effectiveness

The systematic review was undertaken to identify existing economic analyses of the use of home-based, nurse-led health promotion interventions specifically from the perspective of the UK NHS and PSS. The purpose of this review was to identify, appraise and summarise existing evidence concerning the cost-effectiveness of home-based, nurse-led health promotion in order to determine whether or not, and under what circumstances, and for whom, such a programme may represent good value for money for the NHS and associated sectors. A de novo health economic model was not developed as part of this review.

Identification of studies

A comprehensive systematic search of key health and medical databases was undertaken, as detailed in *Chapter 3*. Additional searching using Google Scholar was also undertaken to attempt to identify any relevant unpublished literature not identified by the systematic searches. The full economic search strategy is presented in *Appendix 1*.

The inclusion and exclusion criteria for the review of economic analyses are detailed below.

Study inclusion/exclusion criteria for review of economic evaluations

Inclusion criteria

The following inclusion criteria (additional to those presented in *Chapter 3*) were applied:

- Full comparative economic evaluations that present results in terms of both costs and health outcomes (cost-effectiveness analyses, cost–utility analyses, cost–benefit analyses and cost–consequence analyses). Cost minimisation studies were included, although, strictly speaking, these are not full economic evaluations.
- Studies undertaken from the perspective of the UK NHS and PSS.

Exclusion criteria

The following types of studies were excluded:

- studies that report only costs or outcomes
- studies that evaluate interventions delivered in any other setting than the subjects' home (e.g. institutional, residential or nursing home care)
- studies in which a substantial proportion of patients were < 75 years of age
- non-comparative studies

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- studies in which a substantive element of the intervention was not delivered by nurses
- studies in which the intervention was not specifically related to health promotion
- studies that were undertaken within a non-UK setting
- studies referred to only in editorials, commentaries or letters were also excluded.

No exclusion criteria were applied with respect to the targeted nature of the intervention, i.e. the review does not discriminate between interventions that are intended to improve outcomes within the general older population whereby their capacity to benefit is assumed solely on the criterion of age, or those interventions that are applied on the basis of increased risk owing to a history of a specific medical condition (e.g. stroke, dementia, history of falls). Studies undertaken within a non-UK setting were excluded from the review; these were retained, however, to examine the availability of economic evidence within a non-UK setting.

Identification of relevant studies

All citations were imported into Reference Manager version 12 and duplicates were removed. UK-specific citations were identified; the abstracts of these were then sifted to identify any potentially relevant economic evaluation studies for inclusion in the review. In addition, the studies included in the review of clinical effectiveness (see *Chapter 3*) were also scrutinised to identify any potentially relevant economic studies missed by the economic searches. Full papers of potentially relevant studies were retrieved and scrutinised in greater detail by two reviewers (PT and AR). Subjective judgement on the part of the reviewers was required with respect to the application of certain inclusion criteria, in particular the age distribution of study subjects (the proportion of subjects ≥ 75 years and < 75 years, and the extent to which this is reported), the extent to which the intervention involves health promotion rather than care, and the extent of nurse involvement in the delivery of the intervention. Studies that included a slightly younger patient population were given additional consideration (substantial proportion subjects ≥ 70 years of age) if all of the other inclusion criteria were met. All sifting was undertaken by two reviewers (PT and AR) and disagreements were resolved through discussion among the research team.

Critical appraisal methods

Included studies were critically appraised using the checklist for economic evaluations reported by Drummond *et al.*[33]

Results of the cost-effectiveness review

Number and type of included studies

The systematic searches for economic evaluations identified 1988 potentially relevant citations, excluding duplicated records. Following an initial sift of abstracts and titles, full papers of 49 studies were retrieved for more detailed inspection. Forty-five of these studies failed to meet the inclusion criteria and were hence excluded from the review. The most common reasons for study exclusion were (1) the inclusion of younger age groups; (2) the absence of any substantive nursing element within the description of the intervention; (3) the absence of any form of health promotion in the definition of the intervention; or (4) the failure to undertake a comparative economic evaluation. In many instances, studies were excluded for more than one reason. In total, only three studies, reported across four papers, met the inclusion criteria for the review. Further hand-searching of included studies and web-based searching did not result in the retrieval of any additional relevant studies. An abridged PRISMA diagram is shown in *Figure 5*.

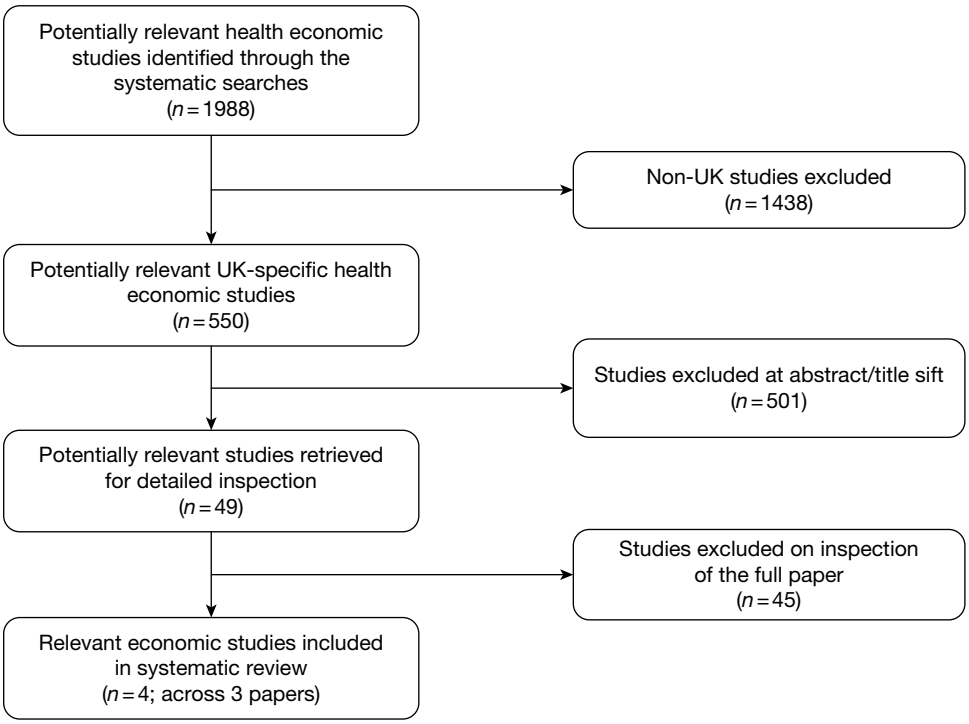

FIGURE 5 PRISMA diagram for systematic review of cost-effectiveness.

Table 8 presents a summary of the characteristics of the economic studies included in the review. *Table 9* summarises the main resource components included within each study. *Table 10* presents the results of the critical appraisal.

Critical assessment of included studies

This section presents a critical appraisal of the three included studies[22,34–36] in the systematic review.

Bakerly et al.

The study reported by Bakerly *et al.*[34] presents the methods and results of a cost minimisation analysis based on the results of a non-randomised prospective study of an early discharge and integrated care protocol for patients admitted to hospital with acute exacerbations of chronic obstructive pulmonary disease (COPD). This study was not included in the review of clinical effectiveness (see *Chapter 3*) owing to its non-randomised design. Although the authors purport to have adopted a NHS perspective, PSS costs were also included within the analysis. Costs were valued at year 2007 prices.

The population within the intervention group included 130 out of 546 patients who were admitted to hospital with acute exacerbations of COPD and who consented to the integrated care intervention during the period August 2003 to August 2004. The comparator group for the economic analysis comprised 95 out of 662 patients who were admitted to hospital with acute exacerbations of COPD between August 2002 and August 2003, and who stayed in hospital for the full duration of his or her treatment. Members of the control population were selected to match members of the intervention population in terms of age, gender and postcode.

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TABLE 8 Summary of characteristics for included studies

Study	Form of evaluation	Population	Intervention	Comparator	Primary economic outcome measure	Perspective	Time horizon
Bakerly *et al.*[34]	Case-matched cost minimisation analysis	COPD	Integrated care model including nurse-led education and advice ($n=130$)	Usual care ($n=95$)	Cost difference	NHS	60 days
Hurwitz *et al.*,[35] Jarman *et al.*[22]	EEACT (presented as a cost–consequence analysis)	Parkinson's disease	Parkinson's disease nurse specialist service ($n=1041$) (including counselling and education-based roles)	Usual care ($n=818$)	EQ-5D, cost difference	Appears to be NHS and local authority	2 years
Miller *et al.*[36]	EEACT	Older patients on discharge from acute hospital inpatient stay	EDRS ($n=185$)	Usual care ($n=185$)	Incremental cost per QALY gained	NHS/PSS	1 year

EDRS, Early Discharge and Rehabilitation Service; EEACT, economic evaluation alongside controlled trial; EQ-5D, European Quality of Life-5 Dimensions; QALY, quality-adjusted life-year.

TABLE 9 Summary of resource components measured and valued within the three included studies

Resource groups/components	Bakerly *et al.*[34]	Hurwitz *et al.*,[35] Jarman *et al.*[22]	Miller *et al.*[36]
Primary care			
Nurse home visits	✓	✓	✓
GP/community care	✓	✓	✓
Occupational therapist home visit/home adaptations	✓	?	×
Ambulance transfers	✓		×
Pharmacological and non-pharmacological treatments			
Drugs/other therapies	×	✓	×
Secondary care			
Hospital outpatient visits	✓	✓	✓
A&E department admissions	✓	✓	?
Inpatient costs	✓	✓	✓
Institutional/residential care			
Institutional/residential/respite care	×	✓	✓
Day care/home help	×	✓	✓
Community and GP care	×	✓	✓
Other			
Social security benefits	×	✓	×

A&E, accident and emergency department.

TABLE 10 Critical appraisal of the included economic papers using the Drummond *et al.* checklist[33]

Question	Bakerly *et al.*[34]	Hurwitz *et al.*,[35] Jarman *et al.*[22]	Miller *et al.*[36]
Was a well-defined question posed in an answerable form?	Yes	Yes	Yes
Was a comprehensive description of the competing alternative given?	Yes	Yes	Yes
Was there evidence that the programme's effectiveness had been established?	Questionable	Not in terms of QALYs	Not in terms of QALYs
Were all the important and relevant cost and consequences for each alternative identified?	Yes for costs No outcomes included	Yes for costs No outcomes included	Yes
Were costs and consequences measured accurately in appropriate physical units?	Yes for costs No outcomes included	Yes for costs No outcomes included	Yes for costs Unclear how/if QALYs were measured at baseline
Were costs and consequences valued credibly?	Yes for costs No outcomes included	Yes for costs No outcomes included	Yes
Were costs and consequences adjusted for differential timing?	No	No	No
Was an incremental analysis of costs and consequences of alternatives performed?	Yes for costs No outcomes included	Yes for costs No outcomes included	Not for expected ICER
Was allowance made for uncertainty in the estimates of costs and consequences?	No	No	Yes
Did the presentation and discussion of results include all issues of concern to users?	Yes	Yes	Yes

ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life-year.

The average age of patients who were allocated to the intervention group was 70 years [standard deviation (SD) = 8 years] and the average age of patients within the retrospective comparator group was 68 years (SD = 11 years). The intervention assessed within this study was an early discharge and integrated care protocol in which patients discharged from hospital early were visited at home by specialist respiratory nurses until they were totally discharged. The Acute COPD Assessment Service (ACAS) was able to provide short-term nebulisers and oxygen to patients. The ACAS team was staffed by three full-time specialist respiratory nurses and a middle-grade physician, who dedicated 40% of his time to the programme. During the last visit, patients and their carers were educated regarding COPD and its causes, how to prevent ill health as a result of the disease and how to manage suspected COPD exacerbations, and were given advice on exercise, healthy living and smoking cessation. In addition, patients were also given a written self-management plan (in conjunction with their GPs), and were given steroids and antibiotics to initiate at home when required. Patients were assessed in clinic 60 days after the index episode and a comprehensive management plan was agreed with the patient and communicated to their GP. Patients who were deemed unfit for early discharge were followed up daily in the hospital by programme nurses until they were well enough to be discharged with or without integrated care support. The comparator group received inpatient hospital care until the patients were considered well enough for discharge.

The objective of the study was to determine any cost savings that could be achieved by the introduction of an early discharge and integrated care protocol. Within the analysis, outcomes for the ACAS programme were assumed to be equivalent between the intervention and control groups. Although the authors did refer to a previous systematic review reported by Ram *et al.*[37]

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as evidence that the intervention was safe, the study did not involve the prospective collection or analysis of evidence regarding health-related quality of life (HRQoL), survival or other intermediate clinical outcomes.

Resource use was measured for patients receiving the early discharge and integrated care protocol and for patients within the retrospective control group. Resource components included the original hospital admission and length of stay, emergency ambulance transfers, and accident and emergency visits prior to their original hospital admission. Additional resource-use components recorded within the intervention group included visits by specialist respiratory nurses, emergency home visits, contact with various health-care professionals, accident and emergency visits following discharge, hospital readmissions, and outpatient clinic visits. Unit costs used to value resource use were obtained from appropriate reference sources, including *NHS Reference Costs 2007/08*[38] and Curtis *et al.*[39]

The authors did not report the results of any sensitivity analysis to examine the impact of costing assumptions on the likely cost savings of the protocol. The use of discounting was not reported; although this may be considered appropriate given the short time horizon for resource measurement (60 days), the potential resource and cost differences beyond this time point remain subject to considerable uncertainty.

The results of the analysis reported by Bakerly *et al.*[34] are summarised in *Table 11*.

The results of the economic analysis suggest that the early discharge and integrated care protocol for patients admitted to hospital with acute exacerbations of COPD may generate substantial cost savings compared with usual inpatient care. However, it should be noted that the study design adopted by Bakerly *et al.*[34] used a non-randomised design without any form of blinded allocation to the groups under assessment. In particular, although the prospective intervention and historical control groups were selected for inclusion in the study using a case-matching approach, subjects were matched only on the basis of age, gender and postcode. Prognostic factors and other baseline characteristics were not included as part of this process. Consequently, the study may be at risk of selection bias.

Hurwitz et al./*Jarman* et al.

The study reported by Hurwitz *et al.*[35] and Jarman *et al.*[22] presents the methods and results of an economic analysis of a RCT of community-based nursing for patients with Parkinson's disease. The authors describe the economic analysis as a cost minimisation analysis and report primary economic outcomes in terms of the cost difference between the intervention and control arms of the trial. However, the study would be more accurately described as a cost–consequence analysis, as disease-specific clinical outcomes and HRQoL outcomes are also reported within both papers.[22,35] The perspective adopted for the analysis was not clearly reported in either paper; however, the types of resource components included within the analysis include those that would typically fall on the NHS (although some local authority costs were also included such as institutional and respite care). Costs were valued at year 1996 prices.

TABLE 11 Summary results reported by Bakerly *et al.*[34]

Treatment group	Mean cost per patient (£)	95% CI (£)
Early intervention and discharge (intervention)	1653	1521 to 1802
Inpatient care (control)	2256	2126 to 2407
Cost difference	603	–

Within the RCT, patients were randomly assigned either to a community-based nursing intervention ($n = 1041$) or standard care ($n = 818$). The study population consisted of patients identified as suffering from Parkinson's disease by 438 general practices in nine randomly selected health authorities in England. The intervention was delivered by nurses who had no previous experience of nursing patients with Parkinson's disease in the community. However, some of the nurses did have experience of nursing patients with Parkinson's disease in a hospital setting. All of the nurses attended a course on meeting the needs of people with Parkinson's disease and their carers. The clinical position of the nurses during the trial was not clinically autonomous; rather they worked in an advisory role to GPs and consultants. The nurses counselled and educated patients and carers about Parkinson's disease, monitored the clinical well-being of patients and their response to treatment at least twice a year, and reported the results back to GPs or consultants as appropriate. The nurses also investigated options for respite or day hospital care, visited patients in hospital and liaised with hospital staff on discharge, assessed social security benefit entitlement, and, where appropriate, liaised with members of local multidisciplinary primary care teams regarding ongoing assessment and therapy. The nurses also provided drug information to patients under the auspices of GPs and consultants. Although the nurses were not empowered to change patient medication, they could make suggestions to GPs about altering a patient's dose regimen. The comparator intervention was defined as standard care; however, patients allocated to the control arm were offered a single assessment by a Parkinson's disease nurse specialist at the end of the 2-year intervention period. Further details of this trial are included in *Chapter 3* of this report.

A number of primary and secondary clinical and health-related quality-of-life outcomes were measured. The primary outcomes include the results from the stand-up test and the dot-in-square test, the proportion of patients sustaining fracture and HRQoL as measured using the European Quality of Life-5 Dimensions (EQ-5D) questionnaire. Patient well-being was also measured using the PDQ-39 (Parkinson's disease-specific measure of health status questionnaire) and a self-perceived global health question asking patients to rate their change in general health over the previous year on a scale from 0 (much better) to 4 (much worse). Outcomes assessments were undertaken during interviews between patients and non-professional interviewers employed by the National Centre for Social Research. Interviewers had received prior training. Other secondary outcomes included the median dose of L-dopa in each group, the proportion of patients on L-dopa controlled-release medication, the proportion of patients on a combination of pharmaceuticals, the proportion of patients referred to ancillary therapy, and the proportion of patients referred to a Parkinson's disease specialist. Again, these secondary outcomes were measured during interviews. Patient mortality for each group was obtained from the NHS Central Registry.

All of the patients in the study were interviewed to estimate NHS resources used. Resource components included institutional, respite, hospital and day care, community and general practitioner care, social security benefits, home aids, adaptations and pharmaceuticals. Unit cost estimates were obtained from appropriate reference sources including the *Monthly Index of Medical Specialities* (MIMS)[40] and Netten *et al.*[41] The authors calculated that, including administrative costs and car hire, the intervention would cost approximately £200 per patient per year.

The authors did not report the results of any sensitivity analysis. Although the authors used non-parametric bootstrapping to check the assumptions of their mean estimates, a comprehensive analysis of decision uncertainty was not reported. Even though the intervention period was 2 years, there is no evidence that discounting of future costs was undertaken. The headline economic results for the study are summarised in *Table 12*. Although the economic study design adopted here is reported to be that of a cost minimisation analysis, EQ-5D scores were actually

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TABLE 12 Mean results presented by Hurwitz *et al.*[35]/Jarman *et al.*[22]

	Cost (£)		
Treatment group	Year 1	Year 2	EQ-5D utility
Nurse group	4055	5860	0.37
Control group	3480	5630	0.39
Difference	575	230	–0.02

reported to be non-significantly lower in the intervention arm (mean EQ-5D difference = –0.02). On the basis of the total direct NHS costs for each group in those completing the study, and absolute EQ-5D differences between the groups, the nurse-led intervention appears to be dominated by standard care (less effective and more expensive). However, this is subject to considerable uncertainty.

Miller et al.

Miller *et al.*[36] present the methods and results of an economic evaluation conducted alongside a RCT to estimate the cost-effectiveness of an early discharge and rehabilitation service for older patients admitted to hospital. The analysis adopted a NHS and PSS perspective. The formal price year was unspecified within the paper; however, it appears from the cost sources used that costs were valued at year 2000 prices.

Within the RCT, patients were randomly assigned to one of two groups: (1) an early discharge and rehabilitation service ($n = 185$) or (2) standard social services home care and outpatient rehabilitation ($n = 185$). The study population consisted of patients who had been admitted to hospital for acute care; the most frequent reasons for admission were fracture (28%), neurological conditions including stroke (26%) and cardiorespiratory illness (14%). The median age of patients was 80 years, although the trial was open to any patient aged ≥ 65 years who was medically ready for discharge, had rehabilitation needs that could be met at home and did not need 24-hour care. Of the patients recruited to the trial, 246 were female (67%) and 247 lived alone (67%). The median hospital length of stay was 13.5 days. The intervention comprised a home care and rehabilitation service that was delivered by a team of nurses, physiotherapists, occupational therapists and rehabilitation assistants during up to four visits per day for up to 4 weeks. Patients who were allocated to the comparator arm received standard care, which included social services home care and rehabilitation delivered through an outpatient department.

European Quality of Life-5 Dimensions HRQoL estimates were elicited at 12-month follow-up using postal questionnaires. Sixty-six patients died before follow-up and were assigned a zero score. The remaining 32 patients withdrew consent or declined follow up. EQ-5D estimates were obtained for 272 patients of the recruited who were still alive at 12 months. Importantly, the authors do not report whether or not EQ-5D assessments were undertaken at baseline; hence, the methods used to estimate incremental QALYs between the groups are not entirely clear. This may affect the credibility of the results of the economic analysis.

Resource costs were measured for all participants in both the intervention arm and the control arm; these included the costs of the intervention, the costs of the acute hospital stay following randomisation, the costs of any readmissions to hospital or outpatient visits, and the costs of any nursing home admissions or any contact with GPs, community health services or social services

within the 12-month follow-up period. Total resource use for each patient was estimated using data collected from service providers over the follow-up period. The cost of the intervention was based on recorded client contact time with members of the early discharge rehabilitation service. Hospital inpatient admissions were costed according to the length of stay and clinical specialty. Outpatient attendances were also costed according to clinical specialty. The cost of contact with GPs was based on the recorded number of face-to-face and telephone consultations. The cost of contact with community health service professionals was based on recorded contact time. Unit costs were obtained from standard references sources including the *NHS Reference Costs 2000/01*[42] and Netten *et al.*[43] The cost of nursing and residential home admission was based on duration of stay multiplied by the average cost obtained from Netten *et al.*[43] The cost of referrals to social services professionals was based on the assumption of 1 hour of contact time per visit, with the hourly rate being obtained from Netten *et al.*[43] The costs of local authority funded social services were based on recorded contact time.

Uncertainty surrounding costs and health outcomes was explored using a paired bootstrapping technique developed by Barber and Thompson.[44] The patient-level data set was resampled 2000 times to generate estimates of variance. Uncertainty surrounding unit cost estimates does not appear to have been considered within the analysis. The results of the uncertainty analysis were presented as cost-effectiveness planes and cost-effectiveness acceptability curves. However, the authors do not actually report mean (expected) incremental quality-adjusted life-years (QALYs) gained or an expected incremental cost-effectiveness ratio (ICER; i.e. the incremental cost per QALY gained).

The paper does not mention the use of discounting to adjust for time preferences in the accrual of future costs and health benefits. Given the short time horizon of the RCT, this may be considered methodologically appropriate, but does raise questions concerning potential longer-term differences in costs and outcomes between the groups.

The main results presented by Miller *et al.*[36] are summarised in *Table 13* and *Figures 6* and *7*.

The authors used three different alternative estimators of the population mean to control for the skewed nature of the cost data and found that in each case this technique yielded an increase in the cost savings that was attributable to the intervention. The results presented on the cost-effectiveness plane demonstrate that the majority of the sample points fell below the horizontal axis, which indicates that the intervention was likely to result in cost savings. However, the QALY estimates appear to be fairly evenly distributed around the vertical axis; this indicates considerable uncertainty around whether or not the service offered any incremental health gain. As such, there appears to be a marked possibility that the intervention was less effective than standard care. Overall, there remains uncertainty, in both the short and longer term, about the actual benefit of the intervention.

TABLE 13 Mean cost differences reported by Miller *et al.*[36]

Treatment group	Mean cost (£)	95% CI
Intervention cohort	8361	7302 to 9420
Control cohort	10,088	8690 to 11,486
Difference	1727	–754 to 4208

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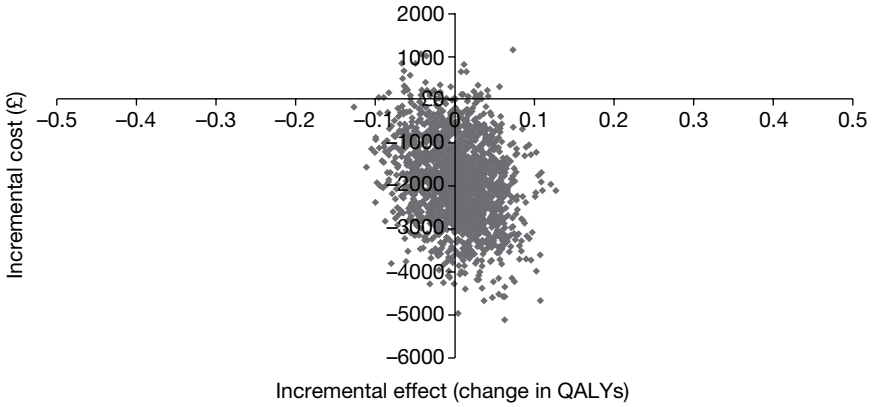

FIGURE 6 Cost-effectiveness plane for early discharge and rehabilitation vs standard care. (Reproduced with permission from Miller *et al.*[36])

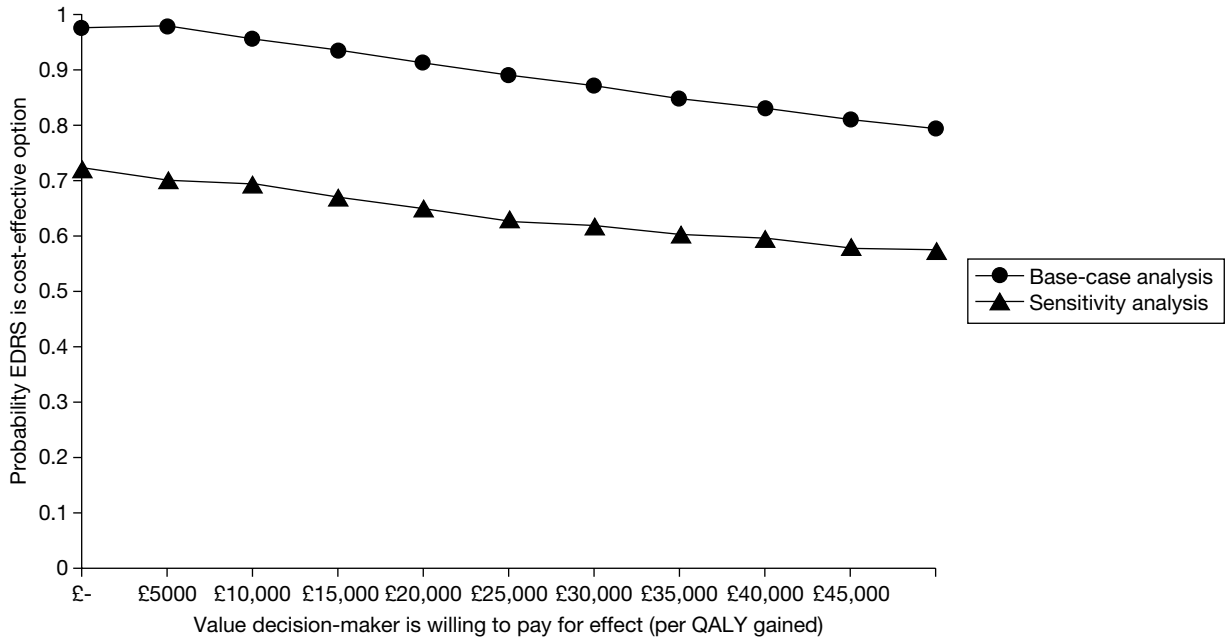

FIGURE 7 Cost-effectiveness acceptability curve for early discharge and rehabilitation vs standard care. (Reproduced with permission from Miller *et al.*[36]) EDRS, Early Discharge and Rehabilitation Service.

Statement of principal findings

The systematic review presented within this chapter highlights a dearth of relevant evidence concerning the cost-effectiveness of home-based, nurse-led health promotion in older people. Of the substantial number of potentially relevant studies identified by the systematic searches, only three studies met the criteria for inclusion in the review. The majority of the trials included in the clinical effectiveness review (see *Chapter 3*) did not include a formal economic evaluation or did they provide sufficient resource-use information to allow such an analysis to be undertaken post hoc.

The relevant evidence base included within this health economic review comprises one cost minimisation analysis based on non-randomised case matching[34] and two economic evaluations[22,35,36] undertaken alongside RCTs. One of these trial-based analyses also adopted a

cost minimisation design. Strictly speaking, cost minimisation analyses are not full economic evaluations. Two of the included studies[34,35] involved an intervention targeted specifically at patients with a known underlying incurable disease (COPD and Parkinson's disease), whereas the third study[36] examined the clinical effectiveness and cost-effectiveness of early discharge in patients with a range of conditions including fractures, neurological conditions and cardiorespiratory conditions.

Summary of main findings

The main findings of the three included studies are summarised below:

- One cost minimisation study, by Bakerly *et al.*,[34] reported cost savings of approximately £600 per patient, associated with an early discharge and integrated care protocol for patients admitted to hospital with acute exacerbations of COPD. This analysis was based on a case-matching exercise involving historical control subjects and prospectively identified subjects within the intervention arm. This study may be open to potential bias as a result of the case-matching exercise, as this did not include any baseline prognostic factors. Furthermore, the economic analysis assumes equivalent effectiveness between the intervention and usual care groups and adopts a very short time horizon for resource-use data collection (60 days).
- The second study[22,35] reports a cost–consequence analysis of community-based nursing versus standard care for patients with Parkinson's disease. This study reported increased costs in the intervention arm compared with standard care; however, the mean increase in costs over 2 years was £266 lower for the intervention group than the standard care group. Although the economic study design adopted here is reported to be that of a cost minimisation analysis, EQ-5D scores were actually reported to be non-significantly lower in the intervention arm (mean EQ-5D difference = –0.02). On the basis of the total direct NHS costs for each group in those completing the study, and absolute EQ-5D differences between the groups, the nurse-led intervention appears to be dominated by standard care (less effective and more expensive). Of particular concern are the short time horizon adopted within this study (2 years) and the potentially perverse assumption of equivalence between the intervention and comparator groups.
- The third study[36] reported a cost–utility analysis of an early discharge and rehabilitation service compared with usual care. The authors reported a high probability that the Early Discharge and Rehabilitation Service (EDRS) would be cost-effective. However, reporting within this study was problematic and the authors did not report expected ICERs. Judging from the presentation of probabilistic sensitivity analysis, although there is a high likelihood that the intervention offers cost savings, there also appears to be a strong possibility that the EDRS offered little or no incremental QALY gain over usual care. As with the other two included studies, the time horizon for this economic analysis is very short (1 year).

Other non-UK economic analyses of home-based, nurse-led health promotion

During the process of preparing the economic review, a number of other non-UK economic analyses of home-based, nurse-led health promotion were identified. Although these studies did not meet the inclusion criteria for this review, as they do not relate to home-based, nurse-led programmes implemented within the UK context, they do provide some notion of the alternative types of programme that have been assessed elsewhere. Generally speaking, these studies fall into one of three groups – studies in which the home-based, nurse-led programme is:

1. widely implemented solely on the basis of older age (e.g. Sahlen *et al.*[45] and Kronborg *et al.*[46]) – there is no equivalent evidence from the UK perspective
2. targeted at individuals with some non-comorbid increased risk factor (e.g. history of falls[47,48])
3. targeted at individuals with increased risk owing to the presence of an incurable disease.

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It is difficult, however, to draw any firm conclusions from these studies, as the clinical effectiveness and patterns of resource use for the home-based, nurse-led intervention and standard care may differ markedly by geographical location.

Conclusions of the health economic review

There remains considerable uncertainty surrounding the expected cost-effectiveness of home-based, nurse-led health promotion in the UK. The existing evidence base is very limited and, for methodological reasons, should be interpreted with caution. In particular, the effectiveness of interventions as measured using preference-based HRQoL measures remains a key area of uncertainty. It is also noteworthy that a number of RCTs included within the clinical effectiveness review (see *Chapter 3*) did not collect or report any resource-use information; this should be an essential element of any future RCT of home-based, nurse-led health promotion. Furthermore, the use of cost minimisation analyses within the included studies, in which effectiveness is assumed to be equivalent between competing programmes of care, is not just unhelpful but actually misleading, as it masks the uncertainty surrounding estimates of incremental benefit between competing alternatives. The goal of any health economic analysis should be concerned with fully reflecting the impact of this uncertainty on the likelihood of making the correct decision given available evidence. Two of the three included studies fall short in this respect.

Given the available evidence there is at best a weak suggestion that the cost-effectiveness of home-based, nurse-led health promotion programmes may be dependent on the population at whom the programme is targeted. However, on balance, the current economic evidence base does not provide a sufficient basis for informing policy decisions.

Chapter 5

Discussion

Statement of principal findings

Clinical effectiveness findings

The systematic review of clinical effectiveness included 11 studies, comprising a total of 5761 participants. There was considerable heterogeneity between the studies in terms of the study populations and the nature, purpose and composition of the interventions. There were also marked differences between studies in terms of the level of training of the nurses delivering the interventions. All but one of the included studies were judged to be at medium or low risk of bias.

Random-effects meta-analysis of eight studies suggested a statistically significant mortality benefit for the home-based nursing groups, whereas a meta-analysis of four studies suggested non-significant benefits in terms of improvement in falls. Positive outcomes for home-based nursing interventions were also reported within individual studies: these outcomes included the Barthel Index (although this finding was not consistent across all studies), leg ulcer recurrence, the Nottingham Health Profile, the Caregiver Strain Index, the GHQ and a global health question. The following outcomes failed to demonstrate a statistically significant difference: admission to hospital, the number of subjects moving into residential care, SF-36 quality of life and the Beck Depression Inventory scores.

Four existing systematic reviews[8,10,14,32] reported a meta-analysis of included studies. These were reviews of home- or community-based interventions to support in older people. The reviews were not limited to nurse-led interventions and were not focused solely on the UK context. Three reviews[8,14,32] did not find a significant reduction in mortality. However, the results reported by Elkan *et al.*[10] concur with the findings of this review, as the authors also reported a significant reduction in mortality (OR = 0.76, 95% CI 0.64 to 0.97).[8,14] Both of these reviews reported statistically significant benefits for the intervention group in terms of reduced nursing home admissions, risk of hospital admissions, falls and functional decline. However, Stuck *et al.*[8] found that the effect on functional decline depended on the number of home visits performed during follow-up. The positive effects seen in these reviews are mirrored in our review, supporting the conclusion that home visits to older people can reduce mortality and appears to improve the health and well-being of those in the intervention group compared with the control group.

On the basis of the evidence included in this systematic review, home-based, nurse-led health promotion may offer clinical benefits across a number of important health dimensions. However, it is generally unclear from the available studies that components of this type of complex intervention contribute towards individual aspects of benefit. This is particularly so when nurses are working within a multidisciplinary team; determining the effect of the nursing intervention distinct from that of other professionals or trained non-professionals is difficult to elicit.

Owing to time and resource constraints for this short report, data from the included clinical studies were extracted by a single reviewer. This should be noted as a possible limitation of the systematic review.

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Cost-effectiveness findings

The systematic review of existing economic evaluation studies highlights a dearth of relevant economic evidence supporting the use of home-based, nurse-led health promotion for older people. A total of three studies were included in the cost-effectiveness review. This evidence base is comprised of one cost minimisation analysis based on non-randomised case matching, and two economic evaluations undertaken alongside RCTs. Two of the included studies involved an intervention targeted specifically at patients with a known underlying incurable disease (COPD and Parkinson's disease), whereas the third study examined the clinical effectiveness and cost-effectiveness of early discharge in patients with a range of conditions including fractures, neurological conditions and cardiorespiratory conditions.

Each of the three studies indicated some likelihood that home-based, nurse-led health promotion may offer cost savings to the NHS (and potentially associated sectors such as social services). However, one study did not report any health outcomes and simply assumed equivalence between the intervention and comparator, whereas the other two studies suggested at best a negligible benefit in terms of preference-based HRQoL measures. Within these last two studies, there is a marked possibility that the intervention offers cost savings but no discernable positive health benefits. The level of uncertainty surrounding measured quality-of-life outcomes suggests that there is also a possibility that the interventions assessed result in a lower aggregate level of health gain compared with standard care. Clearly, these findings are inconsistent with those arising from the clinical review. The critical appraisal of available economic studies highlighted a number of methodological concerns associated with the available studies, which, to some degree, may explain the conflicting findings of the clinical and economic reviews presented here.

Recommendations for future research

Health promotion can be viewed as an umbrella concept that covers a wide range of activities from different disciplines – physical, psychological, social and environmental as well as spiritual – all of which aim to improve the health of the population.[49] Given the limitations of the existing evidence base, there remains a substantial degree of uncertainty surrounding how home-based, nurse-led health promotion should be targeted, implemented and evaluated. This gives rise to a number of potentially relevant policy questions. For instance, would it be more effective to target such a programme at all older people or to limit the intervention to specific disease groups? Would it be better to focus on prevention of disease events (e.g. COPD exacerbations or falls) or focus on the healthy population? Should the intervention be led solely by nurses or within multidisciplinary teams? It is also not possible to determine from the existing research whether another health professional or non-professional trained volunteer could have the same benefits. Clearly, there is considerable scope for future research surrounding the value of health promotion programmes in older people. Rather than suggest one particular research design, *Figure 8* attempts to draw out the main domains in which choices exist for future empirical health promotion studies.

Key issues and considerations relating to each domain are detailed below:

Nature of the programme

- Who will represent the target population? Will the programme include specific at-risk groups?
- Will the programme be implemented as a separate initiative or will it be integrated within existing general health and social services?
- Will the programme be delivered throughout the country or will it be implemented within one or more pilot regions?

Nature of programme
- **Target population**
- **Type of service provided** – integrated or separate
- **Location of service**

Promotional activities
- **Promotional activities** – e.g. educational programmes raising awareness, community development, policy legislation and regulation, dietary habits, equity, active interventions at local, community and national level, assistance provided by health-care professionals, carers, family, etc.

Population criteria
- **Demographics** – age, gender, education, ethnicity
- **Economic status** – income of the individual and family income

Programme implementation
- **Programme operation** – administration, quality assurance
- **Finance** – health–service funding and/or funding from other sectors
- **Coverage** – percentage of population, locations, type of health complications, levels of disability

Health complications
- **Pre-existing morbidity** – e.g. cardiovascular, arterial disease, neurological, mental health, etc.
- **No pre-existing morbidity** – at-risk or otherwise healthy

Health outcomes and opportunity costs
- **Health outcomes** – older people with pre-existing morbidity, healthy at-risk or otherwise healthy
- **Intersectoral considerations** – e.g. carer's time, employment, travel costs, social services costs
- **Objectives** – efficiency maximisation and equitable distribution of health outcomes

FIGURE 8 Choice domains for the design of future home-based health promotion studies. Adapted from a general conceptual framework reported by Kimani *et al.*[50]

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Population criteria

- Should home-based, nurse-led interventions be restricted to certain sections of the population on the basis of demographics such as age, gender, education or ethnicity? If so, what restrictions will be applied and why?
- Should the intervention be targeted at individuals who are in need of emotional and psychological support and care? Or should the intervention include only those individuals who are primarily in need of physical support and care?
- Should the level of income of the individual or their families concerned be taken into consideration while assessing the eligibility criteria for inclusion? How should these restrictions be assessed and applied?

Health complications

- What are the relevant health complications covered under such a programme?
- Will the programme target older people with pre-existing morbidity or will it focus on healthy living in general, targeting the healthy older population? Or will it focus on both?

Promotional activities

- What activities will the health promotion programme comprise? For example, will it include educational aspects to raise awareness of healthy lifestyles, will it focus on prevention of particular events or will it focus on the early identification and management of problems? Will the programme attempt to achieve more than one of these objectives?

Programme implementation

- Who should operate the programme? Will it be led by the NHS alone or will it be funded and implemented in conjunction with other sectors?
- Will patient views be captured within the quality assurance of the delivery of the service?
- What levels of disability among older people will determine the coverage of the intervention?

Recommendations for the evaluation of home-based, nurse-led health promotion programmes

The evaluation of health promotion programmes requires consideration not only of health outcomes accrued by the recipient, and the costs of generating these, but also whether or not the intervention has wider indirect impacts on other individuals (e.g. carers) and other resources incurred outside of the health service. As a consequence, the full range of opportunity costs may be difficult to identify, measure and value. Although the available UK economic evidence base reviewed in *Chapter 4* is sparse, there is some evidence of variability concerning the inclusion of relevant resource costs (see *Table 9*). It has previously been argued that an intersectoral approach is required to identify the broad range of costs and benefits of public health interventions;[51] as such, this goes far beyond the standard methods recommended by existing economic reference cases for cost–utility analysis.[52] For instance, Weatherly *et al.*[51] suggest that the social care and/or health service sector may pay for the social care services and any of the sectors including social care, health service, voluntary or private may provide such services. These issues create an additional layer of complexity to the evaluation of health promotion programmes. The design of future health promotion studies should include prospective consideration of the following issues:

- The definition of the comparator for evaluation may be subject to geographical heterogeneity and may differ according to the particular population risk group under evaluation. Future research should take in ensuring that the comparisons assessed are meaningful from a policy perspective.
- Standard reference cases for economic analysis in the UK typically recommend the adoption of a NHS and PSS perspective, whereby relevant health outcomes are defined as those accrued by NHS patients and relevant costs are those borne by the NHS. Consideration should be given to wider societal costs and benefits.[51,53]

- As health promotion is a complex intervention, it is difficult to associate changes in any particular set of disease events as a direct or indirect result of the intervention on health outcomes. Future research should ensure that preference-based HRQoL instruments (e.g. the EQ-5D) are used as a matter of course and that any potential mortality impacts are also captured. It should also be noted that the QALY may fail to capture other multidimensional aspects of health promotion interventions; Weatherly *et al.*[51] suggest the development of sector-specific generic outcomes outside of health (e.g. a carer QALY).
- Future studies should ensure that the duration of the study follow-up period is sufficient to capture all relevant costs and outcomes between intervention and comparator groups.
- Future studies should also seek to characterise the full range of uncertainty relevant to the policy decision; hence, the use of cost minimisation should be avoided.

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Chapter 6

Other factors relevant to the NHS

The implementation of home-based nurse-led health promotion within the UK gives rise to a number of implications for the NHS and associated sectors (e.g. social services). These relate to three elements that may have a marked impact on the clinical effectiveness and cost-effectiveness of such programmes.

The appropriate level of nurse training

Within the studies identified by this review, there were notable variations in terms of the appropriate level of training for nurses delivering this service. Appropriate training of nurses, and potentially other elements of a multidisciplinary team, may have considerable implications in terms of costs of training, supervision and staffing capacity within trusts. This may also have implications for which types of nurses should deliver health promotion. For example, the training of health visitors and district nurses is focused more on community care, whereas that for other groups may not be focused on home visiting to the same extent. It should also be noted that within multidisciplinary and single profession settings, staff often have generic skills that extend beyond traditional views of their role. For example, physiotherapists may take an individual's blood pressure or nurses may assess equipment required for individual patients.

Composition and frequency of home-based nursing visits

There is considerable uncertainty concerning which elements of home-based nursing visits contribute to positive health outcomes. Given the current evidence base, the most appropriate design of this type of complex intervention remains generally unclear. There exists some evidence to suggest that increased numbers of visits may contribute to positive outcomes, although the actual beneficial components remain unclear. Clearly, the intended designs of such programmes will have a significant bearing on both the costs and health gains arising from them. There may be a role for qualitative research in identifying which components of the intervention patients value or derive benefit from; however, such studies do not provide a suitable comparative basis for evaluating alternative programmes.

Targeting of population groups who have the capacity to benefit

The way in which home-based visiting programmes are designed and delivered, and the nature and size of the target population (e.g. all older individuals, history of stroke, and so on), will likely have substantial implications for staffing capacity and programme costs.

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Contributions of authors

Paul Tappenden acted as principal investigator for the assessment. Fiona Campbell undertook the review of clinical effectiveness. Andrew Rawdin and Paul Tappenden undertook the review of existing health economic evaluations. Ruth Wong undertook the systematic searches of clinical effectiveness and cost-effectiveness. Paul Tappenden and Neelam Kalita prepared the discussion of future research priorities.

About the School of Health and Related Research

The School of Health and Related Research (ScHARR) is one of the nine departments that constitute the Faculty of Medicine, Dentistry and Health at the University of Sheffield. ScHARR specialises in health services and public health research, and the application of health economics and decision science to the development of health services and the improvement of public health.

The ScHARR Technology Assessment Group (ScHARR-TAG) synthesises research on the clinical effectiveness and cost-effectiveness of health-care interventions for the National Institute for Health Research (NIHR) Health Technology Assessment programme on behalf of a range of policy-makers, including the National Institute for Health and Clinical Excellence (NICE). ScHARR-TAG is part of a wider collaboration of a number of units from other regions, including Southampton Health Technology Assessment Centre (SHTAC), University of Southampton; Aberdeen Health Technology Assessment Group (Aberdeen HTA Group), University of Aberdeen; Liverpool Reviews & Implementation Group (LRiG), University of Liverpool; Peninsula Technology Assessment Group (PenTAG), University of Exeter; the NHS Centre for Reviews and Dissemination, University of York; Warwick Evidence, University of Warwick; the *BMJ* Group; and Kleijnen Systematic Reviews.

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Appendix 1

Search strategies

Terms for the population for people over 65 years were identified (statements 1–11) and combined with broad terms for home-based, nurse-led or community interventions (statements 13–45). The search strategy was translated across various databases.

MEDLINE(R) In-Process & Other Non-Indexed Citations and MEDLINE(R): Ovid 1950–present

1. aged/
2. "aged, 80 and over"/
3. frail elderly/
4. aged.tw.
5. aging.tw.
6. geriatric.tw.
7. elder$.tw.
8. senior$.tw.
9. pensioner$.tw.
10. (over 65 or over sixty-five$ or over sixty five$).tw.
11. (old$ adj20 (adult$ or person or people)).tw.
12. or/1–11
13. Health Education/
14. health education.tw.
15. Health Promotion/
16. (health adj (promotion$ or campaign$ or prevention$ or protection)).tw.
17. wellness program$.tw.
18. primary prevention.tw.
19. or/13–18
20. (nurse led or nurse-led or home or community based or community-based).tw.
21. 19 and 20
22. ((home-based or home based or home) adj nursing).tw.
23. Home Care Services/
24. home care service$.tw.
25. Home Nursing/
26. Health Services for the Aged/
27. House Calls/
28. house call$.tw.
29. (home visit$ or house visit$).tw.
30. Geriatric Nursing/
31. geriatric health service$.tw.
32. Community Health Nursing/
33. (community adj (health or nursing)).tw.
34. Public Health Nursing/
35. public health nursing.tw.
36. Specialties, Nursing/
37. specialist nurse$.tw.
38. district nurs$.tw.
39. visiting nurse$.tw.

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40. health visitor$.tw.
41. advanced practitioner$.tw.
42. Nurse Practitioners/
43. nurse practitioner$.tw.
44. Nurse Clinicians/
45. clinical nurse specialist$.tw.
46. or/22–42
47. 12 and (21 or 46)

EMBASE: Ovid 1980–present

1. aged/
2. FRAIL ELDERLY/
3. aged.tw.
4. aging.tw.
5. geriatric.tw.
6. elder$.tw.
7. senior$.tw.
8. pensioner$.tw.
9. (over 65 or over sixty-five$ or over sixty five$).tw.
10. (old$ adj20 (adult$ or person or people)).tw.
11. or/1–10
12. health education/
13. health education.tw.
14. health promotion/
15. (health adj (promotion$ or campaign$ or prevention$ or protection)).tw.
16. wellness program$.tw.
17. primary prevention/
18. primary prevention.tw.
19. or/12–18
20. (nurse led or nurse-led or home or community based or community-based).tw.
21. 19 and 20
22. ((home-based or home based or home) adj nursing).tw.
23. home care/
24. home care service$.tw.
25. elderly care/
26. house call$.tw.
27. (home visit$ or house visit$).tw.
28. geriatric nursing/
29. geriatric health service$.tw.
30. community health nursing/
31. (community adj (health or nursing)).tw.
32. public health nursing.tw.
33. nursing discipline/
34. specialist nurse$.tw.
35. district nurs$.tw.
36. visiting nurse$.tw.
37. health visitor$.tw.
38. nurse practitioner/
39. nurse practitioner$.tw.
40. nurse clinician$.tw.
41. clinical nurse specialist$.tw.
42. or/22–41
43. 11 and (21 or 42)

Science Citation Index: Web of Science 1899–present

# 10	#8 AND #7 Refined by: Publication Years = (2009 OR 2008 OR 2002 OR 2006 OR 2001 OR 2004 OR 2005 OR 2010 OR 2003 OR 2007)
# 9	#8 AND #7
# 8	Topic = ("cost–benefit analysis" or "economic value of life" or "quality-adjusted life years" or "economic model*" or "cost utilit*" or "cost benefit*" or "cost minim*" or "cost effect*" or "economic evaluation*")
# 7	#6 AND #1
# 6	#5 OR #4
# 5	Topic = ("home-based nursing" or "home based nursing" or "home nursing") OR Topic = ("home care service*" or "health services for the aged" or "house call*" or "home visit*" or "house visit*" or "geriatric nursing" or "geriatric health service*" or "community health" or "community nursing" or "public health nursing" or "specialities nursing") OR Topic = ("specialist nurse*" or "district nurs*" or "visiting nurse*" or "health visitor*" or "advanced practitioner*" or "nurse practitioner*" or "nurse clinician*" or "clinical nurse specialist*")
# 4	#3 AND #2
# 3	Topic = ("nurse led" or nurse-led or home or "community based" or community-based)
# 2	Topic = ("health education" or "health promotion*" or "health campaign*" or "health prevention*" or "health protection" or "wellness program*" or "primary prevention")
# 1	Topic = (aged or aging or geriatric or elder* or senior* or pensioner*) OR Topic = ("over 65" or "over sixty-five*" or "over sixty five*") OR Topic = (old* SAME20 (adult* or person or people))

Cochrane Database of Systematic Reviews: Wiley InterScience 1996–present; Cochrane Central Register of Controlled Trials: Wiley InterScience 1898–present; NHS Economic Evaluation Database: Wiley InterScience 1995–present; Health Technology Assessment Database: Wiley InterScience 1995–present; Database of Abstracts of Reviews of Effects: Wiley InterScience 1995–present

#1	MeSH descriptor Aged explode all trees
#2	(aged):ti,ab
#3	(aging):ti,ab
#4	(geriatric):ti,ab
#5	(elder*):ti,ab
#6	(senior*):ti,ab
#7	(pensioner*):ti,ab
#8	(over 65 or over sixty-five* or over sixty five*):ti,ab
#9	(old* NEAR/20 (adult* or person or people)):ti,ab
#10	(#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9)
#11	MeSH descriptor Health Education, this term only
#12	(health education):ti,ab
#13	MeSH descriptor Health Promotion explode all trees
#14	(health NEXT (promotion* or campaign* or prevention* or protection)):ti,ab
#15	(wellness program*):ti,ab
#16	(primary prevention):ti,ab
#17	(#11 OR #12 OR #13 OR #14 OR #15 OR #16)
#18	(nurse led or nurse-led or home or community based or community-based):ti,ab
#19	(#17 AND #18)
#20	(home-based or home based or home) NEXT nursing:ti,ab
#21	MeSH descriptor Home Care Services, this term only

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#22	(home care service*):ti,ab
#23	MeSH descriptor Home Nursing explode all trees
#24	MeSH descriptor Health Services for the Aged, this term only
#25	MeSH descriptor House Calls, this term only
#26	(house call*):ti,ab
#27	(home visit* or house visit*):ti,ab
#28	MeSH descriptor Geriatric Nursing, this term only
#29	(geriatric health service*):ti,ab
#30	MeSH descriptor Community Health Nursing, this term only
#31	(community NEXT (health or nursing)):ti,ab
#32	MeSH descriptor Public Health Nursing, this term only
#33	(public health nursing):ti,ab
#34	MeSH descriptor Specialties, Nursing, this term only
#35	(specialist nurse*):ti,ab
#36	(district nurs*):ti,ab
#37	(visiting nurse*):ti,ab
#38	(health visitor*):ti,ab
#39	(advanced practitioner*):ti,ab
#40	MeSH descriptor Nurse Practitioners, this term only
#41	(nurse practitioner*):ti,ab
#42	MeSH descriptor Nurse Clinicians, this term only
#43	(clinical nurse specialist*):ti,ab
#44	(#20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43)
#45	(#19 OR #44)
#46	(#10 AND #45)
#47	(#46), from 2001 to 2011

CINAHL: EBSCO 1982–present

S39	S5 and S12 and S37 Limiters – Published Date from: 20020101–20111231
S38	S5 and S12 and S37
S37	S15 or S16 or S17 or S18 or S19 or S20 or S21 or S22 or S23 or S24 or S25 or S26 or S27 or S28 or S29 or S30 or S31 or S32 or S33 or S34 or S35 or S36
S36	TI “clinical nurse specialist*” or AB “clinical nurse specialist*”
S35	(MH “Clinical Nurse Specialists”)
S34	TI “nurse practitioner*” or AB “nurse practitioner*”
S33	(MH “Nurse Practitioners”)
S32	TI “advanced practitioner*” or AB “advanced practitioner*”
S31	TI “health visitor*” or AB “health visitor*”
S30	TI “visiting nurse*” or AB “visiting nurse*”
S29	TI “district nurs*” or AB “district nurs*”
S28	TI “specialist nurse*” or AB “specialist nurse*”
S27	(MH “Specialties, Nursing”)
S26	TI public health nursing or AB public health nursing
S25	TI ((community N2 health) or (community N2 nursing)) or AB ((community N2 health) or (community N2 nursing))
S24	(MH “Community Health Nursing”)
S23	TI geriatric health service* or AB geriatric health service*
S22	(MH “Gerontologic Nursing”)
S21	TI (“house call*” or “home visit*” or “house visit*”) or AB (“house call*” or “home visit*” or “house visit*”)
S20	(MH “Home Visits”)

S19	(MH "Health Services for the Aged")
S18	(MH "Home Nursing")
S17	TI "home care service*" or AB "home care service*"
S16	(MH "Home Health Care")
S15	TI ("home-based nursing" or "home based nursing" or "home nursing") or AB ("home-based nursing" or "home based nursing" or "home nursing")
S14	S12 and S13
S13	TI ("nurse led" or nurse-led or home or "community based" or community-based) or AB ("nurse led" or nurse-led or home or "community based" or community-based)
S12	S6 or S7 or S8 or S9 or S10 or S11
S11	TI primary prevention or AB primary prevention
S10	TI wellness program* or AB wellness program*
S9	TI ((health N2 promotion*) or (health N2 campaign*) or (health N2 prevention*) or (health N2 protection)) or AB ((health N2 promotion*) or (health N2 campaign*) or (health N2 prevention*) or (health N2 protection))
S8	(MH "Health Promotion")
S7	TI health education or AB health education
S6	(MH "Health Education")
S5	S1 or S2 or S3 or S4
S4	TI ((old* N20 adult*) or (old* N20 person) or (old* N20 people)) or AB ((old* N20 adult*) or (old*N20 person) or (old* N20 people))
S3	TI ("over 65" or "over sixty-five*" or "over sixty five*") or AB ("over 65" or "over sixty-five*" or "over sixty five*")
S2	TI (aged or aged or geriatric or elder* or senior* or pensioner*) or AB (aged or aged or geriatric or elder* or senior* or pensioner*)
S1	(MH "Aged") OR (MH "Aged, 80 and Over") OR (MH "Frail Elderly")

UK Clinical Research Network: NIHR 2001–present

http://public.ukcrn.org.uk/search/

- Home based nursing
- Home-based nursing
- Home nursing
- Nursing.

Clinical Trials.gov: US-National Institutes of Health (US-NIH) 2000–present

http://clinicaltrials.gov/ct2/search

- Found 92 studies with search of: home based nursing | Senior | received from 1 January 2001 to 1 March 2011.

Health Economic Evaluations Database: OHE-IFPHA 1967–present

AX = (aged) or (aging) or (geriatric) or (elder*) or (senior*) or (pensioner*) or (old people)
AX = (nurse led) or (nurse-led) or (home) or (community based) or (community-based)
AX = (primary prevention) or (health education) or (health protection)
CS = 2 and 3
AX = (home-based nursing) or (home based nursing) or (home nursing)
AX = (geriatric nursing) or (community health) or (community nursing) or (public health nursing)
CS = 4 or 5 or 6
CS = 1 and 7
JD> = 2001
CS = 8 and 9

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Methodological filters

Randomised controlled trial including UK filter, e.g. in MEDLINE

1. Randomized controlled trials as Topic/
2. Randomized controlled trial/
3. Random allocation/
4. randomized controlled trial.pt.
5. Double blind method/
6. Single blind method/
7. Clinical trial/
8. exp Clinical Trials as Topic/
9. controlled clinical trial.pt.
10. or/1–9
11. (clinic$adj25 trial$).ti,ab.
12. ((singl$ or doubl$ or treb$ or tripl$) adj (blind$ or mask$)).tw.
13. Placebos/
14. Placebo$.tw.
15. (allocated adj2 random).tw.
16. or/11–15
17. 10 or 16
18. Case report.tw.
19. Letter/
20. Historical article/
21. or/18–20
22. exp Animals/
23. Humans/
24. 22 not 23
25. 21 or 24
26. 17 not 25
27. 26 and 47 (last statement of MEDLINE strategy)
28. exp Great Britain/
29. (britain or england or uk or united kingdom or scotland or wales or british or northern ireland or gb).af.
30. 28 or 29
31. 27 and 30

Systematic reviews filter, e.g. in MEDLINE

1. meta-analysis as topic/
2. (meta analy$ or metaanaly$).tw.
3. Meta-Analysis/
4. (systematic adj (review$1 or overview$1)).tw.
5. "Review Literature as Topic"/
6. or/1–5
7. (cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or cinhal or science citation index or bids or cancerlit).ab.
8. ((reference adj list$) or bibliograph$ or hand-search$ or (relevant adj journals) or (manual adj search$)).ab.
9. ((selection adj criteria) or (data adj extraction)).ab.
10. "review"/
11. 9 and 10
12. comment/or editorial/or letter/

13. Animals/
14. Humans/
15. 13 and 14
16. 13 not 15
17. 12 or 16
18. 6 or 7 or 8 or 11
19. 18 not 17
20. 19 and 47 (last statement of MEDLINE strategy)

Economic filter, e.g. in MEDLINE

1. Cost–benefit analysis/
2. Economic value of life/
3. Quality-adjusted life years/
4. exp models, economic/
5. cost utilit$.tw.
6. cost benefit$.tw.
7. cost minim$.tw.
8. cost effect$.tw.
9. economic evaluation$.tw.
10. or/1–9
11. 10 and 47 (last statement of MEDLINE strategy)

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Appendix 2

Excluded papers

Table of excluded papers

Paper	Reason for exclusion
Caine 2002[54]	Not a home-based intervention
Campbell 2005[55]	New Zealand-based study
Carpenter 2004[56]	Survey design
Clarke 1992[57]	Intervention not delivered by nurses
Clemson 2004[58]	Study based in Australia
Dalal 2007[59]	Mean age < 70 years
Dar 2009[60]	Telemonitoring intervention delivered by medical specialists and a nurse specialist
Davies 2007[61]	The type of professional delivering the intervention was not described
Degischer 2002[62]	Not conducted in the UK or delivered by nurses
Drennan 2005[63]	Intervention delivered by multiagency team
Finucane 2009[64]	Not home based
Fletcher 2004[65]	Intervention was different approaches to assessment
Fletcher 2009[66]	Before-and-after study
Gill 2002[67]	US-based study
Harari 2008[68]	Intervention was assessment
Hendriksen 1984[69]	Study based in Denmark
Huffman 2002[70]	Unable to extract data for the very elderly population
Jolly 2003[71]	Study protocol
Jolly 2007[72]	Study protocol
Jolly 2009[73]	Mean age < 70 years
Jones 2009[74]	Qualitative study
Khunti 2007[75]	Mean age < 75 years. Interventions delivered not delivered at home
Perry 2008[76]	Based in the Netherlands
Ramsbottom 2004[77]	Intervention not delivered at home
Roderick 2001[78]	Intervention not delivered by nurses
Strachan 2007[79]	Quantitative survey
Yeom 2009[80]	US-based study

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Appendix 3

Protocol

The clinical and cost-effectiveness of home-based health promotion for older people
HTA 09/142
Draft Protocol
1 December 2010

Title of the project

The clinical and cost-effectiveness of home-based health promotion for older people in the United Kingdom.

Name of TAR team and project 'lead'

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Plain English Summary

Older age is associated with numerous health risks. Physical health may decline and frailty increases, bringing with it additional risks such as falls. Social isolation may become more common due to reduced physical mobility and changing family structures and working patterns. Social isolation can lead to deterioration in emotional and psychological health. Older peoples' needs may become an increasingly important health issue as the number of older people increases. Changing family structures and greater mobility in the working population means that more older people will be living alone, and social isolation and loneliness may become increasingly widespread. By 2021 it has been estimated that more than one in every 15 people will be an older person experiencing a mental health problem.

In older age, reduction in physical function can lead to loss of independence, the need for hospital and long-term nursing-home care and premature death. The importance of physical, functional, psychological and social factors in realising a healthy old age is recognised by elderly people,[1] health care professionals[2] and policymakers.[3] Physical and psychological health promotion for the elderly may have many important benefits for individuals, families and society as a whole.

Enabling older people to remain in their own homes has been a relevant government objective for several decades. In recent years, emphasis has been placed on health promotion and other

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preventative measures to delay the onset of illness and dependency that lead to long-term care needs.[4] In the UK, annual assessments of physical and cognitive health for individuals aged over 75 became a necessity in primary care in 1989. In 2005, a targeted approach to assessment and care was developed with community nurse-led case management of elderly people with medical conditions. Home-visiting programmes for older people may positively affect health and functional status, promote independent functioning and reduce hospital and nursing home admissions.

Since 2000, nine systematic reviews[5–10;11–13] have been published. These reported conflicting results regarding the benefits of home-visiting programmes; five found beneficial effects, three found no evidence of benefit and two were inconclusive. A subgroup analysis within one review suggested that effective home-visiting programmes include multidimensional assessment, many follow-up visits and targeted people at a lower risk of death.[7] These reviews did not include consider cost-effectiveness concerns and none were UK-specific.

This assessment will seek to address these gaps to identify the factors which contribute to the effectiveness of these interventions and to examine whether such programmes represent value for money.

Decision Problem

Research Question

What is the clinical and cost-effectiveness of nurse-led health promotion intervention delivered at home for older people at risk of admission to hospital, residential or nursing care in the UK?

Intervention

Structured home-based nurse led health promotion.

Patient population

Frail older people (>75 years) with long-term medical or social needs at risk of admission to hospital, residential or nursing care.

Setting

In the home or community.

Relevant comparators

Standard care including joint health and social assessment. Health promotion delivered in a different setting or not delivered by a nurse.

Design

An evidence synthesis in the form of a systematic review of studies undertaken in the UK, including older people with longer-term medical or social needs and at risk of admission to hospital, residential or nursing care. A decision analytic model will be developed to investigate the cost-effectiveness of nurse-led, home- or community-based health promotion.

Outcomes

The systematic review will summarise the evidence for home-based nurse-led interventions designed to promote health and prevent the deterioration of health. The review will look at the components of the review and seek to identify factors that contribute to the clinical effectiveness of particular programmes.

Key factors to be addressed

Do home-based nurse-led interventions work, and if so what do they prevent or promote? If these interventions work effectively, what features of the interventions are crucial to their effectiveness and do these represent good value for money for the NHS?

Report methods for synthesis of evidence of clinical effectiveness

A systematic review of the evidence for clinical effectiveness will be undertaken following the general principles recommended in the QUOROM statement. The review will assess the effectiveness of nurse-led, home-based health promotion interventions for frail older people. It will also seek to identify the effective components of the intervention.

Population

Frail older people (>75 years) with long-term medical or social needs at risk of admission to hospital, residential or nursing care.

Interventions

Structured home based nurse-led health promotion.

Comparators

Standard care including joint health and social assessment. Health promotion delivered in a different setting or not delivered by a nurse.

Outcomes

Admission to hospital, residential or nursing care, mortality, morbidity including depression, falls, accidents, deteriorating health status, patient satisfaction.

Search Strategy

The search will be limited by date from 2001 to 2010. The Stuck *et al* (2002) review will be used as a source for identifying studies publishing earlier prior to 2002 (their search was conducted from January 1985 to November 2001). Bibliographies of previous systematic reviews, review articles and included studies will be handsearched to identify any other relevant studies.

The search strategy will comprise the following elements:

- Searching of electronic databases
- Handsearching of bibliographies of retrieved papers
- Contact with experts in the field.

Databases to be searched include the following:

- MEDLINE
- MEDLINE in Process (last 12 months)
- EMBASE
- CINAHL
- The Cochrane Library including the Cochrane Systematic Reviews Database, Cochrane Controlled Trials Register, DARE, NHS EED and HTA databases
- Science Citation Index (via Web of Science)
- National Research Register
- www.clinicaltrials.gov.

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Inclusion Criteria

Studies will be included if they were conducted in the UK. They will be included if they evaluated a nurse-led health promoting intervention delivered in a home or community setting. Studies will only be included if they adopted an RCT design.

Exclusion Criteria

Non-randomised studies, non-English-language papers and reports published as meeting abstracts only where insufficient methodological details are reported to allow critical appraisal of study quality. Non-UK studies and interventions led by professionals other than nurses.

Data Extraction Strategy

Data will be extracted by one reviewer (FC).

Quality Assessment Strategy

Quality will be assessed using the Cochrane Risk of Bias tool. In particular, consideration of study quality will include the following factors:

Trial characteristics

1. Timing, duration and length of follow-up of the study
2. Method of randomisation
3. Method of allocation concealment
4. Blinding
5. Numbers of participants randomised, excluded and lost to follow-up
6. Whether intent-to-treat analysis is performed
7. Methods for handling missing data.

Methods of analysis/synthesis

Data will be tabulated and discussed in a narrative review. Where appropriate, meta-analysis will be employed to estimate a summary measure of effect on relevant outcomes based on intention to treat analyses. Meta-analysis will be undertaken using fixed and random effects models, using Revman software. Heterogeneity will be explored through consideration of the study populations, methods and interventions, by visualisation of results and by the I^2 statistic.

Where available data is sufficient, subgroup analysis will be conducted to explore factors identified in earlier work as being significant in influencing intervention effectiveness including risk factors associated with the elderly person, the number of visits and the nature of the initial assessment. Sensitivity analysis will be used to explore the impact of study design on measures of effectiveness.

Methods for estimating quality of life

Studies describing relevant health-related quality of life outcomes will be identified from published sources as deemed appropriate from the definition of the decision problem.

Report methods for synthesising evidence of cost-effectiveness

The cost-effectiveness of alternative NHS-based home nursing interventions will be assessed against standard care from the perspective of the NHS and Personal Social Services. Published trials and economic studies will be examined to identify existing comparative evidence concerning the cost-effectiveness of such interventions. If appropriate/required, a *de novo*

health economic model will be developed. Relevant events, costs and outcomes for inclusion in the model, and the relationship between these, will be elicited from the literature and from the views of clinical experts through a formal and transparent problem structuring process using cognitive mapping. Cost-effectiveness will most likely be assessed in terms of the incremental cost per quality adjusted life year (QALY) gained. Discounting will be undertaken using standard methods. The precise structure of the model will be determined upon consideration of relevant issues arising from the problem structuring process.

Expertise in this TAR team

TAR Centre

The ScHARR Technology Assessment Group (ScHARR-TAG) undertakes reviews of the effectiveness and cost-effectiveness of healthcare interventions for the NHS R&D Health Technology Assessment Programme on behalf of a range of policymakers in a short timescale, including the National Institute for Health and Clinical Excellence. The group has extensive expertise in information retrieval, systematic reviewing and health economic modelling.

Contributions of team members:

Paul Tappenden, Senior Research Fellow

Paul will be the lead on this TAR project. Paul will manage the day-to-day progress of the assessment and will design and undertake the economic analysis.

Fiona Campbell, Research Fellow, ScHARR

Fiona will be the main reviewer on this project. Fiona will undertake the study selection, data extraction and do the meta-analyses.

Ruth Wong, Information Specialist, ScHARR

Ruth will undertake the systematic searches for the review.

Gill Rooney, Project Administrator, ScHARR

Gill will assist in the retrieval of papers and in preparing and formatting the report.

Expert advisors

Two expert advisors will be provide advice for the assessment: Margaret Osborne, who is a heart failure nurse specialist, and Gill Agar, who is a physiotherapist coordinating home based health promotion to prevent falls amongst the elderly. Both are health professionals currently involved in delivering home based health promotion to the elderly in their homes.

Competing interests of authors

None.

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Timetable/milestones

The project is expected to run from 1 December 2010 to 3 May 2011.

Milestone	Deadline
Draft protocol	1 December 2010
Final protocol	15 December 2010
Start review	1 March 2011
Progress report	5 April 2011
Assessment report	3 May 2011

Appendices

Appendix 1– MEDLINE search strategy

1. aged/
2. "aged, 80 and over"/
3. frail elderly/
4. aged.tw.
5. aging.tw.
6. geriatric.tw.
7. elder$.tw.
8. senior$.tw.
9. pensioner$.tw.
10. (over 65 or over sixty-five$ or over sixty five$).tw.
11. (old$ adj20 (adult$ or person or people)).tw.
12. or/1–11
13. Health Education/
14. health education.tw.
15. Health Promotion/
16. (health adj (promotion$ or campaign$ or prevention$ or protection)).tw.
17. wellness program$.tw.
18. primary prevention.tw.
19. or/13–18
20. (nurse led or nurse-led or home or community based or community-based).tw.
21. 19 and 20
22. ((home-based or home based or home) adj nursing).tw.
23. Home Care Services/
24. home care service$.tw.
25. Home Nursing/
26. Health Services for the Aged/
27. House Calls/
28. house call$.tw.
29. (home visit$ or house visit$).tw.
30. Geriatric Nursing/
31. geriatric health service$.tw.
32. Community Health Nursing/
33. (community adj (health or nursing)).tw.
34. Public Health Nursing/
35. public health nursing.tw.

36. Specialties, Nursing/
37. specialist nurse$.tw.
38. district nurs$.tw.
39. visiting nurse$.tw.
40. health visitor$.tw.
41. advanced practitioner$.tw.
42. Nurse Practitioners/
43. nurse practitioner$.tw.
44. Nurse Clinicians/
45. clinical nurse specialist$.tw.
46. or/22–42
47. 12 and (21 or 46)

Searches will be limited by year from 2001 to present. A highly sensitive filter will be applied to limit searches by publication (reviews, RCTs and economic studies).

Appendix 2 – Sample data extraction form

STUDY	Baseline characteristics	Description of Intervention	Outcomes	Study Design
Author: Date: Setting:	Total number: Mean Age: Indicator of Health Status: % Male: Ethnic group: Indicator of provision of social support: Indicator of provision of existing social and/or health care support	Provider details (training, work load) Nature of intervention (purpose, frequency, duration of intervention and duration of follow-up)	Mortality during intervention and follow-up: Hospital or nursing home admission: Indicator of deterioration in health status: Patient satisfaction:	Baseline comparability: RCT or Cluster RCT: Method of allocation concealment: Method of randomisation: Blinding of outcome assessors: Loss to follow-up: Participant withdrawals: Other potential bias:

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The HTA programme and the authors would like to know your views about this report.

The Correspondence Page on the HTA website (www.hta.ac.uk) is a convenient way to publish your comments. If you prefer, you can send your comments to the address below, telling us whether you would like us to transfer them to the website.

We look forward to hearing from you.

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