Health Technology Assessment 2002; Vol. 6: No. 4

A systematic review of discharge arrangements for older people

SG Parker
SM Peet
A McPherson
AM Cannaby
K Abrams
R Baker
A Wilson
J Lindesay
C Parker
DR Jones

Health Technology Assessment
NHS R&D HTA Programme

How to obtain copies of this and other HTA Programme reports.
An electronic version of this publication, in Adobe Acrobat format, is available for downloading free of charge for personal use from the HTA website (http://www.hta.ac.uk). A fully searchable CD-ROM is also available (see below).

Printed copies of HTA monographs cost £20 each (post and packing free in the UK) to both public **and** private sector purchasers from our Despatch Agents.

Non-UK purchasers will have to pay a small fee for post and packing. For European countries the cost is £2 per monograph and for the rest of the world £3 per monograph.

You can order HTA monographs from our Despatch Agents:

– fax (with **credit card** or **official purchase order**)
– post (with **credit card** or **official purchase order** or **cheque**)
– phone during office hours (**credit card** only).

Additionally the HTA website allows you **either** to pay securely by credit card **or** to print out your order and then post or fax it.

Contact details are as follows:

HTA Despatch
c/o Direct Mail Works Ltd
4 Oakwood Business Centre
Downley, HAVANT PO9 2NP, UK

Email: orders@hta.ac.uk
Tel: 02392 492 000
Fax: 02392 478 555
Fax from outside the UK: +44 2392 478 555

NHS libraries can subscribe free of charge. Public libraries can subscribe at a very reduced cost of £100 for each volume (normally comprising 30–40 titles). The commercial subscription rate is £300 per volume. Please see our website for details. Subscriptions can only be purchased for the current or forthcoming volume.

Payment methods

Paying by cheque
If you pay by cheque, the cheque must be in **pounds sterling**, made payable to *Direct Mail Works Ltd* and drawn on a bank with a UK address.

Paying by credit card
The following cards are accepted by phone, fax, post or via the website ordering pages: Delta, Eurocard, Mastercard, Solo, Switch and Visa. We advise against sending credit card details in a plain email.

Paying by official purchase order
You can post or fax these, but they must be from public bodies (i.e. NHS or universities) within the UK. We cannot at present accept purchase orders from commercial companies or from outside the UK.

How do I get a copy of *HTA on CD*?

Please use the form on the HTA website (www.hta.ac.uk/htacd.htm). Or contact Direct Mail Works (see contact details above) by email, post, fax or phone. *HTA on CD* is currently free of charge worldwide.

The website also provides information about the HTA Programme and lists the membership of the various committees.

A systematic review of discharge arrangements for older people

SG Parker[1*]
SM Peet[2]
A McPherson[2]
AM Cannaby[2]
K Abrams[3]
R Baker[4]
A Wilson[4]
J Lindesay[5]
G Parker[6]
DR Jones[3]

[1] Sheffield Institute for Studies on Ageing, University of Sheffield, UK
[2] Division of Medicine for the Elderly, University of Leicester, UK
[3] Department of Epidemiology, University of Leicester, UK
[4] Department of General Practice, University of Leicester, UK
[5] Division of Psychiatry for the Elderly, University of Leicester, UK
[6] Nuffield Community Care Studies Unit, University of Leicester, UK

[*] Corresponding author

Competing interests: none declared

Published May 2002

This report should be referenced as follows:

Parker SG, Peet SM, McPherson A, Cannaby AM, Abrams K, Baker R, *et al*. A systematic review of discharge arrangements for older people. *Health Technol Assess* 2002;**6**(4).

Health Technology Assessment is indexed in *Index Medicus*/MEDLINE and *Excerpta Medica*/EMBASE. Copies of the Executive Summaries are available from the NCCHTA website (see opposite).

NHS R&D HTA Programme

The NHS R&D Health Technology Assessment (HTA) Programme was set up in 1993 to ensure that high-quality research information on the costs, effectiveness and broader impact of health technologies is produced in the most efficient way for those who use, manage and provide care in the NHS.

Initially, six HTA panels (pharmaceuticals, acute sector, primary and community care, diagnostics and imaging, population screening, methodology) helped to set the research priorities for the HTA Programme. However, during the past few years there have been a number of changes in and around NHS R&D, such as the establishment of the National Institute for Clinical Excellence (NICE) and the creation of three new research programmes: Service Delivery and Organisation (SDO); New and Emerging Applications of Technology (NEAT); and the Methodology Programme.

This has meant that the HTA panels can now focus more explicitly on health technologies ('health technologies' are broadly defined to include all interventions used to promote health, prevent and treat disease, and improve rehabilitation and long-term care) rather than settings of care. Therefore the panel structure has been redefined and replaced by three new panels: Pharmaceuticals; Therapeutic Procedures (including devices and operations); and Diagnostic Technologies and Screening.

The HTA Programme will continue to commission both primary and secondary research. The HTA Commissioning Board, supported by the National Coordinating Centre for Health Technology Assessment (NCCHTA), will consider and advise the Programme Director on the best research projects to pursue in order to address the research priorities identified by the three HTA panels.

The research reported in this monograph was funded as project number 95/09/03.

The views expressed in this publication are those of the authors and not necessarily those of the HTA Programme or the Department of Health. The editors wish to emphasise that funding and publication of this research by the NHS should not be taken as implicit support for any recommendations made by the authors.

Criteria for inclusion in the HTA monograph series
Reports are published in the HTA monograph series if (1) they have resulted from work commissioned for the HTA Programme, and (2) they are of a sufficiently high scientific quality as assessed by the referees and editors.

Reviews in *Health Technology Assessment* are termed 'systematic' when the account of the search, appraisal and synthesis methods (to minimise biases and random errors) would, in theory, permit the replication of the review by others.

The editors and publisher have tried to ensure the accuracy of this report but do not accept liability for damages or losses arising from material published in this report. They would like to thank the referees for their constructive comments on the draft document.

ISSN 1366-5278

Published by Core Research, Alton, on behalf of the NCCHTA.
Printed on acid-free paper in the UK by The Basingstoke Press, Basingstoke.

G

Contents

List of abbreviations

ADL	Activities of Daily Living
ADSS	Association of Directors of Social Services
ANOVA	analysis of variance*
BGS	British Geriatrics Society
CABG	coronary artery bypass graft*
CGA	comprehensive geriatric assessment
CHF	congestive heart failure*
CI	confidence interval
COPD	chronic obstructive pulmonary disease*
CRD	[NHS] Centre for Reviews and Dissemination
df	degrees of freedom*
DGH	district general hospital
DRG	diagnosis-related group*
EADL	Extended Activities of Daily Living
EPOC	Effective Practice and Organisation of Care
GDS	Geriatric Depression Scale
GEMU	geriatric evaluation and management unit
GP	general practitioner
HAS	home assessment service
HHAS	hospital home assessment service
IADL	Instrumental Activities of Daily Living
IGCS	inpatient geriatric consultation service
IQR	interquartile range*
ITU	intensive treatment unit*
LoS	length of stay*
MMSE	Mini-mental State Examination
MSQ	Mental Status Questionnaire
NS	not significant*
OAS	outpatient assessment service
OPAC	online public access catalogue
OR	odds ratio*
PADL	Personal Activities of Daily Living
p.r.n.	*pro re nata* – as required
QoL	quality of life
RCT	randomised controlled trial
RRR	readmission risk ratio
SD	standard deviation
SE	standard error*
SEM	standard error of the mean*
SF-36	Short Form with 36 items
SPSS	Statistical Package for the Social Sciences

* Used only in tables and figures

Executive summary

Background

Discharge of older people from hospital is a key issue in both acute health and community care policy and practice. Implementation of the NHS and Community Care Act included a financial imperative for health authorities and local authorities to devise joint discharge planning arrangements. Professionals in health and social care use agreed protocols to help ensure proper quality standards of discharge processes for vulnerable elderly people. We have performed a systematic review of discharge arrangements for older people.

Objectives

This review was conducted to test the following general hypotheses:

- there is an inadequate number of comparable randomised controlled trials (RCTs) to allow a definitive analysis
- hospital discharge process, outcome and cost-effectiveness can be improved through the use of a variety of interventions
- some interventions are more effective than others
- there are priority areas for future research.

Methods

The aim of the search strategy was to provide as comprehensive a retrieval as possible of published and unpublished clinical trials relating to interventions to improve the discharge of older people from inpatient hospital care.

Literature retrieval focused on obtaining RCTs for review. After ensuring an acceptable level of agreement between the reviewers ($\kappa = 0.66$), titles and abstracts were scanned by the research assistant to exclude obviously irrelevant studies. All subsequent assessments were performed by two reviewers independently and disagreements were resolved by discussion. Reprints of all potentially relevant studies were obtained and subjected to a relevance and quality check before proceeding to data extraction. Data were extracted from all relevant RCTs.

Data sources

The search process included:

- keyword searches of 24 electronic databases
- handsearching of relevant journals
- scanning of reference lists
- citation searching of key papers
- contact with organisations and individuals via the Internet and through personal communication
- keyword searching of the world wide web.

Study selection

Included studies

- RCTs evaluating an intervention intended to modify discharge in patients experiencing discharge from inpatient hospital care.
- Studies that included patients over the age of 65 years experiencing discharge from inpatient hospital care.
- Studies undertaken in an inpatient hospital, or in the community after discharge from inpatient hospital care.

Studies were only eligible for inclusion if they described at least one of mortality, length of stay, readmission rate, health status, patient and/or carer satisfaction, use of health and social care resources, and costs.

Excluded studies

Studies were included if they involved:

- discharge from inpatient facilities not potentially providing high technology care
- discharge from ambulatory care.

Data extraction

Data from relevant RCTs were extracted by two reviewers independently. The following information was recorded about each relevant trial: model of discharge arrangement, study quality, range of outcomes reported, mortality, length of stay and readmission, physical function, mental function, use of services, costs, satisfaction, and quality of life.

Data synthesis

The initial synthesis of the results, built on a complete tabular summary of trial characteristics (including type of participants, study type and design and outcome measures), comprises a qualitative overview.

Where sufficient quantitative data and comparable studies existed, standard approaches to combining the results of studies were used. Estimates of the pooled effects sizes on all relevant outcome measures for which data are available were obtained from the study-specific estimates using random effects models, with due regard given to estimates of between-study variations.

Results

Overall 6972 articles were identified, of which 320 proceeded to relevance and quality assessment. Seventy-six papers were identified and the data extracted. Final synthesis was performed using 71 articles representing 54 RCTs, ten of which were from the UK. Five trials were excluded. Four types of intervention were identified: discharge planning, comprehensive geriatric assessment, discharge support and educational interventions. The intervention types were not mutually exclusive.

Overall analysis by intervention characteristics

Overall no significant effect was seen on mortality at 3 months (ten trials), 6 months (14 trials) or 12 months after discharge (14 trials). Index length of stay was not significantly affected by the interventions (19 trials).

The risk of readmission to hospital was significantly reduced by intervention (readmission risk ratio (RRR) 0.851; 95% confidence interval (CI), 0.760 to 0.953; $p = 0.005$; 35 trials). This effect was preserved where the intervention was provided by a single professional (RRR 0.825; 95% CI, 0.699 to 0.974; $p = 0.023$; 16 trials), compared to a team (RRR 0.875; 95% CI, 0.744 to 1.028; $p = 0.105$; 19 trials). The effect on readmission risk was most apparent in interventions provided both in hospital and in the patient's home (RRR 0.829; 95% CI, 0.690 to 0.995; $p = 0.045$; 15 trials). A similar trend was seen for interventions provided in the patient's home only (RRR 0.795; 95% CI, 0.613 to 1.032; $p = 0.085$; 10 trials). Little effect was seen for interventions provided only in hospital (RRR 0.931; 95% CI, 0.795 to 1.091; $p = 0.377$; 6 trials) or by telephone (RRR 0.919; 95% CI, 0.446 to 1.893; $p = 0.819$; 3 trials).

Other outcome measures were not collected or reported consistently in the trials and only limited analysis was possible.

Analysis by intervention type

None of the four intervention types were shown to have major effects on mortality or length of hospital stay. Only educational interventions had an effect on readmission risk ratio (RRR 0.667; 95% CI, 0.573 to 0.778; $p < 0.001$; 5 trials); however, the trials were limited in focus and this result may not be generalisable outside selected patient subgroups.

Conclusions

The evidence from these trials does not suggest that discharge arrangements have effects on mortality or length of hospital stay. This review supports the concept that arrangements for discharging older people from hospital can have beneficial effects on subsequent readmission rates. Interventions provided across the hospital–community interface, both in hospital and in the patient's home, showed the largest effect.

Evidence from RCTs is not available to support the general adoption of discharge planning protocols, geriatric assessment processes or discharge support schemes as means of improving discharge outcomes.

Recommendation for research

More research is needed, particularly in the UK. Models that provide intervention across the hospital–community interface and/or education are worthy of consideration. Future studies should ensure that mortality, index length of stay and readmission rates are recorded Patient health outcomes, patient and carer satisfaction, and costs should be measured. Trials should preferably be conducted to agreed standards, with harmonisation of outcome measures to facilitate pooling of data. Health economic analysis should be planned as integral to future studies, which should be large enough and inclusive enough to detect important effects and ensure generalisability of results. Further research to explore the issue of cross-national comparability of studies between different healthcare systems would be worthwhile.

Chapter 1
Background

Discharge of older people from hospital is a key issue in both acute health and community care policy and practice. Recent years have seen a series of official circulars, reports and workbooks on good practice in hospital discharge planning and process (e.g. HC(89)5,[1] LAC(89)7,[2] Henwood and Wistow,[3] Department of Health 1994[4]). Implementation of the NHS and Community Care Act included a financial imperative for health authorities and local authorities to devise joint discharge planning arrangements.[5] In addition, the Association of Directors of Social Services (ADSS) has agreed protocols with other professional groups to help ensure that assessment and discharge processes are in place to ensure that proper quality standards are maintained for vulnerable elderly people.[6] The continued importance of the topic in health and social care policy and practice is underlined by the Partnership Grant (£647 million over 1999–2002), which is financed from the new resources for social services announced in a recent comprehensive spending review by the UK government. One of its central aims is to improve discharge arrangements from hospital.

Yet, despite these official admonitions and incentives to good practice, the experiences of older people and their families continue to be less than optimal. This is not because of a lack of knowledge; as outlined below there is a substantial literature which tells us both what can go wrong with hospital discharge and what could be better.

The boundary between hospital and the community is a crucial one, for patients, purchasers and providers alike. For elderly patients unplanned entry to hospital is often the first step on a path which leads, sooner or later, to discharge to residential or nursing home care. Inadequate discharge planning may hasten this outcome, either immediately, through lack of proper consideration of other options, or in the longer term if people are returned to their own homes with inadequate support. For health purchasers and providers delayed discharge increases costs and 'blocks' beds, while too hasty or ill-prepared discharge may prompt otherwise avoidable readmission. For social services purchasers poor discharge practices may find them 'steamrolled' into financing expensive forms of care which, with a little more thought and time, might have been provided more economically. When the boundary between health and social care is so contested, hospital discharge is arguably a key indicator of the quality of joint working.

Identifying the problem

Discharge from hospital is a cause of great anxiety for frail older people and their carers, who may feel rushed or ill prepared for coping back at home.[7–12] Patients and carers are often not involved in the process of discharge planning.[11,12] Discharge plans may not commence on admission, and the standard and level of communication between hospital and community staff, patients and carers staff could be improved.[13,14]

Surveys of outcomes of discharge as perceived by older patients consistently highlight poor communication and consultation by staff, inadequate notice of discharge,[15–17] little assessment of home circumstances,[16] short lengths of stay[16–18] and inadequate involvement in discharge arrangements. Poor consultation, communication and coordination result in dissatisfied patients and carers.[18,19] Patient and carer satisfaction with discharge, assessment and meeting care needs are therefore central in discharge planning.[20]

Qualitative studies of older people's experiences of the discharge process have also indicated that poor consultation, communication and coordination result in dissatisfied patients and carers.[18,19] These themes predominate throughout the literature of discharge planning.

These factors combined have fuelled attempts to understand the discharge process, to define what constitutes a 'good discharge' and to identify the most appropriate means of improving health, social and economic outcomes resulting from the process. The studies referred to above and the various policy reports suggest there is general agreement on what constitutes the principal elements of a 'good discharge' procedure. Indeed, there have been clear and specific recommendations from the Department of Health, the British

TABLE I *Summary of the recommendations of the Department of Health and BGS/ADSS*

Recommendation	Source
Written discharge procedures agreed and made available to community- and hospital-based participants in care	Department of Health, BGS/ADSS
Preparation for discharge to begin as early as possible	Department of Health, BGS/ADSS
Patient and/or carers should be central to the planning of discharge	Department of Health, BGS/ADSS
One named member of the multidisciplinary team should hold responsibility for discharge preparation	Department of Health
Written information about lifestyle, diet medication, symptoms and where to obtain help should be made available	Department of Health
All preparations should be based on effective multidisciplinary teamwork between the hospital and the community	BGS/ADSS

Geriatrics Society (BGS) and the ADSS. These recommendations are summarised in *Table 1*.

This framework will be revisited and examined in the light of the results of this systematic review of discharge arrangements for older people and weighed against the evidence identified in the review process.

Ways of improving discharge

A potentially useful framework within which the experience of discharge could be placed and evaluated is provided by Donabedian's structure–process–outcome triad,[21] which can be used as a starting point by considering which aspects of structure and process influence discharge outcomes.[22]

The definition of optimal outcomes from hospital discharge will vary depending on the actor involved and may, indeed, conflict. For patients, issues such as feeling recovered and ability to cope at home may be at odds with purchasers' and providers' desires to see the most efficient use of beds. Rapid and smooth discharge to a residential or nursing home may meet hospital performance standards, but may not be what the patient really wanted or even what was best for him or her in the longer term. Even if managed well from the point of view of the patient, early discharge may impose considerable costs on carers. While these costs are hidden from purchasers and providers in the short term, they may have longer term repercussions if the carers themselves subsequently become ill or simply decide that they have 'had enough'. In the latter case, however, the longer term costs are unlikely to fall on the health service but will be transferred to the social care system.

While there is a general agreement on what elements constitute a 'good discharge', there has been some debate about how best to influence discharge structures and processes to achieve better outcomes, and there are also questions about appropriate methods of evaluation. Despite the central importance of patients' and carers' needs and wishes to the process of discharge, the predominant outcomes of discharge which feature in the literature tend to be related to economic and operational efficiencies.

The main variables of interest are readmission rates,[10,23,24] patient length of stay or bed use[6,9,25–27] and their cost implications. Readmission rates have been proposed as an outcome measure of service efficiency for the audit of psychiatric services[28] in old age psychiatry; failed discharge may be a reflection of the tendency for conditions such as depression to relapse if postdischarge care is inadequate.[22] Studies conducted in the UK and abroad provide some evidence that a comprehensive approach to discharge planning can improve economic and operational parameters of the effectiveness of inpatient services by reducing readmission rates,[23,29] improving utilisation of hospital beds by reducing bed-blocking and shortening waiting times,[26] and reducing healthcare charges for the frail elderly.[30]

Other studies have used a case management approach to try to improve discharge. Studies of case managed home support schemes for frail elderly patients, including those with dementia, indicate that the standard range of support services is not sufficient to have an impact on survival at home, or on carer strain. More intensive and focused services, however, do appear to have some effect in this respect.[27,31,32] Mamon and colleagues[33]

in the USA demonstrated that the involvement of a discharge planning case manager was related to a significant reduction in unmet treatment needs, but they did not report on issues of communication, information and patient satisfaction. A similar intervention in the UK produced a reduction in problems experienced by patients after discharge and in perceived needs for medical and healthcare services, but had no effect on timely provision of services or appropriateness or efficiency of bed use.[23]

Evaluation of the impact of different discharge procedures is particularly difficult when assessing the outcome of cost. The focus on economic and operational efficiencies for inpatient services may obscure impacts of discharge planning on other organisations. Comprehensive planning, that offers assessment for health and social service support postdischarge, may provide such efficiencies through timely discharge and offer improvements in patient and carer satisfaction, but such improved outcomes may only be gained by shifting care to community social services. Economic evaluation requires an assessment of all changes in resource use associated with an intervention. However, determining community and social services inputs that are attributable to discharge from hospital (i.e. any increase in community and social services for patients with planned discharges above the level received by similar people who have not been hospitalised, or alternatively above the level received by similar people whose discharges were inadequately planned) is likely to be problematic.

Chapter 2
Methods

This review was conducted in the division of Medicine for the Elderly, at the University of Leicester, and at the Sheffield Institute for Studies on Ageing at the University of Sheffield. A review team was established to oversee the development and conduct of the review.

The review team comprised:

- Stuart Parker, Amy McPherson, Susan Peet and Ann Marie Cannaby, who were responsible for protocol development, literature retrieval, maintenance of the Reference Manager database, literature screening, quality and relevance assessment, data extraction and report writing.
- Suzy Paisley, who performed the electronic searches and contributed the section on search strategies in this report.
- Richard Baker, Gillian Parker, James Lindesay, Andrew Wilson, Keith Abrams and David Jones, who acted as reviewers for quality and relevance checks and data extraction, participated in team meetings and helped to guide the development and progress of the review. In addition, Richard Baker took lead responsibility for chapter 7 on educational intervention.
- Keith Abrams performed the meta analyses.

The review was conducted to test the following general hypotheses:

- There is an inadequate number of comparable randomised controlled trials (RCTs) to allow a definitive analysis.
- Hospital discharge process, outcome and cost-effectiveness can be improved through the use of a variety of interventions.
- Some interventions are more effective than others.
- There are priority areas for future research.

In addition, during the progress of the review, more specific hypotheses were developed in relation to individual intervention types. These are described in detail in the relevant chapters.

The review process

Studies for inclusion in the review were identified primarily by interrogation of a range of electronic databases, by searching a number of internet sites, and from databases of current research. Citation searches of studies included in the review, searches of the reference lists of included studies and additional handsearches of key journals (those occurring most frequently in included studies: *BMJ, Age and Ageing, Journal of the American Geriatrics Society* and *The Gerontologist*) were undertaken to complement the primary searches.

All studies identified by these means then underwent a standardised process of selection based on criteria of study quality and relevance to the discharge review (*Figure 1*). In summary, the process for identifying studies for inclusion was as follows:

- search of the literature with liberal criteria
- primary trawl of the literature to identify studies of potential relevance
- obtain research papers of all studies of potential relevance
- dual independent quality and relevance assessment leading to identification of studies for inclusion in the review
- data extraction
- final determining of studies for inclusion or exclusion.

Review strategy

Accepted standards for systematic review methods are defined in the NHS Centre for Reviews and Dissemination, Report 4 (CRD4),[34] and the handbook of the Cochrane Collaboration.[35] These guidelines have been used to inform the methods used in this review. We have also drawn on the methods of the Effective Practice and Organisation of Care (EPOC) group of the Cochrane Collaboration in quality assessment of studies included in the review. The possible elements of a systematic review are given in *Box 1.*

Scoping literature search

The first step was to perform a literature search to help to define the range and type of studies potentially available for synthesis. An initial MEDLINE search was performed. Perhaps because of the intention to remain as inclusive as possible, and the nature of the search strategies required to

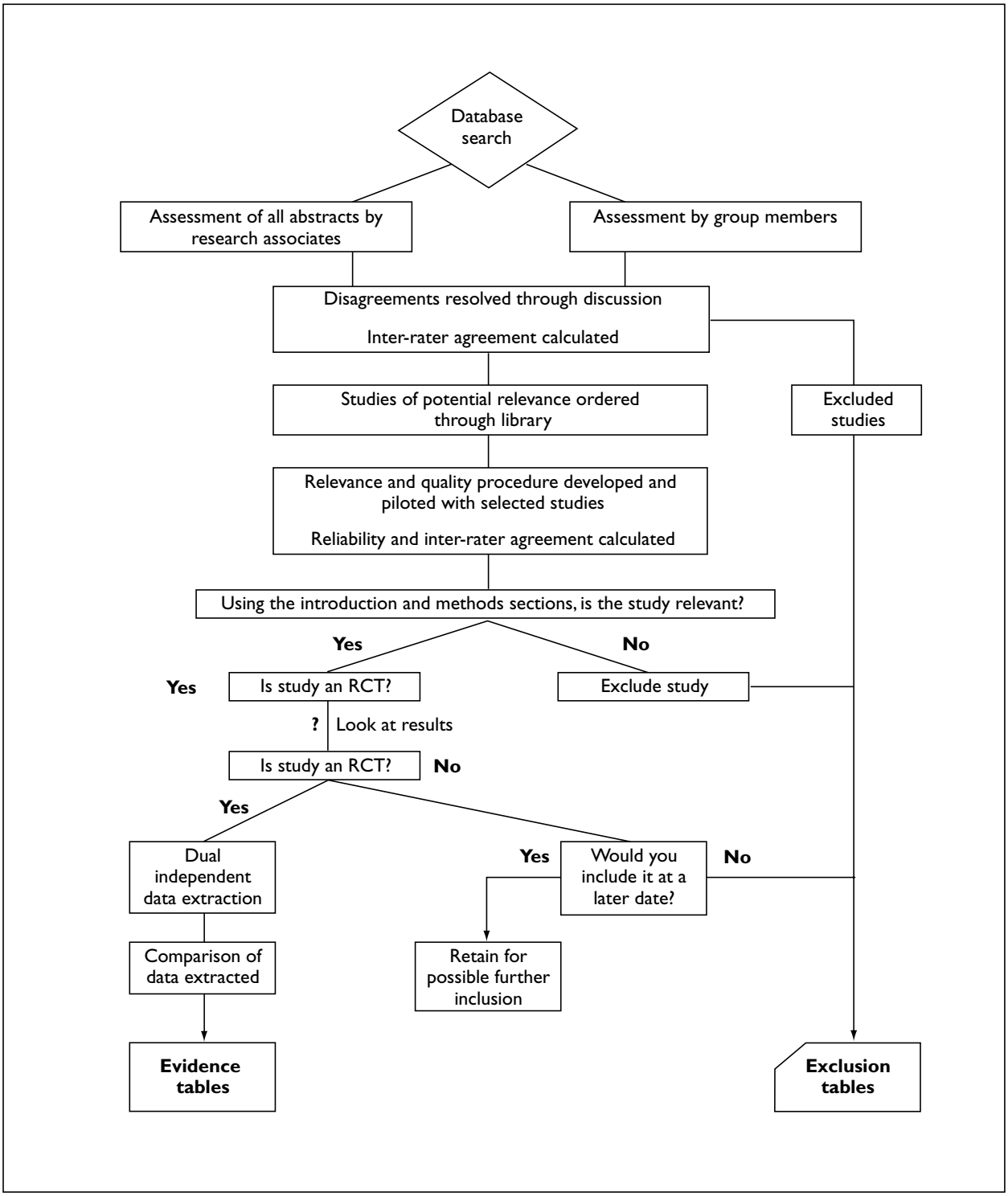

FIGURE 1 *Overview of the review process*

capture all studies of discharge arrangements, large numbers of potential studies were identified. Restriction of the study type to RCT even at this early stage in the review uncovered 559 papers in MEDLINE alone. Review of the title and abstracts of these studies suggested that a significant proportion would proceed to quality and relevance checking, if not to full data extraction. In view of this, a decision was made early in the review process to restrict the initial search to identify only potential RCTs, at least until it became possible to reject the first hypothesis that there is an inadequate number of comparable RCTs to allow a definitive analysis. As the nature of the evidence in the literature was identified in the initial literature searches and pilot data extraction

BOX 1 *Possible elements of a systematic review*

Literature	Hierarchy of evidence	Hierarchy of approaches to synthesis
Initial literature search	Controlled comparative studies	Meta-analysis of RCTs Synthesis including other controlled comparative designs
Studies graded for quality and relevance	Other quantitative studies Qualitative evidence	Synthesis of other quantitative evidence Synthesis of qualitative evidence

phases of the study, it became apparent that the notion that only a small number of RCTs would be available for synthesis was incorrect. Literature searching and subsequent filtering was therefore focused on RCTs.

Search strategy

The aim of the search strategy was to provide as comprehensive a retrieval as possible of published and unpublished clinical trials[34] relating to interventions to improve the discharge process from hospital of elderly people. The search process included the following search techniques:

- keyword searches of electronic databases
- handsearching of relevant journals
- scanning of reference lists
- citation searching of key papers
- contact with organisations and individuals via the Internet and through personal communication
- keyword searching of the world wide web.

Twenty-four databases, providing coverage of health and social sciences literature, grey literature and current research were searched. A list of these databases is given in *Box 2*.

Search strategies were devised to retrieve items that included the concepts 'discharge planning' and 'elderly people'. In order to maximise the sensitivity of the retrieval a number of free text terms and, where available, thesaurus terms were used to define both concepts. Examples of search terms are given in *Table 2*.

No date limits were placed on the search and each database was searched as far back as possible. The MEDLINE search was limited to trials using the first two stages of the Cochrane RCTs filter.[36] The filter was modified to exclude the search term 'placebo', as this retrieved a high number of irrelevant drug trials that happened to mention in the abstract the discharge of patients but which

BOX 2 Databases searched

- AgeINFO
- AMED
- ASSIA
- BNI
- CINAHL
- Cochrane Library
- Current Research in Britain (CRIB)
- Current Research Worldwide (CRIW)
- DoH COIN (Department of Health Circulars)
- DoH POINT (Department of Health Publications)
- EMBASE
- HealthSTAR
- HMIC (Department of Health, King's Fund, HELMIS)
- Index of Scientific and Technical Proceedings (ISTP)
- Index to Theses
- MEDLINE
- National Research Register (NRR)
- NHS CRD DARE
- NHS CRD HTA
- NHS CRD NEED
- PsycLIT
- Science Citation Index
- Social Sciences Citation Index
- UK Official Publications (UKOP)

TABLE 2 *Examples of keywords relating to search concepts*

Concept	Keywords
Discharge planning	Patient discharge Aftercare Continuity of patient care Patient transfer Postdischarge Predischarge Posthospital Discharge plan/system/ destination
Elderly people	Aged Geriatric Health services for the aged Gerontology Elderly Old people/person/adult Old old Oldest old

did not include an evaluation of the discharge process as part of the intervention. Other databases were limited using the truncated search terms 'trial*', 'random*', 'blind*', 'control*' and 'compar*'.

As an illustration, the search strategy used in MEDLINE is shown in *Box 3*. Search strategies for all databases are available on request from either S Paisley or SG Parker at the University of Sheffield.

A trawl of the internet using the metasearch search engine COPERNIC was carried out on a selection of the keywords given in *Table 2*. Library online public access catalogues (OPACs), age related and health services research related sites were also consulted. Examples are shown in *Box 4*.

BOX 3 MEDLINE search strategy

1. exp Aged/
2. Geriatrics/
3. Homes for the Aged/
4. Health Services for the Aged/
5. Geriatric Assessment/
6. Geriatric Nursing/
7. Geriatric psychiatry/
8. Geriat$.tw.
9. Gerontol$.tw.
10. Oldest old$.tw.
11. Old old.tw.
12. Old age$.tw.
13. Elder$.tw.
14. Old$ adult$.tw.
15. Old$ people.tw.
16. Old$ person$.tw.
17. Or/1–16
18. Patient Discharge/
19. Aftercare/
20. Continuity of Patient Care/
21. Patient Transfer/
22. Post discharg$.tw.
23. Postdischarg$.tw.
24. Post hospital$.tw.
25. Posthospital$.tw.
26. Predischarg$.tw.
27. Pre discharg$.tw.
28. Patient$ discharg$.tw.
29. Discharg$.ti.
30. ((readmission$ or early or premature or care or medication or destination or decision or decid$ or support$ or prepar$ or process$ or plan$ or system$) adj6 discharg$).tw.
31. Or/18–30
32. 17 and 31
33. Clinical trial.pt.
34. Exp Clinical Trials/
35. Random Allocation/
36. Double-blind Method/
37. Single-blind Method/
38. (clin$ adj25 trial$).tw.
39. ((singl$ or doubl$ or trebl$ or tripl$) adj25 (blind$ or mask$)).tw.
40. Random$.tw.
41. Research Design/
42. Or/33–41
43. (animal not human).sh.
44. 42 not 43
45. 32 and 44

BOX 4 Library OPACs, age related and health services research related sites consulted

Age Concern
Ageing Research Centre
AGENET
American Association of Retired Persons
British Geriatrics Society
British Society of Gerontology
Centre for Policy on Ageing
ESRC
Health Economics research centres
Help the Aged
INAHTA
Institute of Human Ageing, Liverpool
MRC
National Institute on Ageing
National R&D Network in the Health Care of Older People
NCCHTA
NHS R&D Programmes
PSSRU

Criteria for including studies for the review

Types of studies

Only RCTs which were identified as relevant to the topic were included in the review. Identification of these trials is discussed under '*Assessment of studies for inclusion*' below.

Patients

Studies which included patients over the age of 65 years experiencing discharge from inpatient hospital care were sought for inclusion.

Settings

Studies from all countries were included if they were undertaken in inpatient hospital settings (teaching or district general hospitals (DGHs), community hospitals) or in the community after patient discharge from inpatient hospital care. Discharge from inpatient facilities not potentially providing high technology care (such as nursing homes) or ambulatory care settings such as day hospitals and outpatient departments were excluded.

Interventions

To be included, a trial had to evaluate an intervention intended to modify discharge in patients experiencing discharge from inpatient hospital care. Trials were excluded if they were drug or disease specific, unless they were testing an intervention that was potentially generalisable. For example, an intervention that tested the

effectiveness of a specific drug in patients receiving inpatient treatment for heart failure would not have been included, while a trial testing the effectiveness of a home visit by a specialist nurse after discharge from inpatient care in patients with heart failure would have been included. Trials that did not include patients over the age of 65 years were excluded.

A typology of interventions specific to discharge arrangements was developed for the review and informed by emerging evidence from the review process. Studies identified as relevant on the above criteria underwent data extraction as described below. The studies selected for review were discussed between the members of the research team. The following broad classification emerged. The categories are not mutually exclusive, but provided the framework for analysis that has been used to structure this report. We included studies of the following types of intervention:

- Discharge planning schemes: primarily interventions that utilise comprehensive discharge planning protocols.
- Discharge support schemes: a variety of models in which new and existing services are targeted at recently discharged patients, including schemes with early discharge from inpatient hospital care.
- Geriatric assessment programmes: assessment services focused on hospital inpatients and patients recently discharged from hospital. Comprehensive assessment schemes in ambulatory care were excluded.
- Educational programmes: a fairly distinct group of studies with objectives of educating patients in aspects of management of their illness. Many are related to drug treatment.

Types of outcome measures

Studies were only eligible for inclusion if they described at least one of the following outcomes:

- length of stay
- readmission rate
- patient outcome (health status, mortality)
- patient and/or carer satisfaction
- use of healthcare and social care resources
- costs.

Assessment of studies for inclusion

A two-stage filter was used to include or exclude studies on the basis of relevance to the review and quality of the evaluation.

Title and abstract review

First titles and abstracts were reviewed independently by the research assistant and one other reviewer. In this way many drug trials and disease-specific interventions were eliminated from further processing. Similarly, if the abstract stated that the study did not include any participants over 65 years of age, the study was excluded. Any titles or abstracts that did not clearly indicate that they were not of relevance to the review were included at this stage. Disagreements were discussed and resolved between the research assistant and co-reviewer. If agreement was not reached then the paper was obtained and progressed to the next stage of relevance and quality assessment.

Relevance and quality

Relevance and quality checks were performed independently by two reviewers who were blinded to the authors, institution and journal. It is possible that assessment of the quality of methods used might be biased by knowing the results or reading the discussion and being swayed by authors' conclusions.[37] Following pilot work with selected studies, the reviewers felt that it was very difficult to obtain sufficient information on the quality of a paper from the methods section in isolation (i.e. vital information about relevance and quality may be reported in either the methods or the results section of a paper). Wherever possible the quality and relevance check was performed in two stages. In the first stage, only the introduction and methods sections of the paper were reviewed. This was achieved by cutting and pasting the text for the introduction, methods and results separately and providing the reviewers with the introduction and methods in one envelope and the results in another. The methods section was reviewed first and a decision was made as to whether the study was an RCT. If it was not possible to answer all the questions on the relevance and quality pro-forma (see appendix) from the introduction and methods alone, the results section was taken from its envelope and used to provide the rest of the information. The reviewers then indicated whether inspection of the results had changed their decision about the nature of the study.

Relevance criteria

Studies were included if they were testing an intervention designed to modify discharge in subjects experiencing discharge from inpatient hospital care. Studies were excluded if they were drug or disease specific or did not include patients aged 65 years or over.

Quality criteria

Trials which were described as RCTs were included. Controlled trials with pseudo-randomisation or no randomisation were excluded at this stage.

Disagreements between reviewers were resolved by discussion.

Data extraction

Data were extracted onto data extraction forms (see appendix 1) by two reviewers independently. Studies from the same author(s) or institution(s) that described different aspects of the same dataset (e.g. different lengths of follow-up) were extracted independently and the evidence combined into tables after extraction. Data on the extraction forms were used to build the evidence tables under the following headings:

1. range of models of discharge arrangement for older people experiencing discharge from hospital inpatient care
2. quality of studies (Jadad criteria[37])
3. quality of studies (EPOC criteria[38])
4. range of outcomes reported in studies
5. mortality outcomes
6. length of stay and readmission outcomes
7. physical function outcomes
8. mental function outcomes
9. use of health and social care services
10. costs to health service providers
11. costs to social care providers
12. costs to patients and informal carers or families
13. patient satisfaction
14. impact on quality of life
15. impact on informal carers or family
16. destinational outcome.

Finally, the lead authors for each chapter used the data in the evidence tables, methods and results sections of the paper to write an initial draft of their chapter. Chapter writers were unaware of the title, authors and journal of the papers they were reviewing. Furthermore, the discussion section and abstract of the papers were unavailable to the authors. The aim of this blinding was to remove bias caused by knowledge of the authors or being swayed by authors' conclusions. This blinding, however, was not perfect. The chapter writers are all well aware of the field of this research and were frequently able to identify prominent papers and authors. For example, some studies use distinctive acronyms, (e.g. DOMINO) or are distinguished by the institution in which they were performed, which is often named in the introduction. This potential failure of blinding, while noted, has not been quantified in the present review.

Study synthesis

Aims

- To provide an estimate of the typical effect of the intervention
- to investigate if the effect is the same in different settings or with different study participants.

Qualitative overview

As indicated above, our previous experience in this field had suggested that the number of relevant papers, of appropriate quality for the formal synthesis of their results to be appropriate and worthwhile, was limited. Thus, the initial synthesis of the results of the studies identified, building on a complete tabular summary of their characteristics (including type of participants, study type and design and outcome measures), comprises a qualitative overview, with graphical display of results wherever possible. These include the traditional graphs showing study-specific point estimates and confidence intervals (CIs) of key outcome measures, such as absolute risks of individual interventions and relative and absolute risk differences for comparisons of interventions. Enhanced graphical displays facilitate investigation of the effect of covariates and of selection effects (e.g. dependence of the outcome on study size and design and on a subpopulation studied).

Quantitative synthesis

Where sufficient quantitative data and comparable studies exist, standard approaches to combining the results of studies have been adopted, with critical appraisal of their application in the particular context of discharge intervention. Thus, estimates of the pooled effects sizes on all relevant outcome measures for which data are available were obtained from the study-specific estimates using random effects models, with due regard to estimates of between-study variations. Random effects models were explicitly used because of both the methodological and the quantitative heterogeneity that was present in the review. Meta-regression methods were also used to investigate the effects of different study characteristics (including study design and study population characteristics, as well as the nature of the intervention) on the effects observed. In addition, funnel plots were used to assess the extent to which publication bias could be a

possible explanation for any overall positive findings. Similarly, standard approaches to sensitivity analysis were performed in order to investigate the robustness of the main findings of the review process to inclusion and exclusion of studies with different characteristics and quality. A brief outline of these approaches to analysis is given in the CRD4[34] and a more detailed description of the methodology is given in Sutton and co-workers.[39]

All quantitative analyses were performed in Stata 6.0,[40] using meta,[41] metan[42] and metareg.[43]

Methods for specific outcome measures

Mortality

Studies that reported mortality results did so at different time intervals post-randomisation. In order to allow for this differential follow-up they were stratified into those that reported at 3 months post-randomisation or earlier, those that reported at 6 months and those that reported at 12 months. For each of the subgroups the odds ratio of death and its standard error were used as the study outcome measure to be synthesised. Random effects models were then used to obtain pooled estimates of the effect of intervention compared to control in terms of an odds ratio.

Readmissions

Reporting of readmission data was usually in terms of the number of hospital episodes experienced by the patient population under study in a defined follow-up period. In order to allow for both the fact that different studies had different lengths of follow-up and that some patients experienced more than one readmission, formal synthesis of the studies was in terms of the readmission rate ratio and its associated standard error.

Physical and mental functioning

The reporting of physical and mental functioning was particularly heterogeneous, both in terms of the outcome measures used and the manner in which they were reported. This made formal synthesis of the quantitative results particularly difficult. In terms of physical functioning some studies reported outcome in terms of a mean difference on a suitable scale (e.g. Barthel index), and even when different instruments were used a standardised difference and standard error could usually be calculated. In nearly all studies this standardised difference was unadjusted for baseline levels, and so was a measure of the absolute difference between intervention and control. Other studies simply reported the proportion of patients who improved over a specific time period, and this was treated as a binary outcome, with an odds ratio and standard error calculated for each study.

For mental functioning, reporting of studies tended to be in terms of the absolute difference between the two groups at specific time points, but again a variety of different instruments were used. Therefore, formal synthesis of this quantitative data used a standardised difference scale, and thus measured the absolute difference between intervention and control groups.

Discharge destination

Studies reported destinational outcome either at discharge and/or at follow-up. This outcome was generally reported as living at home versus living in some form of long-term care (residential or nursing home). The log odds ratio of being at home and its standard error were used as the study outcome measure to be synthesised. This was calculated at discharge and at follow-up, where the data were aggregated for all follow-up periods. Random effects models were then used to obtain pooled estimates of the effect of the intervention compared to the control in terms of an odds ratio.

Chapter 3
Results

The review process: included and excluded studies

This chapter provides an overview of the research process, details of the studies that were included, excluded and outstanding, the statistical analyses undertaken on the included studies as a whole, and conclusions relating to these overall results.

Reliability of assessment of titles and abstracts

An assessment of the reliability of coding and levels of agreement between reviewers of titles and abstracts was undertaken. An example of this process is given below.

Step 1

The research assistant (AM) assessed all initial MEDLINE search titles and abstracts (n = 559) for inclusion, exclusion or unsure, using the following criteria:

- Is it disease/drug specific (e.g. drugs trials)?
- Is it an intervention designed to modify discharge?
- Unsure – not enough information from abstract, need whole paper.

Step 2

Three members of the research team each assessed one in ten MEDLINE abstracts using the above criteria (55 abstracts in total).

Step 3

The decision of the researcher was then compared with that of the other raters, disagreements were discussed and data entered into the Statistical Package for the Social Sciences (SPSS).

Inter-rater agreement was calculated for the dual-assessed abstracts. Kappa values ranged from 0.64 to 0.74. The mean inter-rater reliability was calculated as $\kappa = 0.66$, which indicates moderate reliability was considered to be acceptable. Subsequent screening of titles was performed initially by the research assistant (AM or SMP) in order to include all studies where inclusion was uncertain or definite, with the reviewers participating in dual assessment only after this initial step.

Included and excluded studies

Overall, 6972 papers were identified by electronic and other searches. Of the 6972 papers reviewed, 366 papers underwent the dual quality and relevance process, resulting in 76 papers being identified for data extraction (*Table 3*; for clarity, tables and figures in chapters 3–7 are collected together at the ends of the chapters).

Of the 76 papers which proceeded to full data extraction, 71 were included in the review and five were excluded (*Table 4*). The included papers represent 54 RCTs, details of which are given later in this chapter. Additional information as to their country of origin, the models of care under investigation, setting, and medical conditions included are shown in *Table 7*.

Contact with authors and investigators

In order to include data from as many relevant trials as possible, authors and researchers were contacted by email with postal follow-up to non-responders. Twenty-two research projects of potential relevance were identified from searches of the Internet and databases of research in progress (*Table 5*). Investigators in ten of these projects provided further information, and one report proceeded to quality and relevance checking. Further information was sought from the authors of 19 articles for which published information was not available to us. This included three authors of foreign language papers (seven papers in all) and 12 authors of articles for which there were no UK holdings. Two replies were received, one of which proceeded to quality and relevance checking.

Characteristics of the interventions

The Cochrane EPOC group provides a framework of intervention types for interventions, which includes professional, organisational and regulatory interventions (*Box 5*).[38] The majority of the studies included in the review reported the results of evaluations which would come under the EPOC category of organisational interventions. These were either provider oriented (multidisciplinary teams, new arrangements for providing continuity of care through arrangements for follow-up or case management) or structural (alternative setting or site of service delivery). No patient-oriented

organisational interventions were identified (e.g. complaints procedures, participation in governance). Only one professional intervention was identified, in which an element of comprehensive geriatric assessment (CGA) (standardised assessment of physical function) was used to provide new information to professional teams who also received education in its interpretation. No trials of financial interventions directed at either providers or patients were found. Neither were there any regulatory interventions (e.g. peer review, management of patient complaints). There were no studies of barriers to change, or interventions designed to identify or overcome barriers to change.

The review protocol anticipated that the taxonomy of interventions developed by the Cochrane EPOC group would be used to classify studies. A summary of the EPOC intervention types is shown in *Box 6*. During the review process we became concerned about the definition of discharge arrangements and the classification of intervention types to be included in the review. This was partly due to the heterogeneity of intervention types. It was also related to the overlap between the concept of discharge arrangements and other types of intervention.

Further classification of the intervention types

The objectives of the review dictated that trials of discharge arrangements should be focused primarily on the process of discharge of older people from hospital and be potentially generalisable. Interventions which we felt not to be potentially generalisable would include, for example, disease-specific, medical technological interventions, such as home dialysis or implantable defibrillators, or specific drug therapy. Some disease-specific interventions were, however, felt to be potentially generalisable; for example, the concept of a specialist nurse providing client-specific education and/or support is potentially generalisable outside of its original disease-specific context and therefore falls under the remit of the review. A further criterion was that studies should consider some or all of the primary outcomes of discharge.

Forty-three studies identified during the scoping searches were used to examine and refine the classification of included studies. This exercise identified structural interventions, interventions to change staff behaviour and changes to community provision. However, it also identified other trials in which:

- a holistic approach to patient care was adopted (in which discharge planning might or might not explicitly feature and in which discharge-related outcomes were observed), but where discharge did not appear to be the primary emphasis of the study
- the intervention focused on specific elements of discharge (e.g. medication, rehabilitation), but not on discharge planning or preparation specifically
- a disease-specific study group was used (e.g. stroke survivors, myocardial infarction).

Therefore, further analysis was performed using these 43 studies to attempt to clarify the classification of studies included in the review. Three approaches were used, as described below.

Overlap between the discharge review and other reviews

Two potential areas of overlap identified by the review team were between this review and reviews of trials of CGA and stroke units.

CGA review

A review of CGA by Stuck and co-workers[44] was used to assess the identification of studies for the present review. Multidimensional assessment, multidisciplinary intervention, including discharge planning with or without support, comprise the process of CGA, and therefore we might expect a significant proportion of the trials identified in a systematic review of CGA to appear in this review. Discussion between the reviewers suggested that we should expect to include trials of inpatient CGA that included discharge arrangements and measured discharge outcomes. We should not expect to include trials of community-based or outpatient CGA when the patients were not experiencing an episode of discharge from inpatient care. This anticipated pattern of overlap was shown to be the case:

- 14/17 of relevant papers identified in the CGA review were identified for potential inclusion in the present review
- 0/11 of CGA review papers which considered community-based intervention in patients not experiencing discharge from inpatient hospital care were identified by the discharge review.

The stroke unit review[45]

In stroke units multidisciplinary assessment and discharge planning are part of a package of organised care, but the intervention is focused on a specific event (acute stroke) and acute and rehabilitative

clinical intervention. We anticipated, therefore, that few if any of the stroke unit trials would appear in the present review, as the primary focus of these studies was unlikely to be the discharge arrangement. There was much less overlap between the present review and the stroke unit review, with only one of the 21 stroke unit review trials being identified by the discharge review searches.

Primary focus of the discharge review papers

This exercise was based on the 43 papers identified in the scoping searches. One of us (SP) identified each study's primary focus using the data extracted into evidence tables by the reviewers. This opinion of the studies' primary focus was then compared with the reviewers' decisions of whether or not the studies should be included in the review.

MeSH headings

It was conceivable that MeSH headings in themselves may be a useful tool in identifying studies for inclusion in the present review. Therefore MeSH headings for each of the 43 studies were identified. The single most relevant MeSH heading is 'patient-discharge'. The scope for this heading is:

> 'The administrative process of discharging the patient, live or dead, from hospitals or other health facilities.'

MeSH headings are starred (*) by MEDLINE if they are considered to be the primary focus of the study.

The results of these three approaches to identifying and classifying studies for inclusion in the present review were tabulated and reported to the members of the review team. A summary of the information considered by the team, which includes a preliminary classification of intervention type based on the information provided in the methods and results sections of the relevant papers, and the results of the three analyses described above is given in *Table 6*.

Subsequent discussion between the members of the research team resulted in the combination of early discharge schemes and postdischarge support into one class. Stroke units were specifically excluded as a category of intervention. Stroke unit trials were only included if they fell into one of the other categories of the review. Four categories of intervention were defined:

- discharge planning
- CGA
- discharge support arrangements
- educational interventions.

Discharge planning

Organised discharge planning (usually following an explicit protocol) was the intervention under investigation (five studies[46–50]). These studies were exclusively performed in the USA. All interventions were delivered in hospital by a single professional, usually a specialist nurse. Most studies[46–49,51] included some form of follow-up (home visit,[46] by telephone[48,49] or both[51]) after the patient had been discharged from hospital.

Comprehensive geriatric assessment

These were trials of CGA programmes in which the patients were experiencing discharge from inpatient hospital care (14 studies[52–67]). These trials included geriatric evaluation and management units (GEMUs), inpatient geriatric consultation services (IGCSs) and hospital home assessment services (HHASs), as previously defined by Stuck and co-workers.[44] None of these studies were performed in the UK. One was performed in each of Canada,[55] Australia,[56] Denmark[57] and The Netherlands.[67] The rest emanated from the USA. In one of these studies a single professional provided the intervention, but was supported by a multidisciplinary team.[58] All the other trials were of multiprofessional interventions delivered in hospital. Three trials included an arrangement for home-based or outpatient support.[58,59,63]

Discharge support arrangements

In these studies the interventions were intended to provide an enhanced level of support around the time of discharge and, often, subsequently (27 studies[58,59,63,68–102]). This group included nine trials from the UK[69,74,82,84,86,88,90,93,94,96,97] and seven from the USA.[58,63,70,81,87,95] Thirteen of the trials examined an intervention provided by a single professional, usually a nurse and delivered either over the telephone or in the patient's home. A further 13 trials examined interventions delivered by a multiprofessional team, mostly delivered after hospital discharge in the patient's home. Five of these trials included both inpatient and home-based components. Three included elements of CGA[58,59,63] and a further three had adopted a predominantly educational approach.[68,72,99–101]

Educational interventions

In these studies the interventions were intended to improve patients' abilities to manage aspects of their care after discharge through the provision of information or more active education (12 studies[68,72,99,103,107–112]). Five were from the USA,[103,108,110,111] three from Canada[68,72,107] and one from the UK.[109] They included interventions designed specifically to improve self-medication

after discharge[107–109,111] and complex interventions with education supplemented by multiple activities to improve patients' self-care.

Summary

Each category was used for an analysis of the extracted data by intervention type. A chapter of this report is devoted to each category. The categories proved not to be mutually exclusive, some studies falling legitimately into more than one class. Where a study included elements of more than one category, discussion and agreement between relevant chapter authors was used to place the study in one or other chapter or both. The outcome of this discussion is stated in the relevant chapter. The intervention types (models of care), settings and conditions studied are shown in *Table 7*. The staff contributing to each intervention were noted, as was the site at which the intervention was delivered (*Table 8*).

Details of studies included in the review

Each of the studies included in the review is given in the reference list.[46–116]

Overall synthesis of data

Formal quantitative synthesis of outcomes data was undertaken where possible. Sufficient studies reported data in a form which could be synthesised for the outcomes of mortality, index length of stay, readmission to hospital, discharge destination and physical function. These outcomes were analysed overall, regardless of the nature of the intervention, and by intervention characteristics, as shown below. This chapter presents the results of the following syntheses:

- all types of intervention combined (overall)
- setting of intervention
  - inpatient only
  - home only (face-to-face)
  - phone contact only
  - multiple intervention (inpatient and home)
- whether the intervention was conducted by a team or a single person.

Subsequent chapters present the results of analyses with the intervention type restricted to each of the four main categories of intervention, namely:

- discharge planning
- discharge support
- CGA
- education.

Mortality

Mortality was the most consistently available outcome, being reported in 36 of the trials studied.

A quantitative synthesis of mortality data was possible for three different time periods following discharge: up to 3 months, 6 months and 12 months in which a single overall estimate of effect on mortality was calculated. No statistically significant effects on mortality were found at any of the three time periods (*Table 9*, *Figures 2* to *4*).

No particular advantage or disadvantage appears to be conferred by interventions being delivered by a team or a single person (*Table 9*, *Figures 5* to *7*).

Neither were striking effects seen when the data were analysed by the setting in which the intervention was delivered. Among interventions provided both in the hospital and in the home (multiple interventions) the lowest odds ratio (most benefit) was seen at 6 months, but this was not apparent at other time periods and requires caution in interpretation in view of the small number of studies and the relatively large number of comparisons made (*Table 9, Figures 8* to *10*).

Therefore, no major effects on mortality were seen in this analysis, which synthesised the data from a wide variety of intervention types (see also *Figures 11* to *19*).

Index length of stay

Table 10 reports results of index length of stay, with a positive difference indicating that the intervention reduces length of stay. The results are illustrated in *Figures 20* to *24*. All results use a random effects meta-analysis model.

Readmissions

Formal synthesis of readmission data was possible for 31 studies. The results of readmission rates are reported in terms of the readmission rate ratio (RRR). An RRR of less than one indicates that the intervention is beneficial (i.e. there is a relative reduction in the risk of being readmitted). All results were obtained using a random-effects meta-analysis model.

Thirty-five studies were included in the overall synthesis of readmission rates. The RRR was 0.851 (95% CI, 0.760 to 0.953), indicating a reduction in

relative risk for being readmitted in the intervention subjects. This reduction was statistically significant ($p = 0.001$). This overview is illustrated in *Figure 25*.

Analysis of the RRR by the characteristics of the interventions showed that interventions which were implemented by either an individual or a team had similar effects on the reduction in the RRR, the largest effect size being seen for single-person interventions. The trend to fewer readmissions in the intervention groups was apparent in interventions provided in hospital, but was more marked among interventions provided both at hospital and at home. It was less marked among interventions delivered only in the home, either face-to-face or by telephone (*Table 11*, *Figures 26* to *30*).

Physical and mental functioning

Formal synthesis of the effects of interventions on physical functioning was possible for 14 studies. Even within this subset, physical function was reported very variably. Some studies used similar scales but reported the results in a range of ways which prevented easy comparison of results. Physical function scales were either reported with absolute values, in which case the standardised difference was calculated, or as relative change, in which case the odds ratio for improvement was calculated. The results are shown in *Table 12*, and illustrated in *Figures 31* to *34*. All results were obtained using a random effects meta-analysis model.

It can be seen that the absolute difference in physical function shows a tendency to better functioning in the intervention groups and that those trials that reported relative change recorded levels of improvement among subjects in receipt of discharge arrangements.

Destinational outcome

Formal synthesis of the effects of interventions on discharge destination was possible for 13 studies. Destinational outcome was generally reported as living at home versus living in some form of long-term care (residential or nursing home). Six studies reported destination at discharge (*Figure 35*). Nine studies reported destinational outcome at variable periods after discharge, ranging from 3 to 12 months. All the time periods were aggregated into a single 'follow-up' measure for meta-analysis (*Figure 36*). These analyses are summarised in *Table 13*.

Publication bias

The readmission data were analysed for publication bias. The funnel plot in *Figure 37* does not provide much evidence for the presence of publication bias, and using either a Begg test ($p = 0.07$) or an Egger test ($p = 0.1$) confirms that there is little evidence for its presence.

Quality scores

The quality of the studies was rated crudely using a count of EPOC quality criteria[38] satisfied for each study. Where a criterion was partly satisfied, a score of 0.5 was given. Using weighted regression techniques, it would appear that individual study quality has little impact on the log(RRR), with the slope coefficient being estimated as –0.10 with 95% CI of –0.48 to +0.28 ($p = 0.5$) (*Figure 38*).

Discussion

Synthesis of outcome data derived from the included studies was somewhat limited by the heterogeneity of outcomes reported between studies as well as the differences in the way the same outcomes were reported by these studies. Mortality and index length of stay were unaffected by discharge arrangements.

The main positive finding was that the greatest impact of the interventions was on readmission rate. Half of the included studies ($n = 31$) contributed to the meta analysis of RRR and the overall effect was that an older person undergoing discharge from inpatient hospital care and in receipt of one of an intervention had a 15% reduction in the likelihood of readmission to hospital when compared with controls.

Readmission figures were favourably affected if the intervention took place in hospital or was on multiple sites. A hierarchy of effectiveness is suggested according to the setting in which the intervention was delivered. A telephone-based intervention is at the bottom of the hierarchy, followed by interventions provided only in the home. Interventions provided only in hospital and those conducted both in hospital and at home were the most effective.

If the intervention was delivered by a single person, then the effect was slightly greater than when delivered by a team.

No consistent effects were seen on physical functioning (measured as absolute change). The six studies in which physical functioning was expressed as a relative change showed some impact of the interventions. No effect was seen

on cognitive functioning. Little effect was seen on discharge destination in the studies in which this outcome was reported.

The readmission data were analysed for publication bias. The funnel plot does not provide much evidence for the presence of publication bias. The effect of publication quality was explored using weighted regression techniques, and it would appear that individual study quality has little impact on the RRR.

Overall, the message from these data seems to be that doing something is better than doing nothing. If what is done extends across the hospital–community interface then it stands a greater chance of having a positive effect on readmission rate.

TABLE 3 *Sources of studies by search method*

Databases and other information sources*	Number identified	Number undergoing		Outcome	
		Quality and relevance	Data extraction	Included	Excluded
MEDLINE (to May 1999)	678	95	49	46	3
EMBASE	1944	130	11	11	–
CINAHL	1113	72	6	6	–
Social Sciences Citation Index	88	2	–	–	–
Science Citation Index	160	4	–	–	–
HealthSTAR	12	2	1	1	–
AMED (Complimentary Therapies and Professions Allied to Medicine)	23	–	–	–	–
Cochrane Library (CDSR)	11	–	–	–	–
Cochrane Controlled Trials Register (CCTR)	240	0	0	0	0
BNI (British Nursing Index)	87	9	0	0	0
NHS CRD NEED	250	3	0	0	0
NHS CRD DARE	86	–	–	–	–
NHS CRD HTA	19	–	–	–	–
PsycLIT	213	14	1	0	1
AgeINFO (Centre for Policy on Ageing bibliographic database)	58	2	–	–	–
ISTP (Index of Scientific and Technical Proceedings)	24	–	–	–	–
HMIC (Health Management Information Consortium)	165	5	1	1	–
ASSIA (Applied Social Science Index and Abstracts)	0	–	–	–	–
Current research					
CRIB (Current Research in Britain)	138	–	–	–	–
NRR (National Research Register)	98	–	–	–	–
CRIW	25	–	–	–	–
Internet					
Index to Theses	204	–	–	–	–
ISTP	–	–	–	–	–
POINT	52	2	1	1	–
UKOP (UK Official Publications)	36	4	–	–	–
COIN (Circulars on the Internet)	130	0	–	–	–
General Internet trawl	241	1	1	1	–
Supplementary searches					
Handsearching, citation searching, scanning of references from included studies	877	21	5	4	1
Total	6972	366	76	71	5

* *Listed in the order in which they were interrogated*

TABLE 4 *Excluded studies*[*]

Study	Intervention type	Subject group	Reasons for exclusion
Garraway WM, Akhtar AJ, Hockey L, Prescott RJ. Management of acute stroke in the elderly: follow-up of a controlled trial. *BMJ* 1980; **281**:827–9 Garraway WM, Akhtar AJ, Prescott RJ, Hockey L. Management of acute stroke in the elderly: preliminary results of a controlled trial. *BMJ* 1980;**280**:1040–3	Stroke unit	Stroke survivors	Trial of inpatient management of acute stroke (see methods)
Aish AE, Isenberg M. Effects of Orem-based nursing intervention on nutritional self-care of myocardial infarction patients. *Int J Nurs Stud* 1996;**33**:259–70	Disease-specific nursing intervention	Myocardiol infarction	Effect on healthy low fat eating behaviour only
Roden SM, Harvey PG, Mayer PP, Spence LI. Evaluation of two techniques to improve drug compliance in the elderly. *J Clin Exp Gerontol* 1985;**7**:71–82	Special labelling and pharmacist counselling over drug therapy before discharge	Patients discharged from the geriatric unit of a DGH	No relevant outcome measures
Campion E, Jette A, Berkham B. An interdisciplinary geriatric consultation service. A controlled trial. *J Am Geriatr Soc* 1983;**31**:792–6	Geriatric consultation team on a medical inpatient unit	> 75 years old, medical patients	Not randomised

[*] *Papers which proceeded to data extraction and were subsequently excluded from the review*

TABLE 5 *Researchers contacted for further information*

Source	Number of research projects/articles 'of interest'	Further information received	Countries of origin	Proceeded to quality and relevance check
Research databases (research projects)	9	7	England x 6 Ireland x 1 Scotland x 2	1
Internet databases (research projects)	13	1	England x 10 New Zealand x 1 Scotland x 2	0
Articles not in English	7 (3 authors)	1	Belgium x 1 USA x 1 Denmark x 1	0
No UK holdings (articles)	12	1	France x 1 USA x 9 Canada x 1 UK x 1	1

BOX 5 Framework of interventions of the Cochrane Collaboration EPOC group

1. Professional interventions
2. Financial interventions
   2.1 Provider interventions
   2.2 Patient interventions
3. Organisational interventions
   3.1 Provider orientated interventions
   3.2 Patient orientated interventions
   3.3 Structural interventions
4. Regulatory interventions

BOX 6 Taxonomy of intervention types developed by the Cochrane EPOC group

Structural: managed care approaches, discharge coordinators, discharge wards, etc.

Interventions to change staff behaviour: such as protocols/guidelines, education of staff, quality management systems, clinical audit

Changes to community provision: such as rehabilitation programmes, provision of new community services, hospital discharge support schemes

Interventions aimed at carers: including joint planning and education or preparation schemes

TABLE 6 *Preliminary classification based on analysis of 43 studies identified in the scoping search*

Preliminary category	Number of papers	Reviewer's opinion			Mesh		Comment
		Include	Unsure	Reject	Identified	Included	
Discharge planning	3	3	0	0	3	3	Three studies of comprehensive discharge planning protocols
Early discharge schemes	2	2	0	0	1	1	Two studies of early discharge schemes targeted at high-risk groups
CGA/multi-disciplinary interventions	9	7	1	1	4	3	Inpatient-based services offering multidimensional assessment; multidisciplinary management which addressed relevant outcomes, such as readmission rates, LoS, use of community services
Postdischarge aftercare ± community-based support	13	6	4	3	2	0	A variety of schemes which share the common characteristic that enhanced support in the community is provided to patients recently discharged from inpatient care. Intervention began in hospital in some cases, and was provided entirely in the community in others
Educational programmes	9	4	2	3	3	2	Studies in which education about medication and self-care (often in relation to a specific disease) were principal components of the intervention
Stroke units	3	2	0	0	1	0	Studies in which the impact on discharge outcomes on stroke unit care with explicit discharge support arrangements were evaluated
Miscellaneous	2	0	0	0	0	0	An examination of compliance of staff with CGA recommendations and a nutrition support scheme

LoS, length of stay

TABLE 7 *Details of studies included in the review: model of care, setting and condition*

Study	Country	Model of care (intervention type)	Setting	Condition
Beckie, 1989[68]	Canada	Postdischarge follow-up, supportive/ educative telephone programme	Teaching hospital	Undergoing CABG
Townsend, 1988[69]	UK	Community support/standardised aftercare	DGH and community	Patients aged > 75 years discharged to own home
Smith, 1988[70]	USA	Postdischarge telephone support by nurses using standard protocols addressing unmet need, medication, clinic appointments and barriers to keeping appointments	Acute hospital and patients' homes. Nurses followed people up if attending hospital for clinics, etc.	General medical patients
Saltz, 1988[52]	USA	Inpatient geriatric consultation team	Veterans medical centre – teaching hospital	Medical, psychiatric and surgical patients aged ≥ 75 years
Hogan, 1987[55]	Canada	IGCS	DGH	All emergency admissions aged ≥ 75 years
Kennedy, 1987[46]	USA	Discharge planning	Acute teaching hospital	
Mor, 1983[71]	Not stated	To examine impact of friendly visitor programme compared to a group who received a rehabilitation nurse visit compared to usual treatment (no follow-up) Three groups compared on readmissions	Rehabilitation units and the community	Patients were classified into different diagnostic groups and then randomised to ensure comparability between groups, but there was no specific condition
Harris, 1991[56]	Australia	Geriatric assessment unit	DGH	All emergency medical admissions
Wong, 1990[72]	Canada	Inpatient education and community nurse follow-up at home	General hospital orthopaedic units	Hip arthroplasty
Fretwell, 1990[57]	USA	Multidisciplinary geriatric assessment on a senior care unit	DGH	Admissions to DGH
Naylor, 1990[48]	USA	Discharge planning	Urban hospital/ medical centre	
Rich, 1996[103]	USA	Multidisciplinary education about heart failure and treatment, diet, review of medications, discharge planning with social services and postdischarge visits and telephone calls/usual care	Medical wards of university hospital	Heart failure
Weinberger, 1996[73]	USA	Increased access to primary care to prevent readmission; increased access/usual care	Nine veteran medical centres/ hospitals	Patients to be discharged at risk of readmission (e.g. patients with diabetes, COPD or CHF)
Pereles, 1996[139]	Canada	Self-medication programme/usual care	Geriatric units for short-term assessment and rehabilitation	All
Siu, 1996[58]	USA	Pre- and postdischarge geriatric assessment	University hospital (DGH?)	Medical/surgical admissions aged ≥ 65 years
Donald, 1995[120]	UK	Hospital at home scheme	Geriatric inpatient unit	Not specific

continued

TABLE 7 contd *Details of studies included in the review: model of care, setting and condition*

Study	Country	Model of care (intervention type)	Setting	Condition
Hansen, 1995[59]	Denmark	Postdischarge geriatric follow-up by an interdisciplinary geriatric consultation team	University acute care hospital	All admissions to subacute geriatric ward
Williford, 1995[108]	USA	Pharmacist counselling/no counselling	Large veteran tertiary hospital	Patients receiving acute care or rehabilitation
Hui, 1995[75]	Hong Kong	Early discharge with day hospital rehabilitation after stroke	Acute hospital neurology unit	Stroke
Lowe, 1995[109]	UK	Self-medication education programme for patients/usual care	DGH	Medical inpatients
Landefeld, 1995[60]	USA	Enhanced inpatient, nurse-led geriatric assessment	Private, acute, non-profit teaching hospital	General medical care admissions
Melin, 1995[76]	Sweden	Comprehensive in-home primary healthcare team	DGH (Stockholm); acute medical discharges – primary care (patient's home)	Patients recruited from the department of medicine and orthopaedics
White, 1994[61]	USA	Nurse-managed interdisciplinary geriatric service	Urban university hospital	Admissions to a geriatric service
Martin, 1994[80]	Not stated	Evaluation of a home treatment team and usual care on readmission rates	States patients came from medical and rehabilitation wards	Medical and rehabilitation patients
Fitzgerald, 1994[81]	USA	To evaluate if case management prevented readmission	University and affiliated medical centre	No specific condition – medical patients
Naylor, 1994[49]	USA	Discharge planning	University hospital	
Gilliss, 1993[110]	USA	Psychoeducation – in-hospital education for patients and partners on emotional reactions to surgery and telephone coaching after discharge/usual care	Two hospitals with cardiac surgery	Undergoing cardiac surgery (CABG ± valve repair, single or double valve replacement or repair; septal repair; or repeats of these)
Gladman, 1993[82]	UK	Compare function/perceived health status of stroke patients receiving domiciliary care compared with usual/ hospital based rehabilitation team. Three different settings: three groups: healthcare of elderly stratum, general medicine stratum, stroke unit	Two acute trusts and three rehabilitation hospitals in Nottingham	Stroke patients
Evans, 1993[50]	USA	Selection of patients for early discharge planning	Veterans medical centre	Medicine/neurology/surgery
Thomas, 1993[62]	Not stated (USA)	Inpatient geriatric consultation team	Non-academic community hospital	Inpatients
Williams, 1992[84]	UK	Evaluation of postdischarge visits by health visitor assistants	Community	Patients discharged from hospital to their own home or to a home of a relative; no specific condition specified
Hansen, 1992[85]	Denmark	A feasibility study to evaluate postdischarge follow-up home visits	Patient's home following a hospital discharge	No specific disease group; discharged from medical/ surgical and geriatric wards

continued

TABLE 7 contd *Details of studies included in the review: model of care, setting and condition*

Study	Country	Model of care (intervention type)	Setting	Condition
Phillips, 1993[98]	Not stated	Nurse supported early hospital discharge, telephone follow-up with education and counselling	Acute hospital	Abdominal and back surgery
Naylor, 1999[51]	USA	Discharge planning	University hospital and medical centre	A number of specific DRGs including myocardiol infarction, CABG, bowel surgery, heart failure
Rubin, 1992[63]	USA	Outpatient care management and treatment programme by a geriatric assessment team	Acute care urban teaching hospital	Medical admissions admitted via emergency departments at high risk of readmission for chronic conditions or good patients for outpatient management
Logan, 1997[86]	UK	To determine whether stroke patients would benefit from enhanced occupational therapy service compared to usual service	Community discharged stroke patients	Stroke patients
Rubenstein, 1984[64]	USA	Geriatric assessment unit	Veterans medical centre	Persistent medical functional or psychosocial problems interfering with d/c home
Naughton, 1994[65]	USA	Geriatric evaluation and assessment unit	Acute medical centre	Admission via the emergency department
Lipton, 1994[111]	USA	Review by pharmacist of patient records, then pharmacist consultation with physician and patient, plus follow-up consultations by telephone at 1 week, 2–4 weeks, and 2 and 3 months after discharge	Non-teaching community hospital	Patients admitted with non-psychiatric illness
Williams, 1994[87]	USA	Home visits by military staff nurses	Military hospital/ community	Internal medicine service patients
Dunn, 1994[88]	UK	Single visit from health visitor	DGH/community	Not specific
Fishman, 1994[66]	USA	Functional assessment coordinating treatment and transition programme	Urban community teaching hospital	Eight target DRGs: cerebro-vascular disease, transient ischaemic attack, COPD, pneumonia/pleurisy, CHF + shock, gastrointestinal haemorrhage, kidney infection + urinary tract infection
Slaets, 1997[67]	The Netherlands	Multidisciplinary joint geriatric/ psychiatric assessment team	Acute care teaching hospital	Patients aged 75+
Rodgers, 1997[90]	UK	Early discharge, community-based rehabilitation team in stroke	Acute hospital/ community	Stroke
Rudd, 1997[93]	UK	Early discharge supported by community rehabilitation team/ usual care inpatients with stroke	Acute hospital and community	Stroke
Rawl, 1992[95]	USA	Telephone and clinic/home follow-up by specialist nurse practitioner	Community hospital	Rehabilitation unit inpatients
Richards, 1998[96]	UK	Early discharge hospital at home scheme	Acute hospital	General medical, care of the elderly, orthopaedic and general surgical ward discharges

continued

TABLE 7 contd *Details of studies included in the review: model of care, setting and condition*

Study	Country	Model of care (intervention type)	Setting	Condition
Stewart, 1998[99]	Australia	Home based intervention – counselling before discharge on medications and signs of clinical deterioration; home visit at one week post discharge by nurse and pharmacist to check medication use, advise caregiver, improve liaison with community services	440 bed hospital	All admissions to medical and surgical units
Widen Holmqvist, 1998[102]	Sweden	Home rehabilitation after stroke	Department of neurology and patients homes	Stroke
Cline, 1998[112]	Sweden	Education and information for patients with heart failure	University hospital	Congestive cardiac failure
Winograd, 1993[113]	USA	Comprehensive assessment by a multidisciplinary team/usual patient care	Hospital	No specific conditions
Parfrey, 1999[114]	Not stated (USA?)	To develop a way of early discharge identification to reduce LoS/ conventional follow-up	DGH/acute hospital	Not condition specific
McInnes, 1999[115]	Australia	GP pre-discharge visit/usual care	Hospital/community	Not stated
Nielsen, 1972[116]	Not stated	Home aid service/geriatric rehabilitation hospital home aid service assisted in continued care rehabilitation e.g. house cleaning, meal planning, shopping, bathing, etc.	Hospital	No specific conditions

CABG, coronary artery bypass graft; CHF, congestive heart failure; COPD, chronic obstructive pulmonary disease; d/c, TBC; DRG, diagnosis-related group; GP, general practitioner

TABLE 8 *Characteristics of included studies, and personnel involved in the interventions*

Study	Site of intervention	Single person or team*	Doctor	Nurse	PT	OT	SALT	SW	Pharm.	Assist.	Comments
Beckie, 1989[68]	Phone	Single		Yes							
Townsend, 1988[69]	Home	Single								Yes	
Smith, 1988[70]	Phone	Single		Yes							
Saltz, 1988[52]	Inpatient + phone	Team	Yes	Yes				Yes			
Hogan, 1987[55]	Inpatient	Team	Yes	Yes	Yes						Discharge planning
Kennedy, 1987[46]	Inpatient + home	Single		Yes							
Mor, 1983[71]	Home	Single		Yes						Yes	
Harris, 1991[56]	Inpatient	Team	Yes	Yes	Yes	Yes		Yes			
Wong, 1990[72]	Inpatient + home	Single		Yes							
Fretwell, 1990[57]	Inpatient	Team	Yes		Yes			Yes	Yes		Dietician
Naylor, 1990[48]	Inpatient + phone	Single		Yes							
Rich, 1996[103]	Inpatient + home	Team	Yes	Yes				Yes		Yes	Dietician also
Weinberger, 1996[73]	Phone + clinic	Team	Yes	Yes							
Pereles, 1996[107]	Inpatient	Team		Yes					Yes		
Siu, 1996[58]	Inpatient + home	Single		Yes							Nurse supported by team
Donald, 1995[74]	Home	Team		Yes	Yes	Yes				Yes	Hospital at home
Hansen, 1995[59]	Home	Team	Yes	Yes	Yes						Discharge support arrangement
Williford, 1995[108]	Inpatient	Single							Yes		
Hui, 1995[75]	Inpatient + clinic	Team									Team membership not stated
Lowe, 1995[109]	Inpatient	Team		Yes					Yes		
Landefeld, 1995[60]	Inpatient	Team	Yes	Yes	Yes	Yes		Yes			Dietician
Melin, 1995[76]	Home	Team	Yes	Yes	Yes	Yes					Secretarial staff
White, 1994[61]	Inpatient	Team									Dietician
Martin, 1994[80]	Home	Single		Yes						Yes	
Fitzgerald, 1994[81]	Phone + clinic	Single		Yes							Case manager
Naylor, 1994[49]	Inpatient + phone	Single		Yes							
Gilliss, 1993[110]	Inpatient + phone	Single		Yes							
Gladman, 1993[82]	Home	Team			Yes	Yes					
Evans, 1993[50]	Inpatient	Single						Yes			Risk screening + discharge planning protocol
Thomas, 1993[62]	Inpatient	Team	Yes	Yes	Yes			Yes	Yes		Discharge planning, carer education. Dietician
Williams, 1992[84]	Home	Single								Yes	Health visitor assistants
Hansen, 1992[85]	Home	Team	Yes	Yes							
Rubin, 1992[63]	Clinic	Team	Yes	Yes				Yes			
Logan, 1997[86]	Home	Single				Yes					Stroke
Rubenstein, 1984[64]	Inpatient + clinic	Team	Yes	Yes				Yes			
Naughton, 1994[65]	Inpatient	Team	Yes					Yes			
Lipton, 1994[111]	Inpatient + phone + clinic	Single							Yes		
Williams, 1994[87]	Home	Single		Yes							

continued

TABLE 8 contd *Characteristics of included studies, and personnel involved in the interventions*

Study	Site of intervention	Single person or team*	Doctor	Nurse	PT	OT	SALT	SW	Pharm.	Assist.	Comments
Dunn, 1994[88]	Home	Single		Yes							Health visitor
Fishman, 1994[66]	Inpatient	Team		Yes				Yes			
Slaets, 1997[67]	Inpatient	Team	Yes	Yes	Yes						
Rodgers, 1997[90]	Home	Team			Yes	Yes	Yes	Yes		Yes	Secretarial/stroke
Rudd, 1997[93]	Home	Team	Yes		Yes	Yes	Yes			Yes	Stroke
Rawl, 1992[95]	Phone	Single		Yes							
Richards, 1998[96]	Home	Team		Yes	Yes	Yes				Yes	
Phillips, 1993[98]	Phone	Single		Yes							
Naylor, 1999[51]	Inpatient + phone + home	Single		Yes							
Stewart, 1998[99]	Hospital + home	Team		Yes					Yes		
Widen Holmqvist, 1998[102]	Home	Team			Yes	Yes	Yes				
Cline, 1998[112]	Inpatient + home	Single		Yes							
Winograd, 1993[113]	Hospital	Team	Yes	Yes	No	No	Yes	Yes	No	No	Psychologist
Parfrey, 1999[114]	Inpatient	Team	Yes	Yes	Yes	Yes	Yes	Yes			
McInnes, 1999[115]	Hospital + home	Team	Yes	No	No	No	No	No	No	No	Discharge protocol
Nielsen, 1972[116]	Home	Team	No	No	No	No	No	No	No	Yes	Postdischarge community support

* *Who was responsible for delivering the intervention: Assist., assistant responsible to professional team member; OT, occupational therapist; Pharm., pharmacist; PT, physiotherapist; SALT, speech and language therapist; SW, social worker*

TABLE 9 *Mortality at 3, 6 and 12 months, by intervention characteristics*

	Mortality: OR (95% CI) [number of studies]		
	Up to 3 months	**6 months**	**12 months**
Overall	1.03 (0.83 to 1.28) [*n* = 10]	1.13 (0.66 to 1.95) [*n* = 14]	0.90 (0.78 to 1.11) [*n* = 14]
Setting			
Inpatient only	1.11 (0.83 to 1.50) [*n* = 2]	0.91 (0.60 to 1.38) [*n* = 3]	0.91 (0.64 to 1.30) [*n* = 3]
Home only	1.11 (0.66 to 1.85) [*n* = 3]	1.03 (0.66 to 1.62) [*n* = 6]	0.92 (0.74 to 1.14) [*n* = 7]
Phone only			
Multiple	0.81 (0.53 to 1.25) [*n* = 5]	0.62 (0.42 to 0.93) [*n* = 4]	0.90 (0.55 to 1.47) [*n* = 4]
Intervention delivery			
Single person	1.04 (0.71 to 1.53) [*n* = 4]	0.66 (0.44 to 1.00) [*n* = 4]	1.03 (0.83 to 1.29) [*n* = 6]
Team	1.03 (0.79 to 1.34) [*n* = 6]	1.38 (0.68 to 2.79) [*n* = 10]	0.77 (0.63 to 1.012) [*n* = 8]

OR, odds ratio

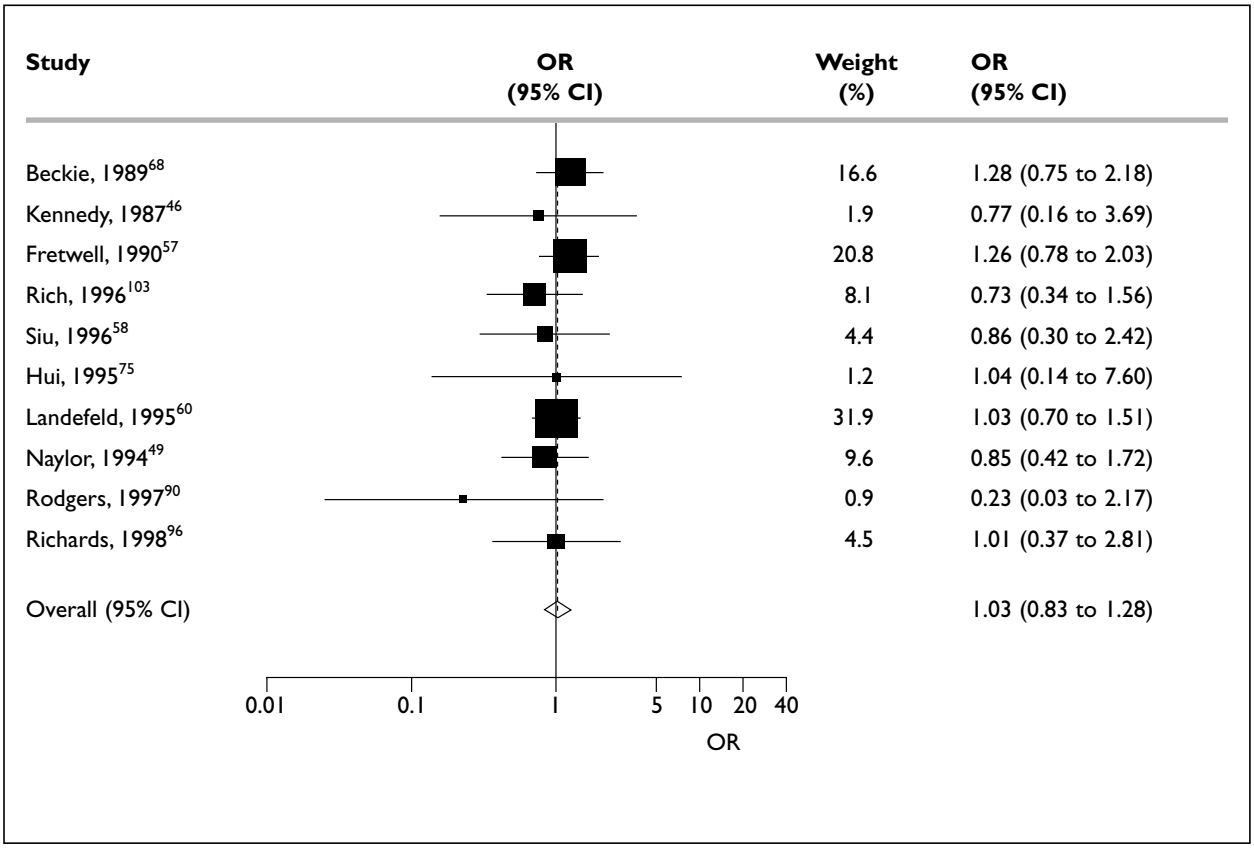

FIGURE 2 *Overall: mortality at 3 months*

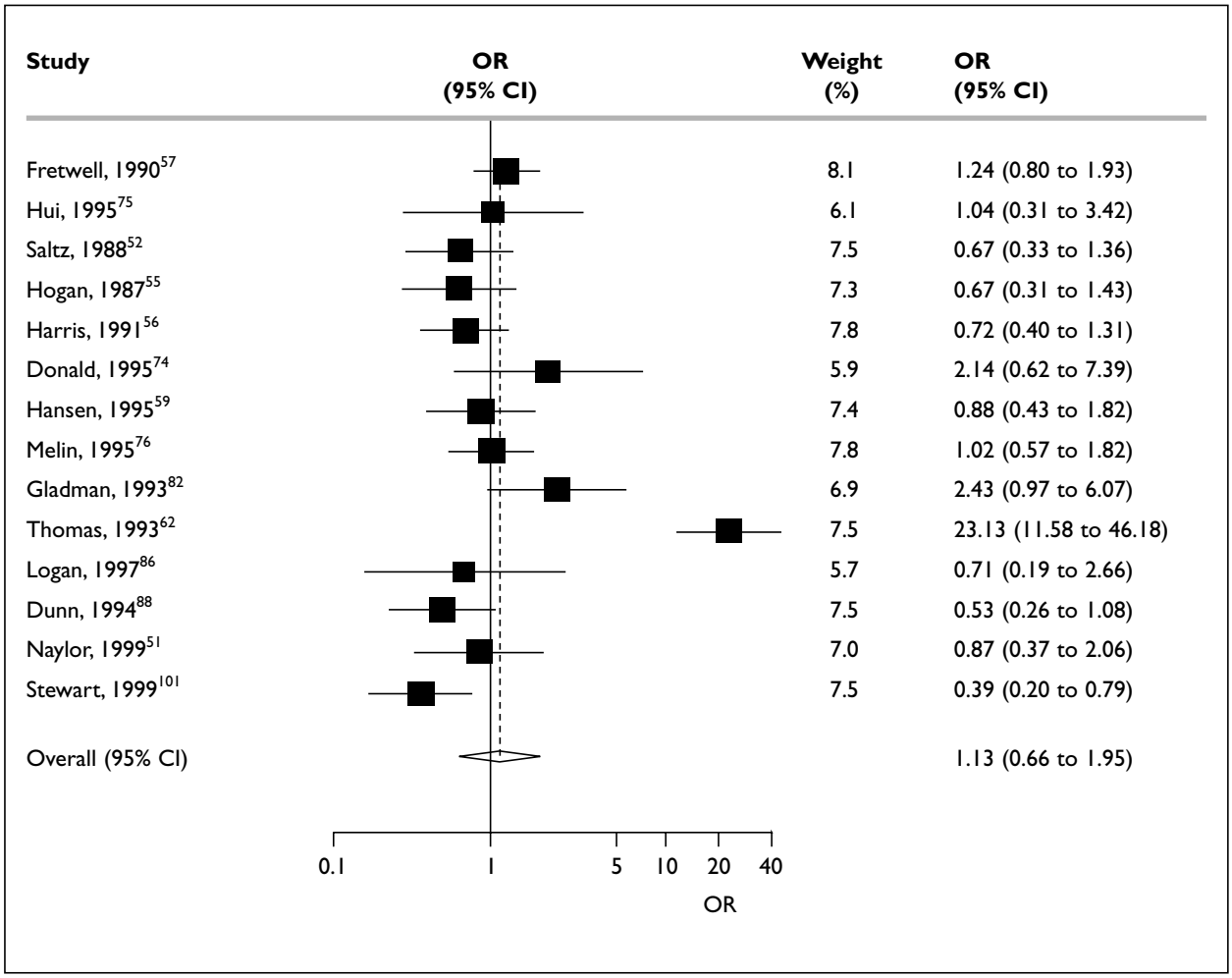

FIGURE 3 *Overall: mortality at 6 months*

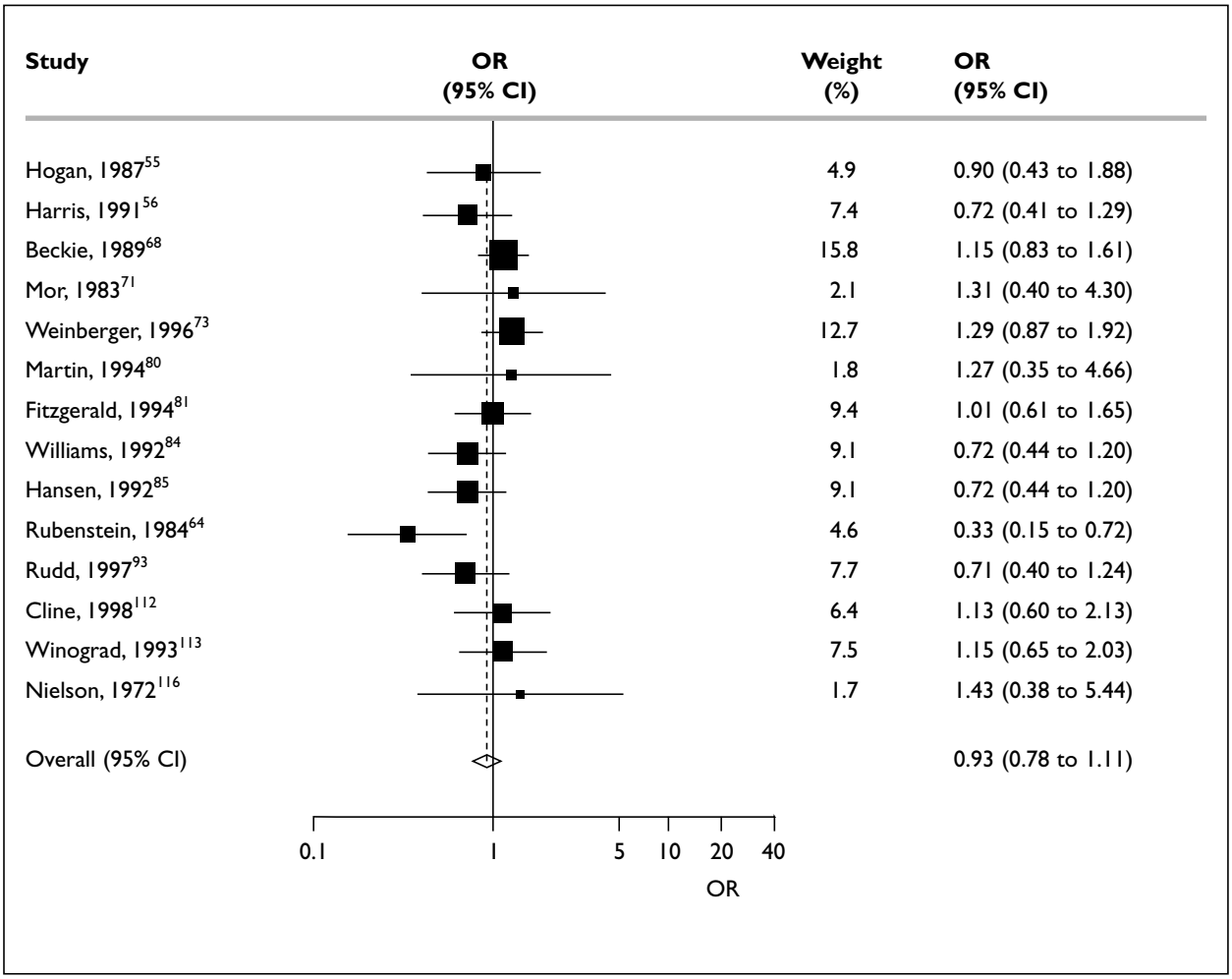

FIGURE 4 *Overall: mortality at 12 months*

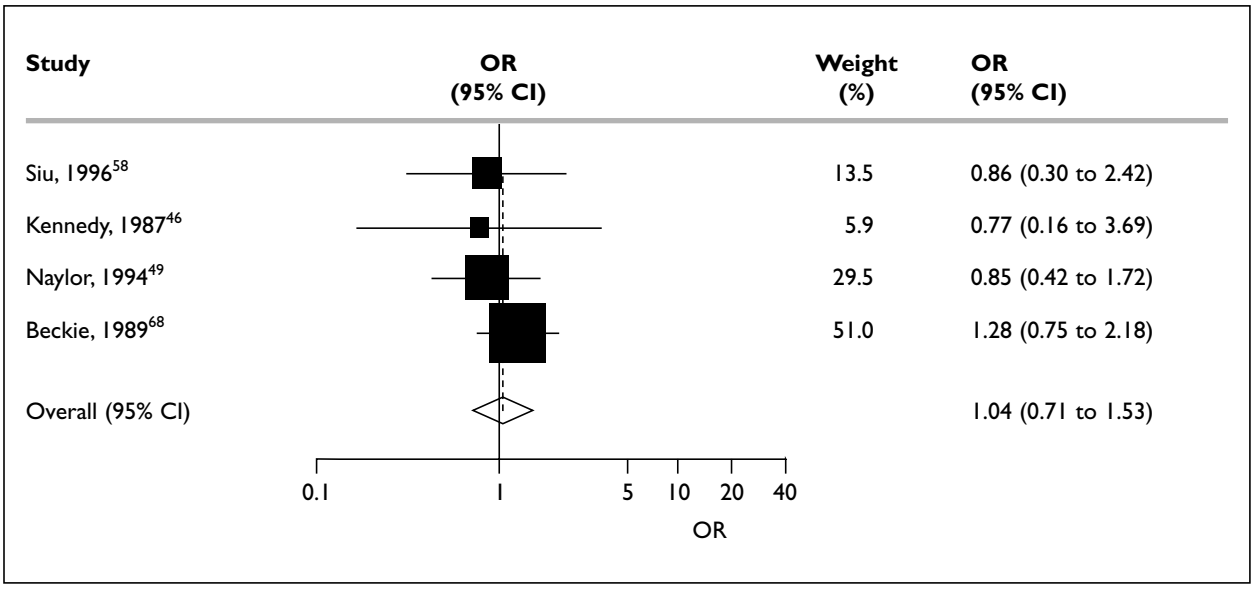

FIGURE 5 *Single-person interventions: mortality at 3 months*

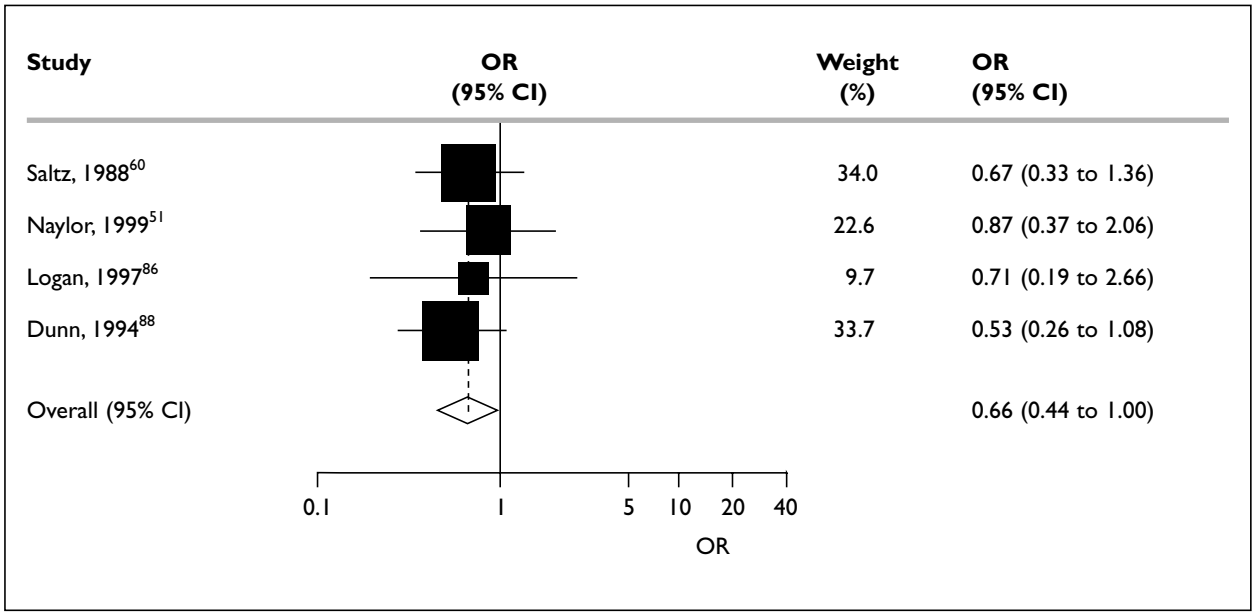

FIGURE 6 *Single-person interventions: mortality at 6 months*

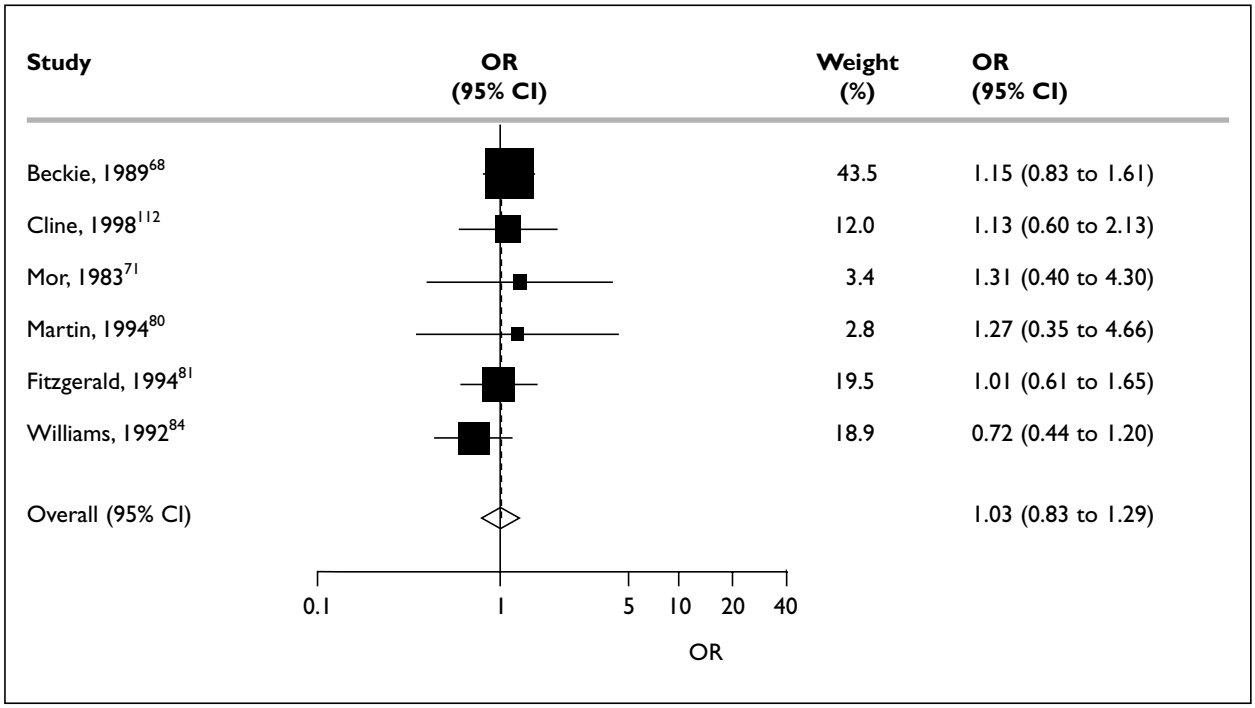

FIGURE 7 *Single-person interventions: mortality at 12 months*

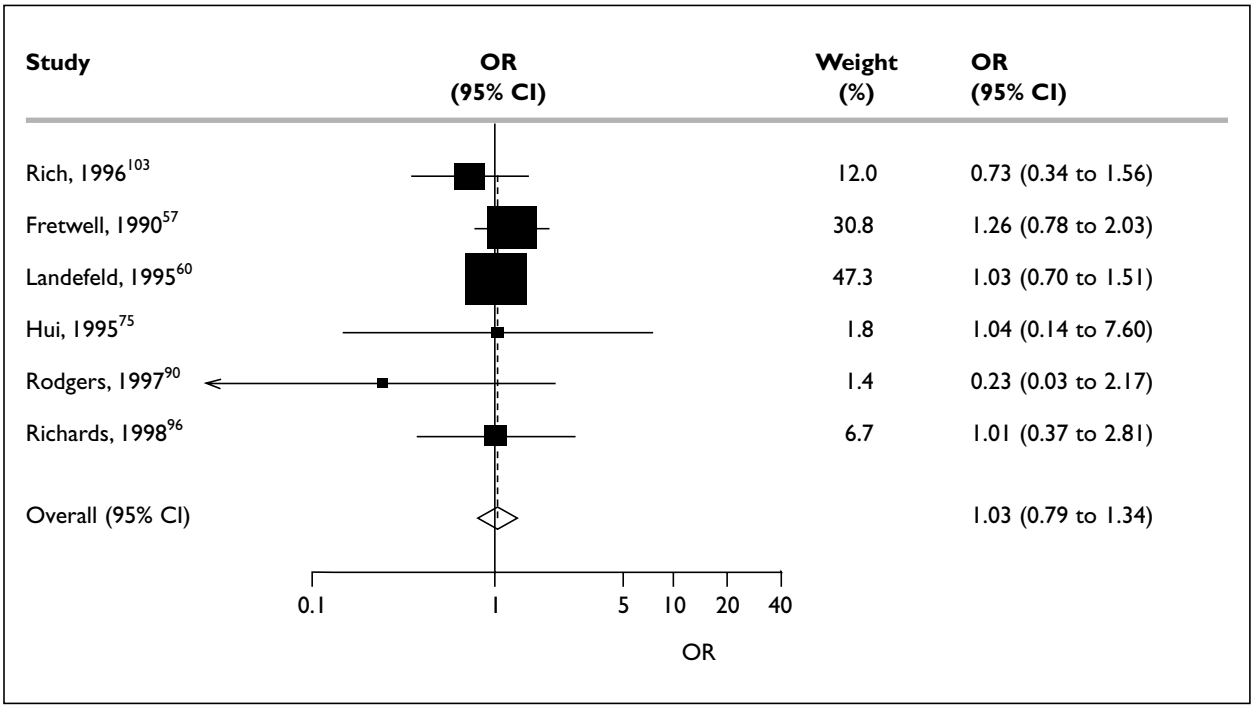

FIGURE 8 *Team interventions: mortality at 3 months*

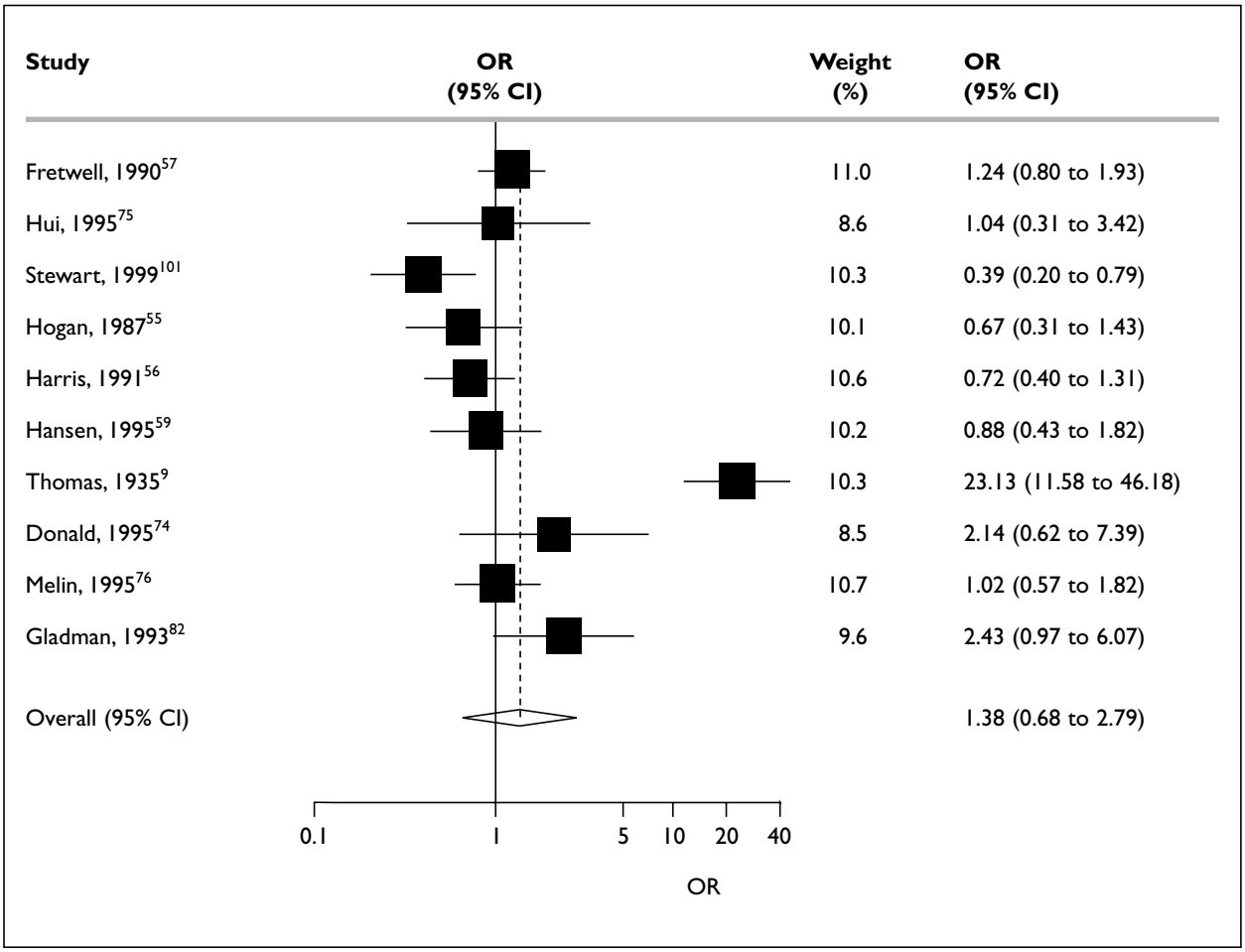

FIGURE 9 *Team interventions: mortality at 6 months*

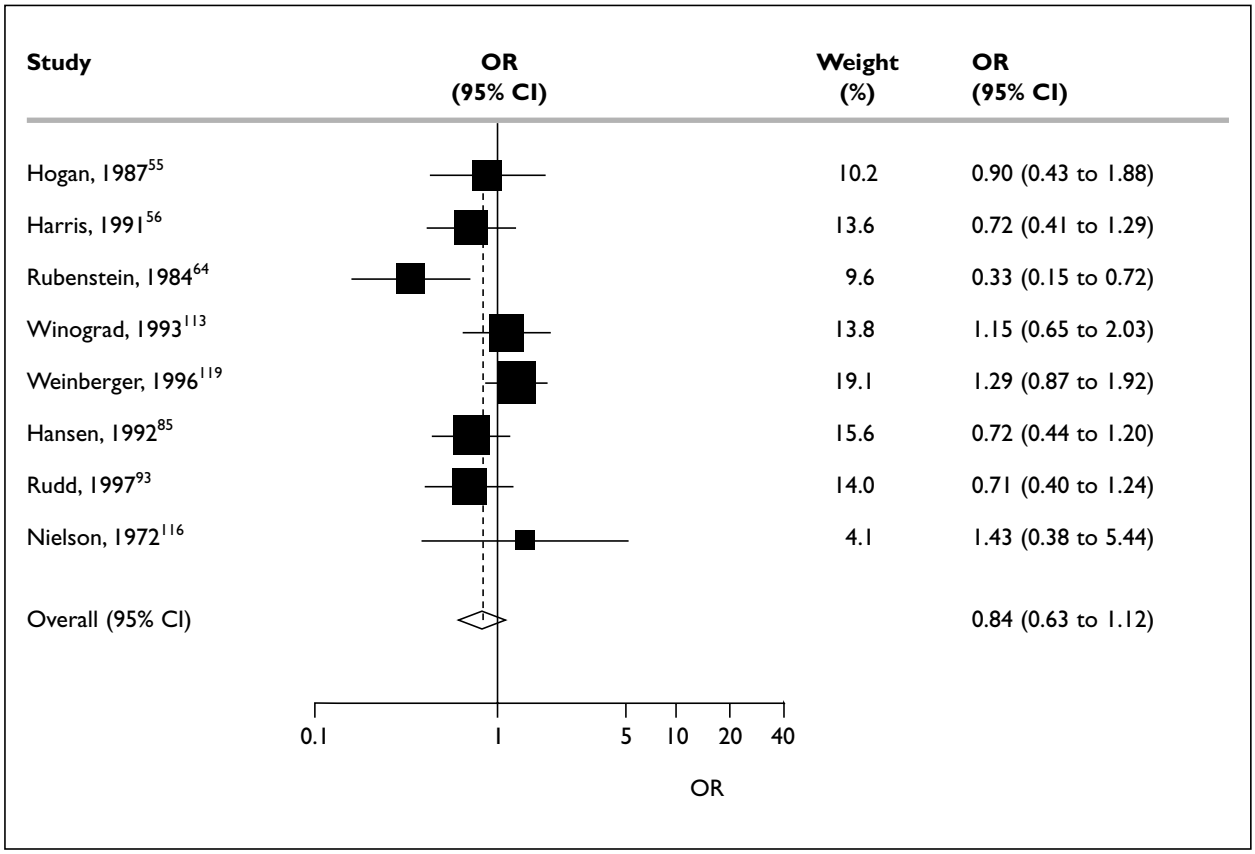

FIGURE 10 *Team interventions: mortality at 12 months*

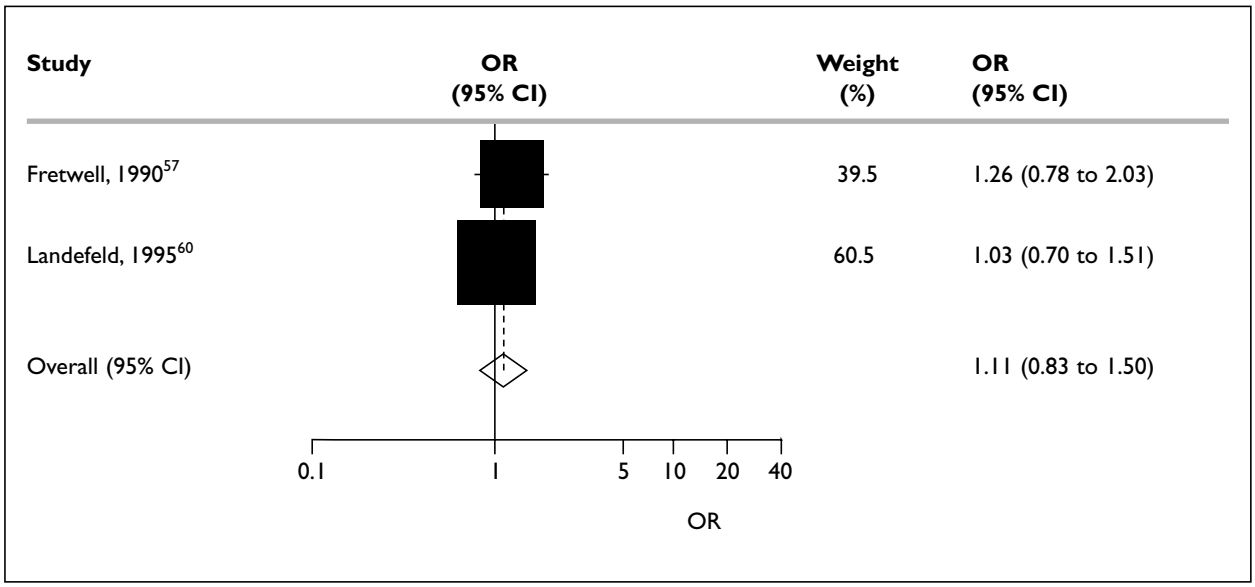

FIGURE 11 *Inpatient-only interventions: mortality at 3 months*

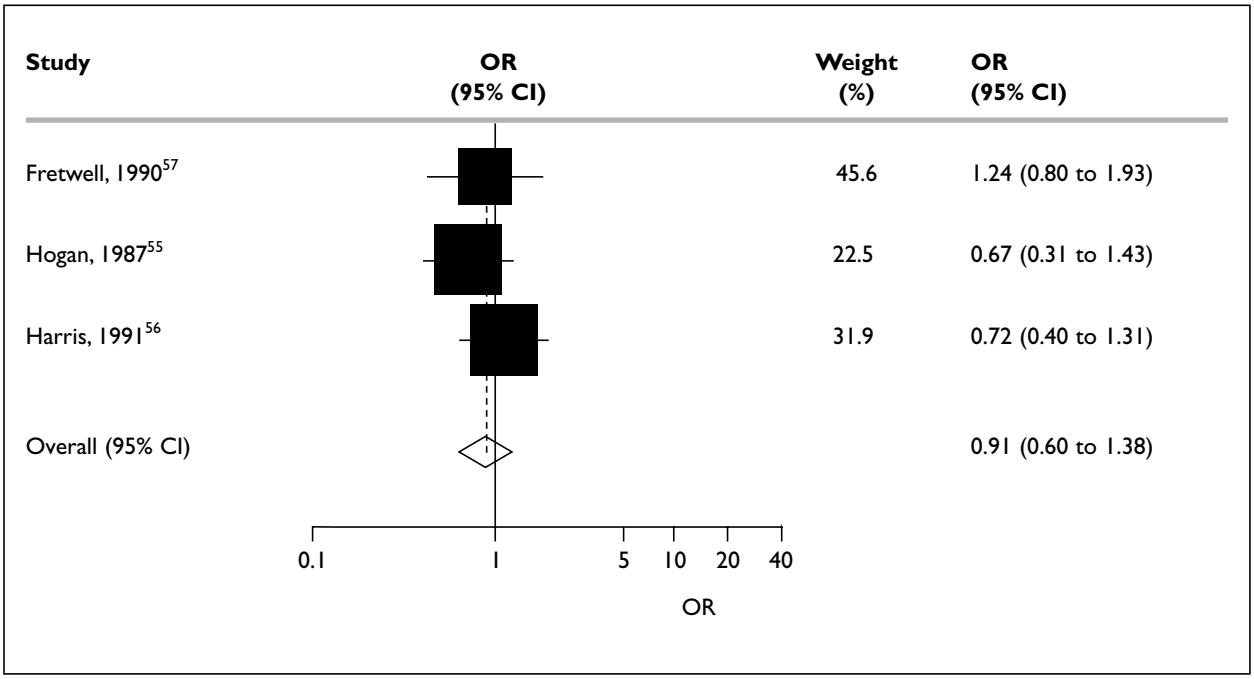

FIGURE 12 *Inpatient-only interventions: mortality at 6 months*

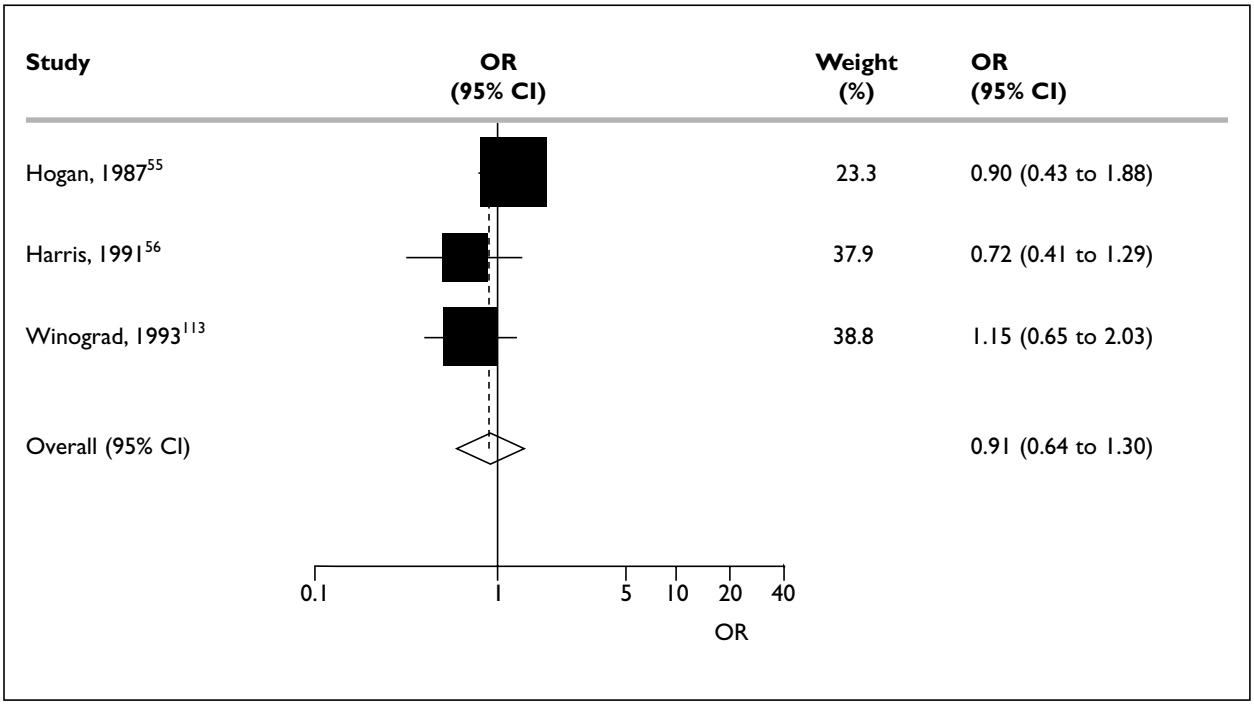

FIGURE 13 *Inpatient-only interventions: mortality at 12 months*

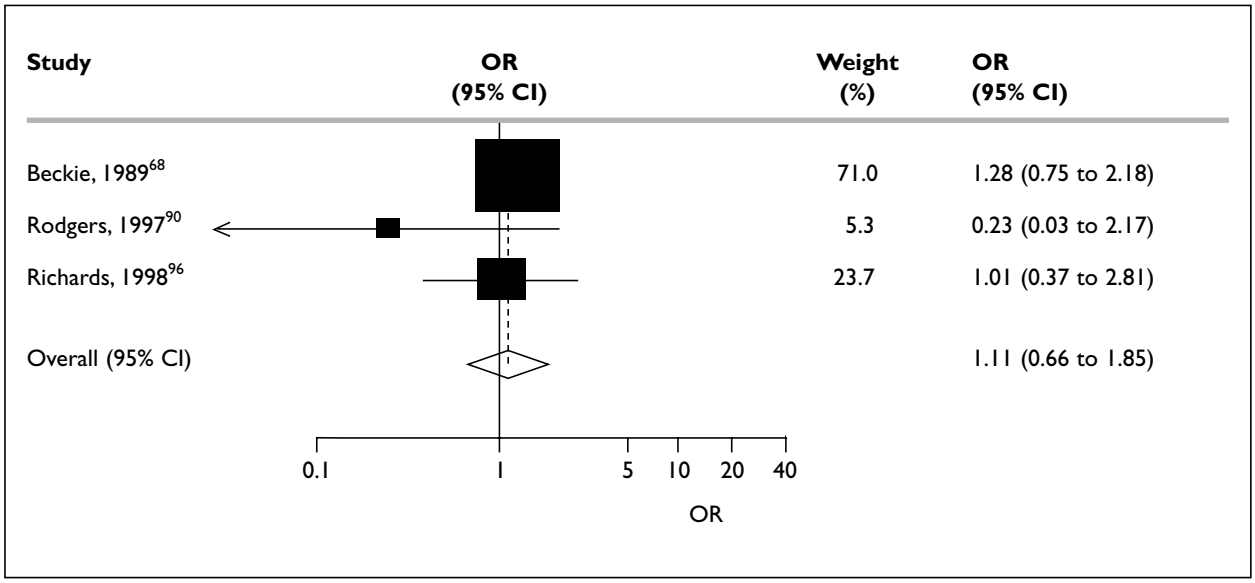

FIGURE 14 *Home-only interventions: mortality at 3 months*

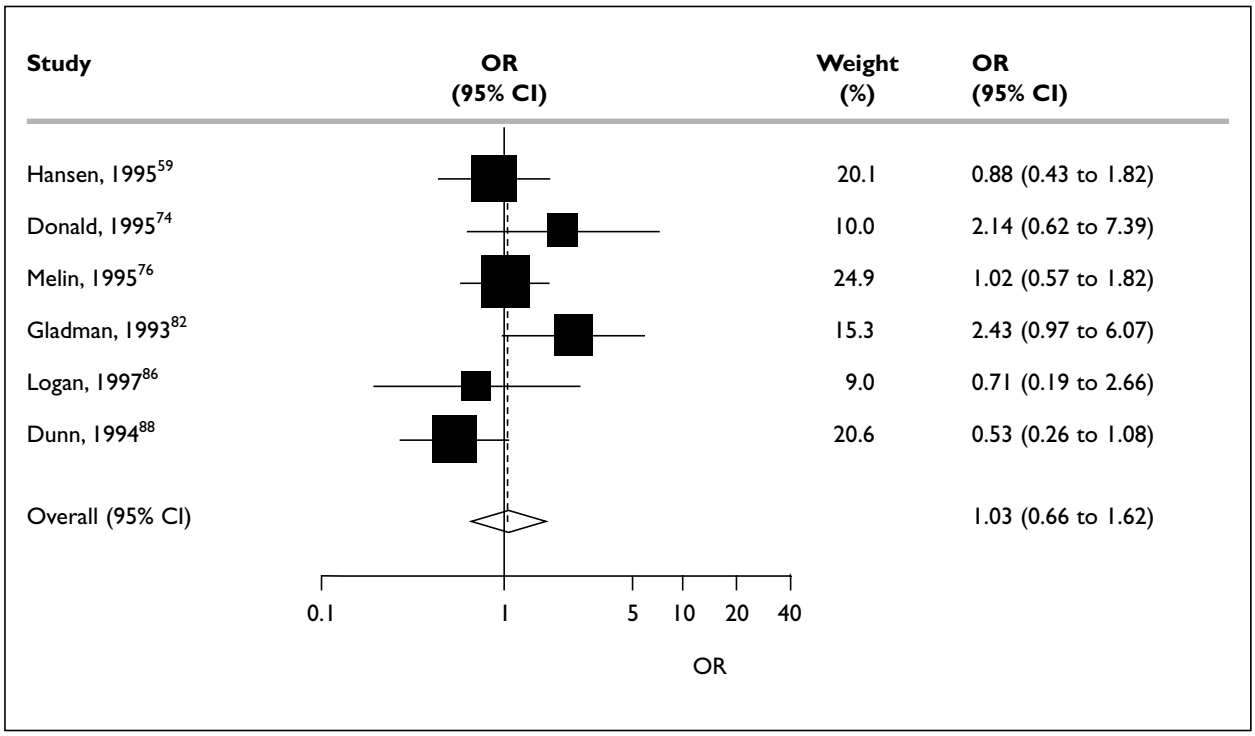

FIGURE 15 *Home-only interventions: mortality at 6 months*

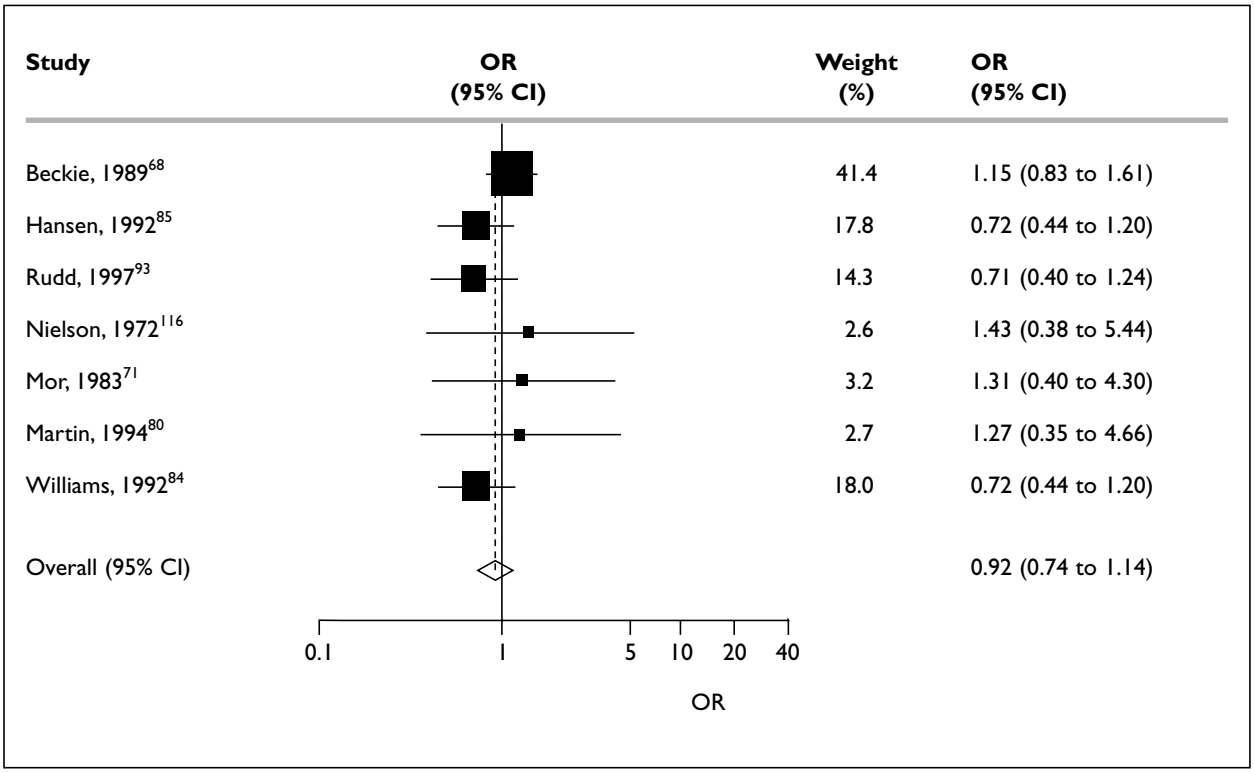

FIGURE 16 *Home-only interventions: mortality at 12 months*

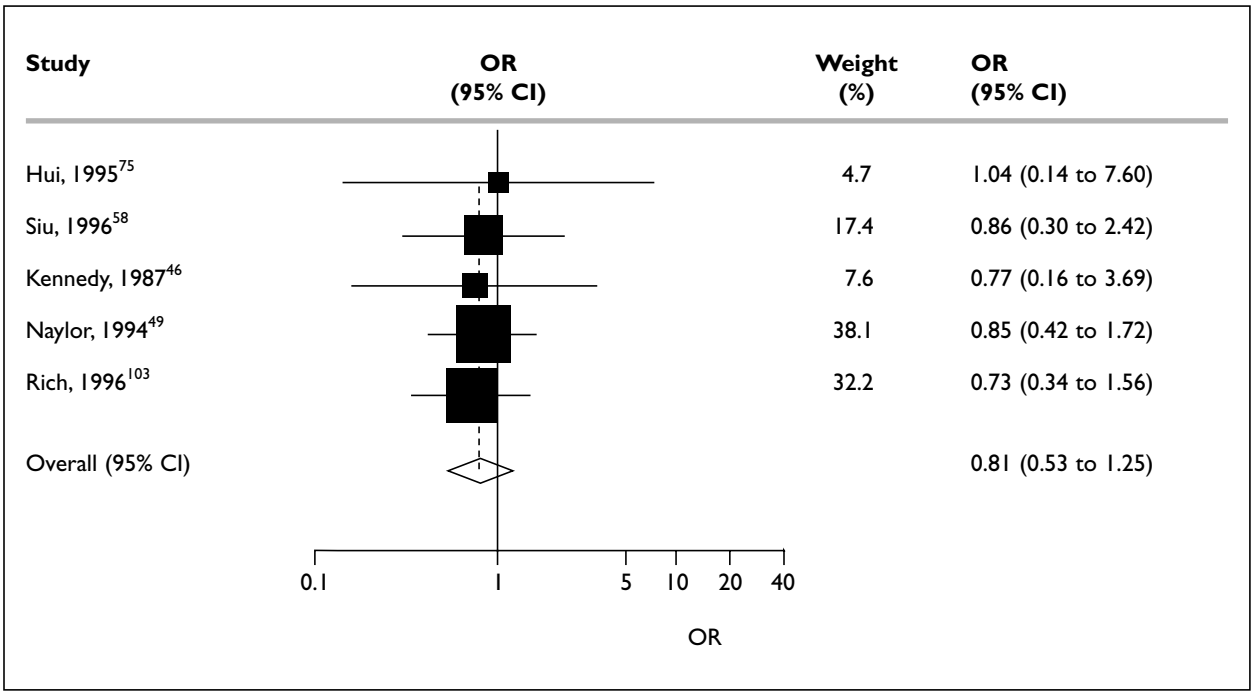

FIGURE 17 *Multiple-site interventions: mortality at 3 months*

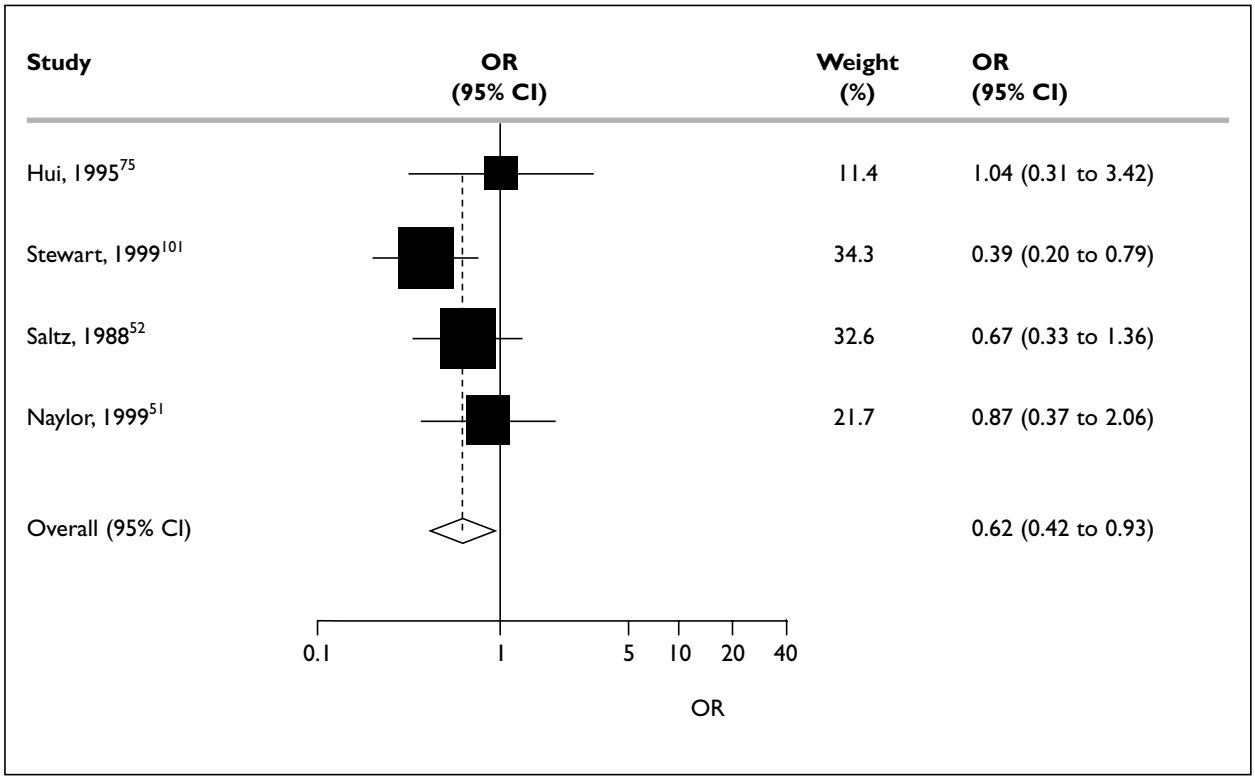

FIGURE 18 *Multiple-site interventions: mortality at 6 months*

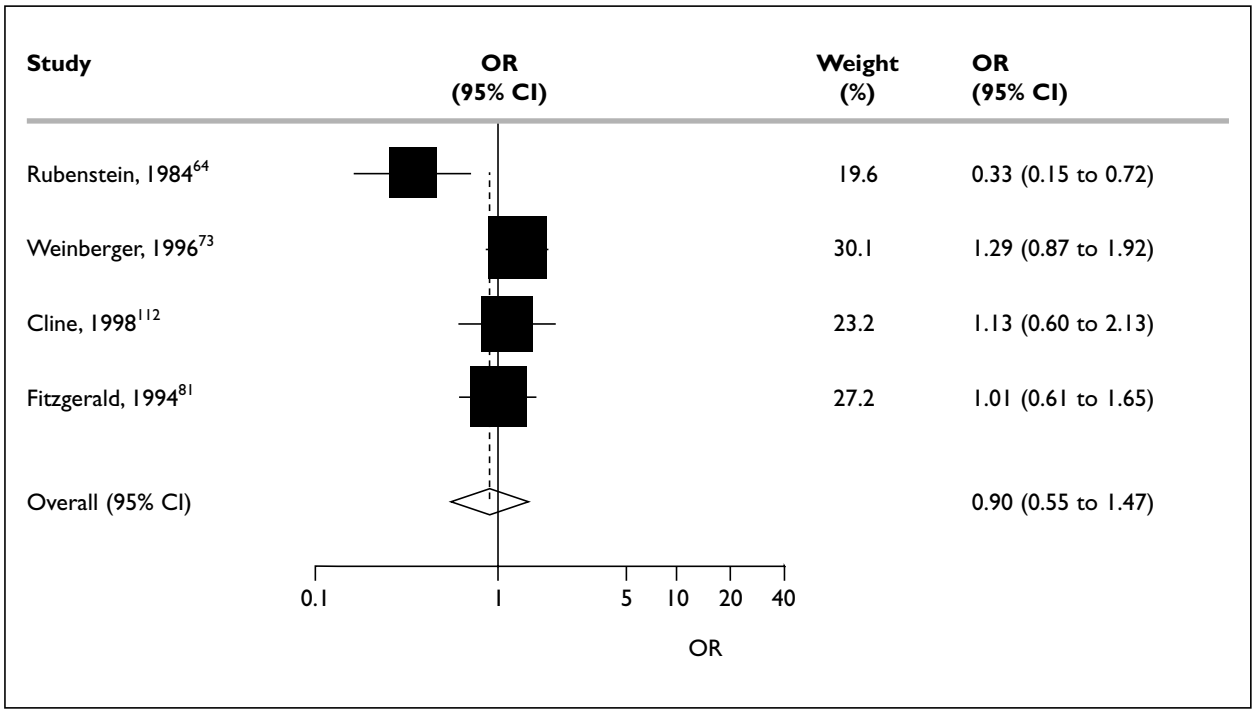

FIGURE 19 *Multiple-site interventions: mortality at 12 months*

TABLE 10 *Index length of stay*

	Number of studies	Mean difference	95% CI	*p*
Overall	19	–0.46	–2.883 to +1.962	0.710
Setting				
Inpatient only	7	+1.430	–2.251 to +5.112	0.466
Home only				
Phone only				
Multiple	9	–3.22	–6.905 to +0.734	0.385
Intervention delivery				
Single person	7	–0.795	–6.905 to +5.314	0.799
Team	12	+0.165	–2.106 to +2.347	0.882

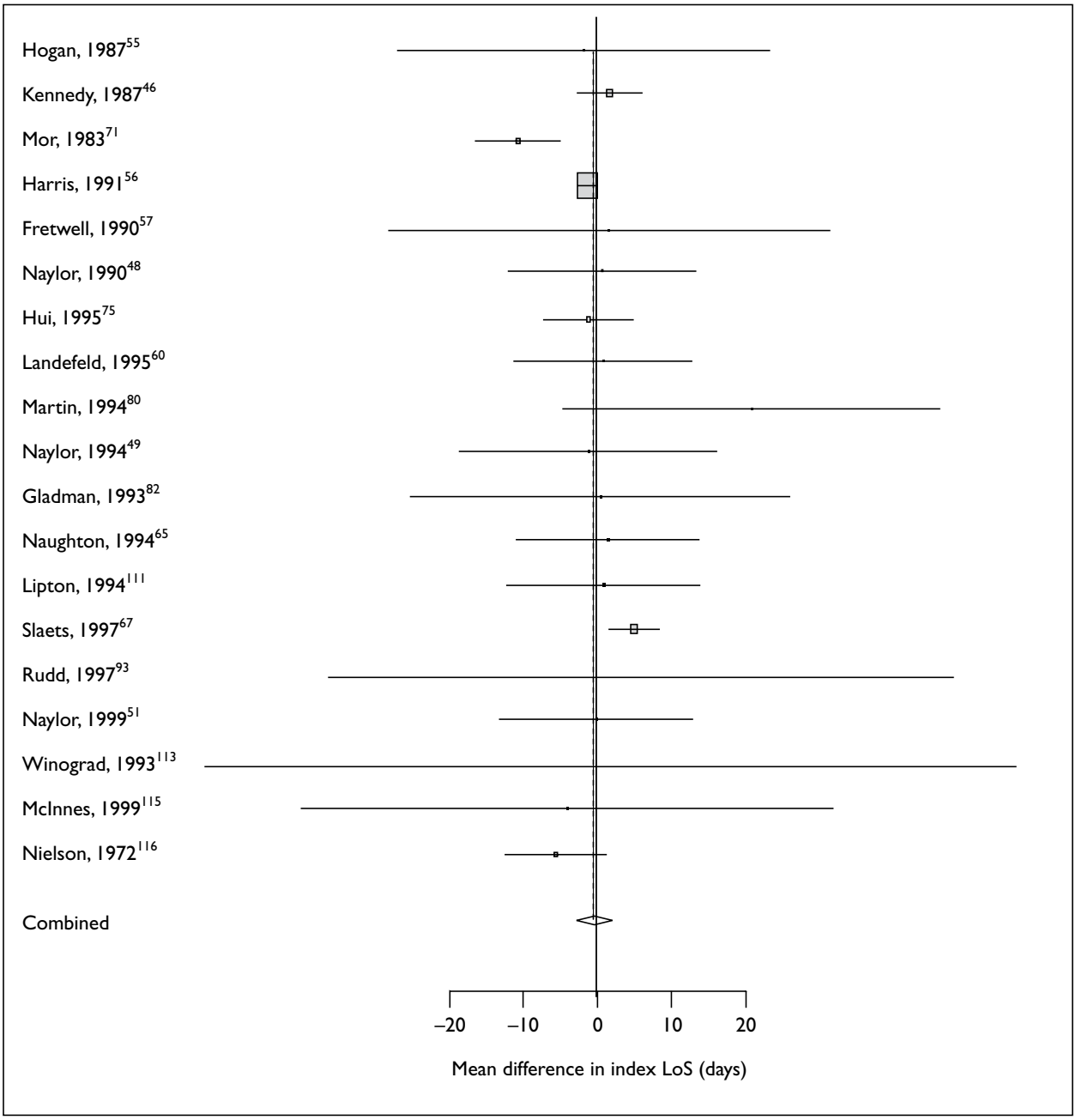

FIGURE 20 *Overall: index length of stay*

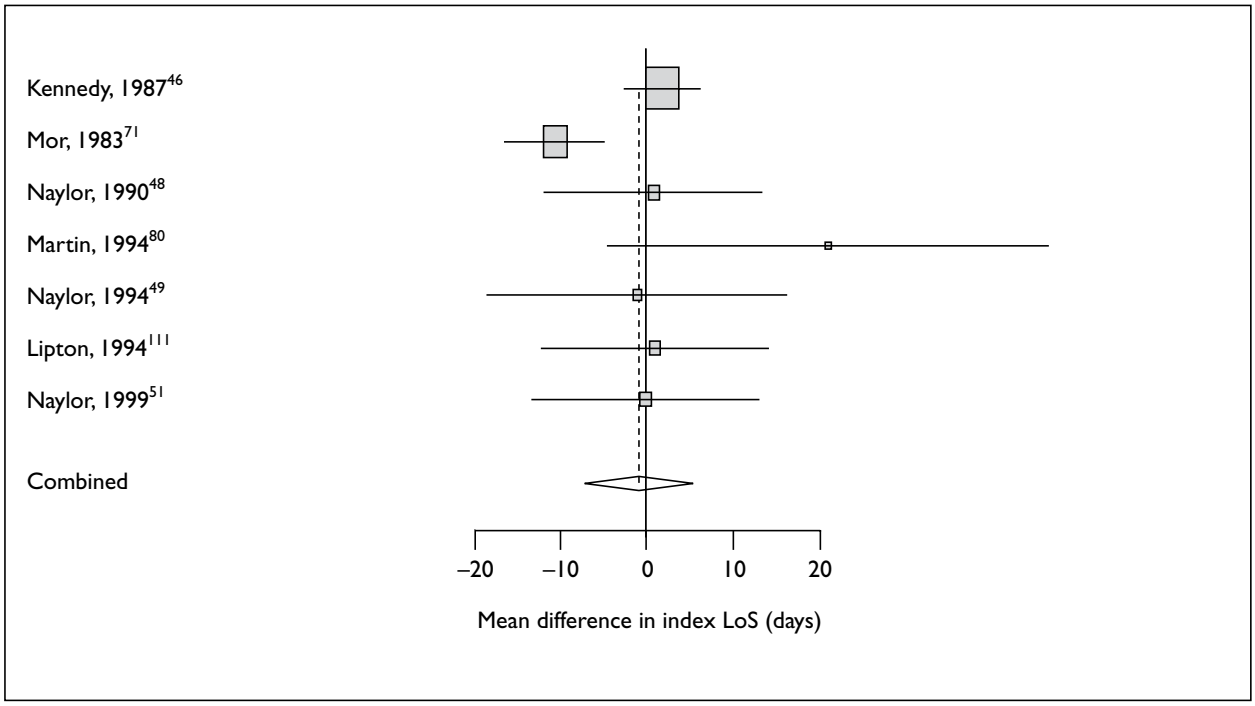

FIGURE 21 *Single-person interventions: index length of stay*

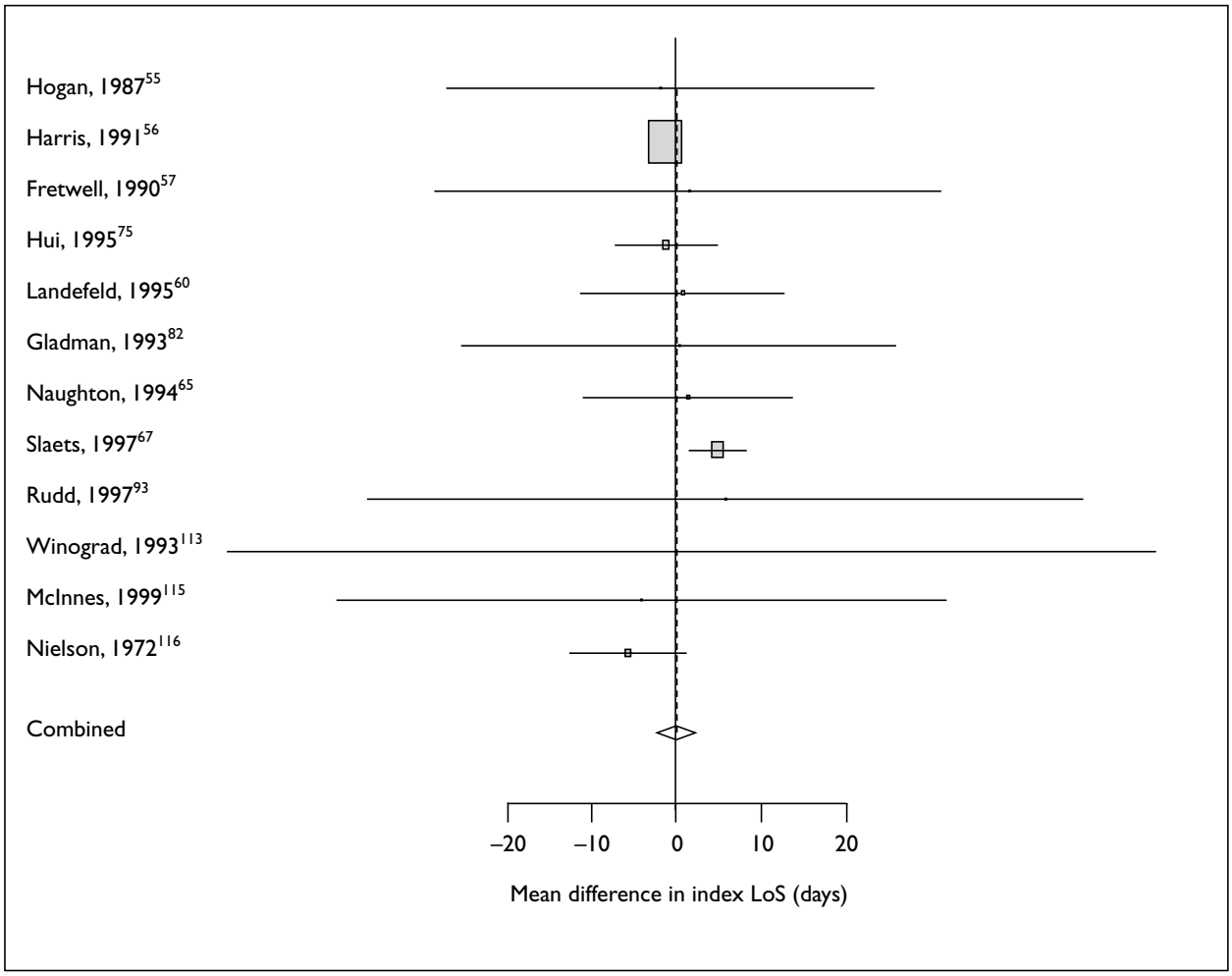

FIGURE 22 *Team interventions: index length of stay*

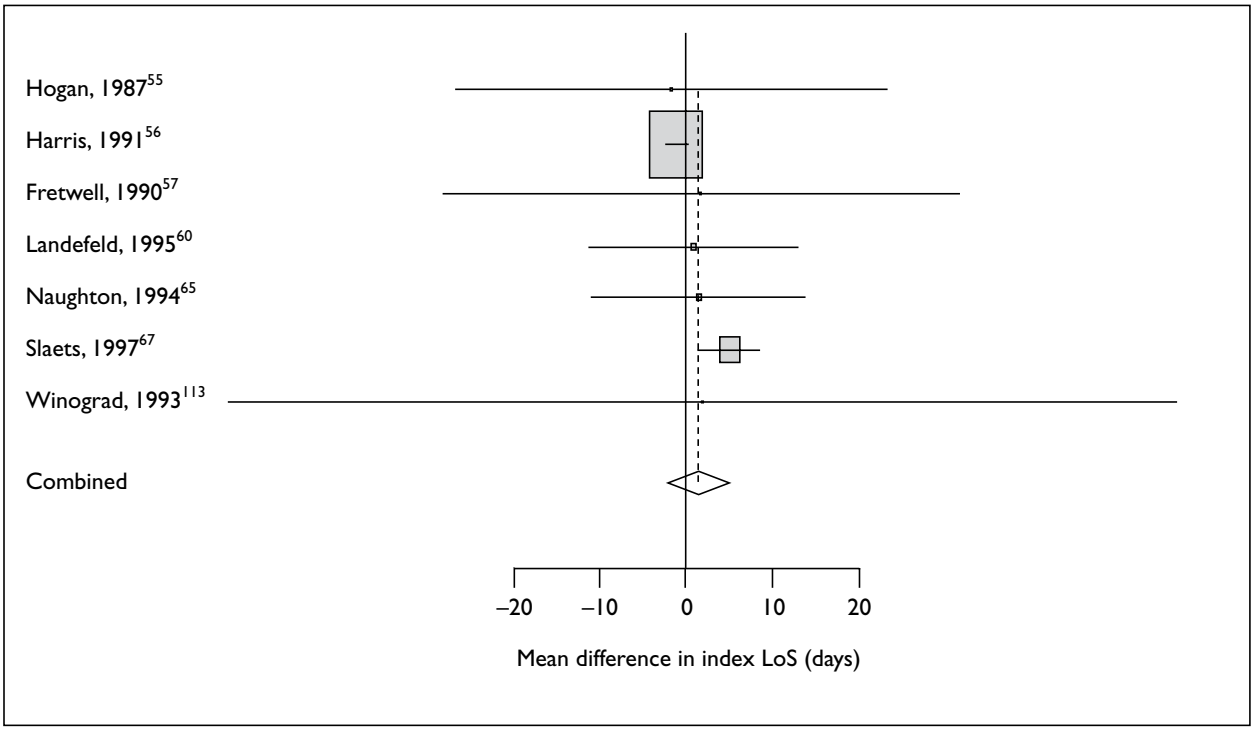

FIGURE 23 *Inpatient interventions: index length of stay*

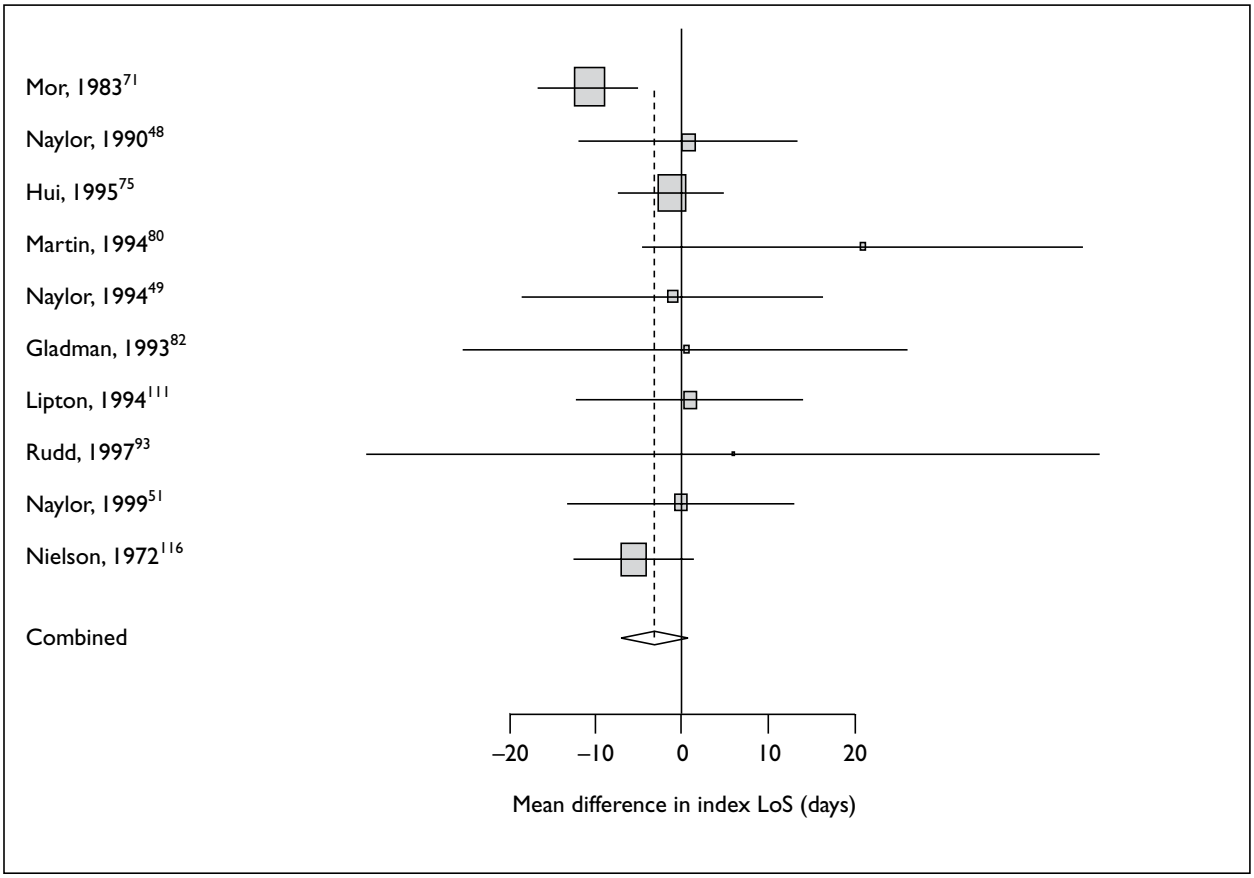

FIGURE 24 *Multiple intervention sites: index length of stay*

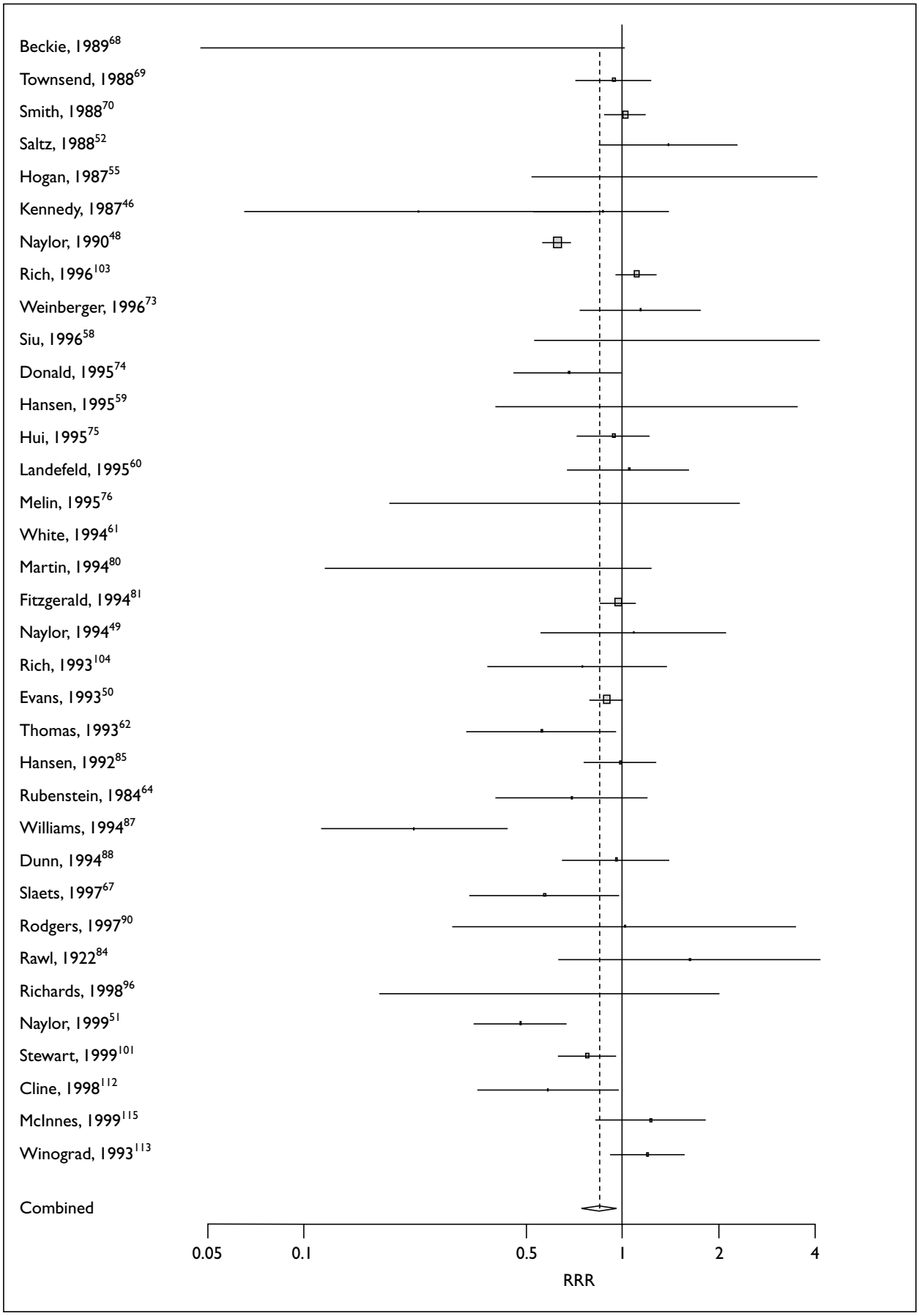

FIGURE 25 *Overall: RRR*

TABLE 11 *RRR by intervention characteristics*

	Number of studies	RRR	95% CI	*p*
Overall	35	0.851	0.760 to 0.953	0.005
Setting				
Home only	10	0.795	0.613 to 1.032	0.085
Inpatient only	7	0.931	0.795 to 1.091	0.377
Phone only	3	0.919	0.446 to 1.893	0.819
Multiple	15	0.829	0.690 to 0.995	0.045
Intervention delivery				
Single	16	0.825	0.699 to 0.974	0.023
Team	19	0.875	0.744 to 1.028	0.105

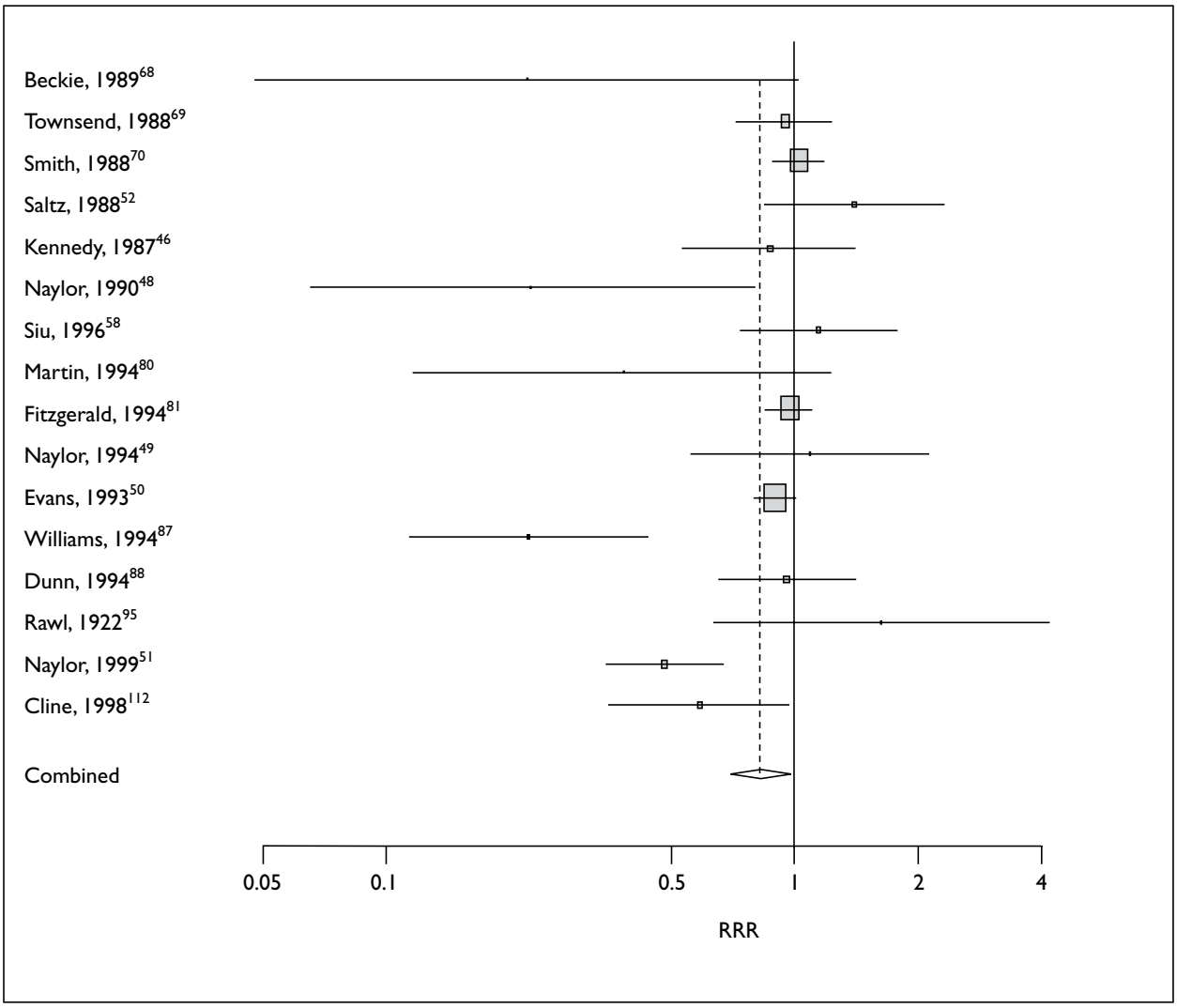

FIGURE 26 *Readmission: single-person interventions*

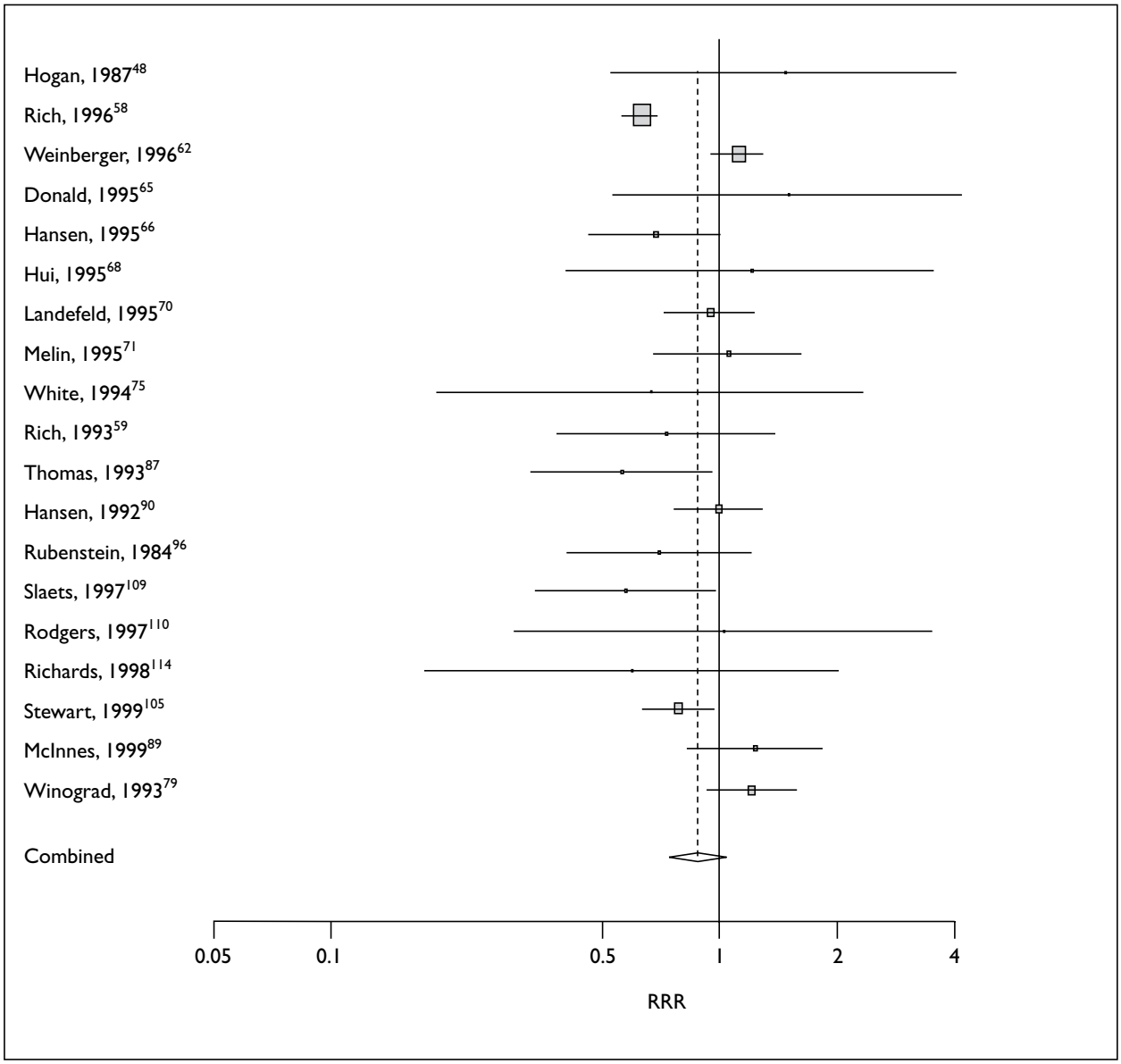

FIGURE 27 *Readmission: team interventions*

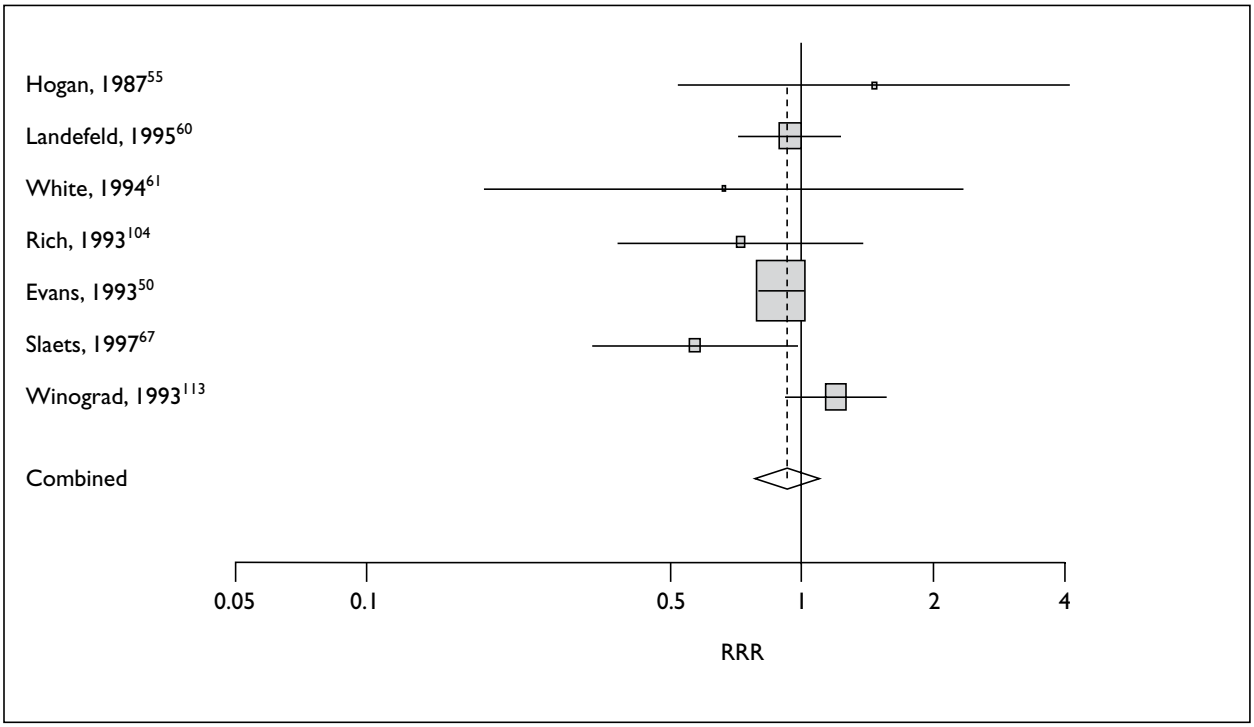

FIGURE 28 *Readmission: inpatient interventions*

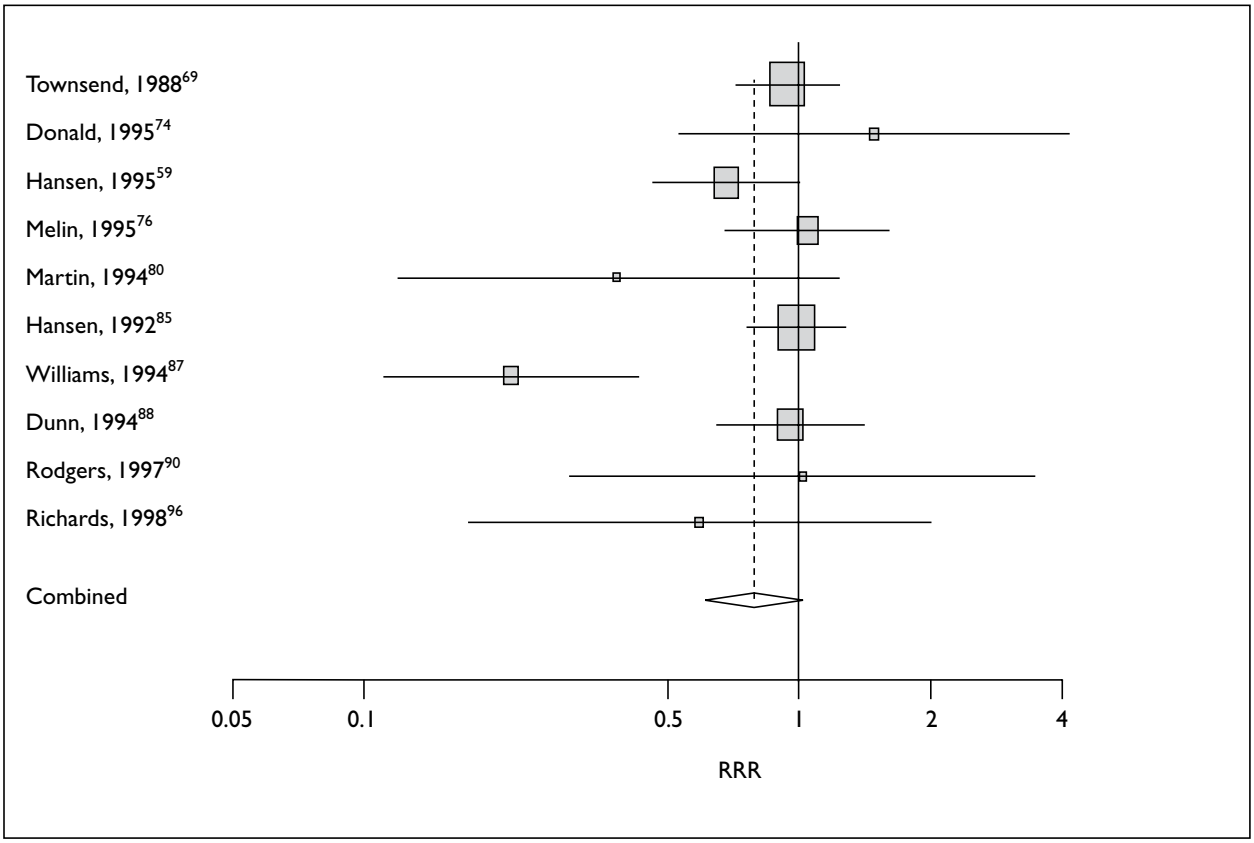

FIGURE 29 *Readmission: home interventions*

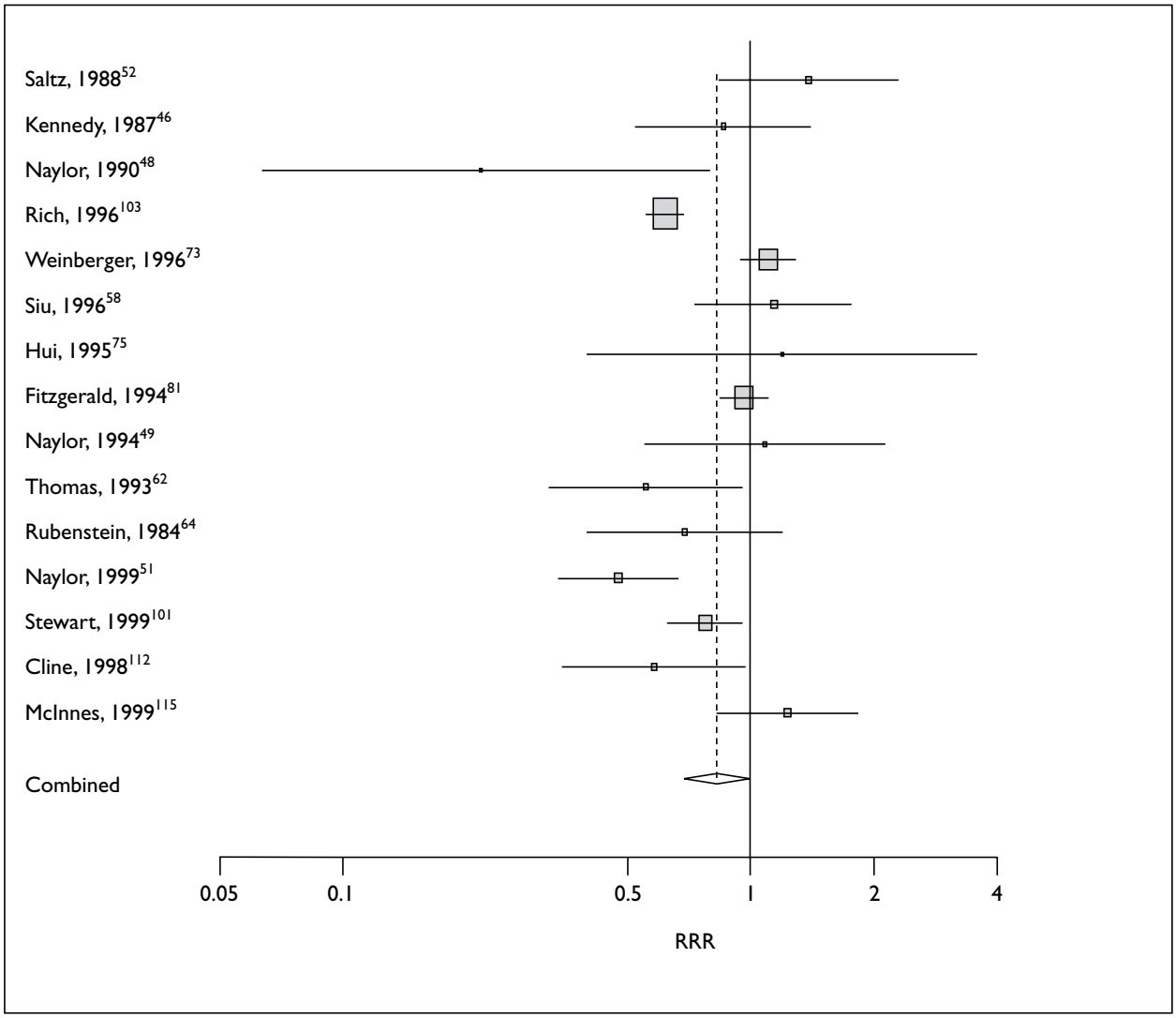

FIGURE 30 *Readmission: multiple intervention sites*

TABLE 12 *Physical and mental functioning*

Outcome	Scale	Number of studies	Estimate	95% CI	*p*
Physical	Standardised difference	8	–0.135	–0.590 to +0.319	0.6
Physical	OR	6	+1.401	1.031 to 1.904	0.03
Anxiety	Standardised difference	4	+0.257	–0.952 to +1.465	0.7
Cognitive	Standardised difference	4	+0.060	–0.106 to +0.226	0.5

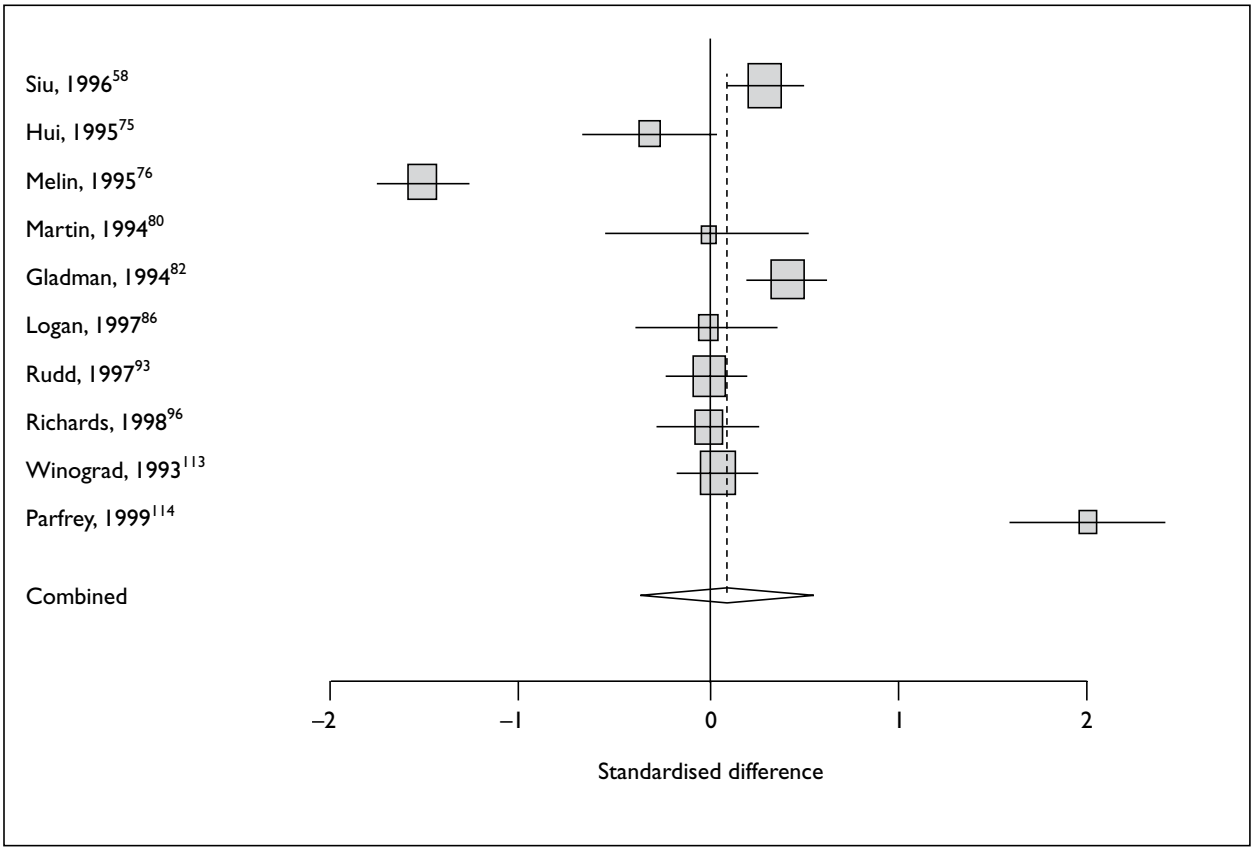

FIGURE 31 *Overall: absolute change in physical function*

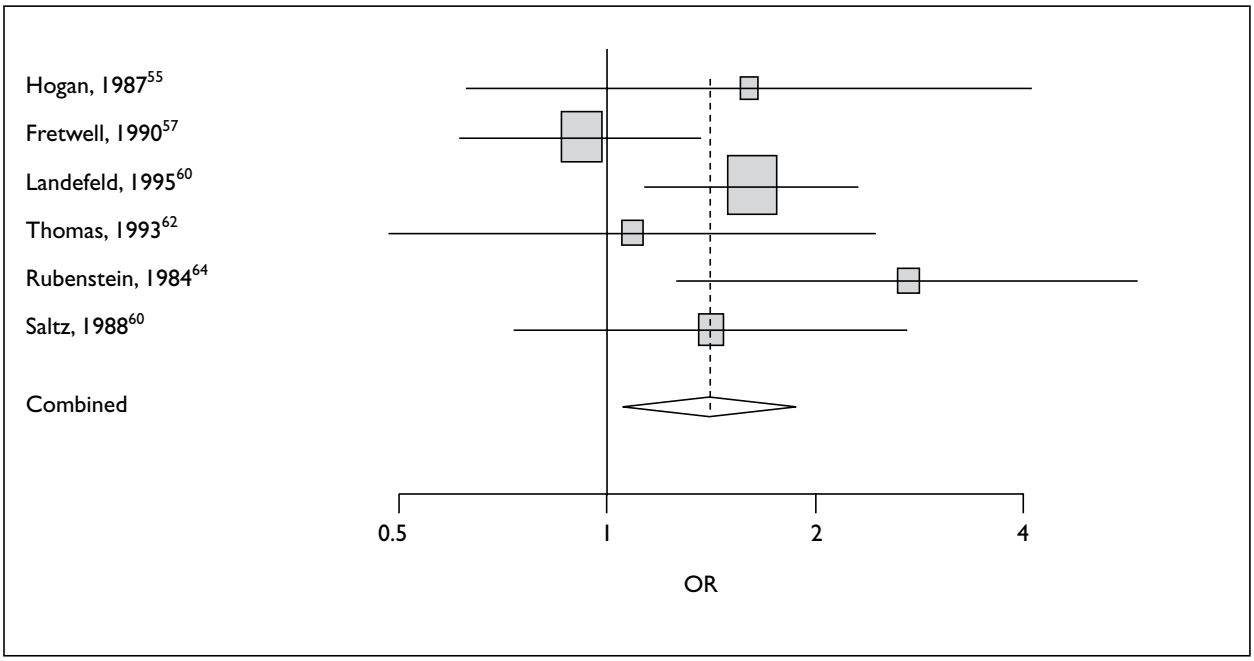

FIGURE 32 *Physical functioning: odds ratios for improvement*

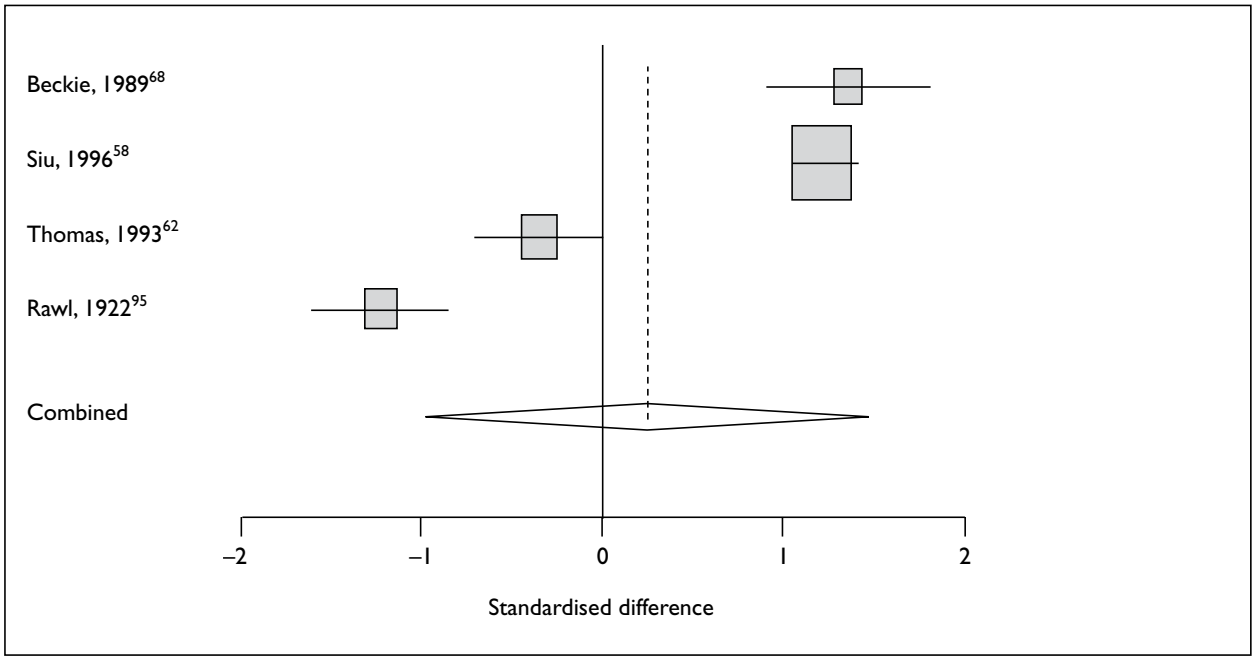

FIGURE 33 *Mental functioning: anxiety scores*

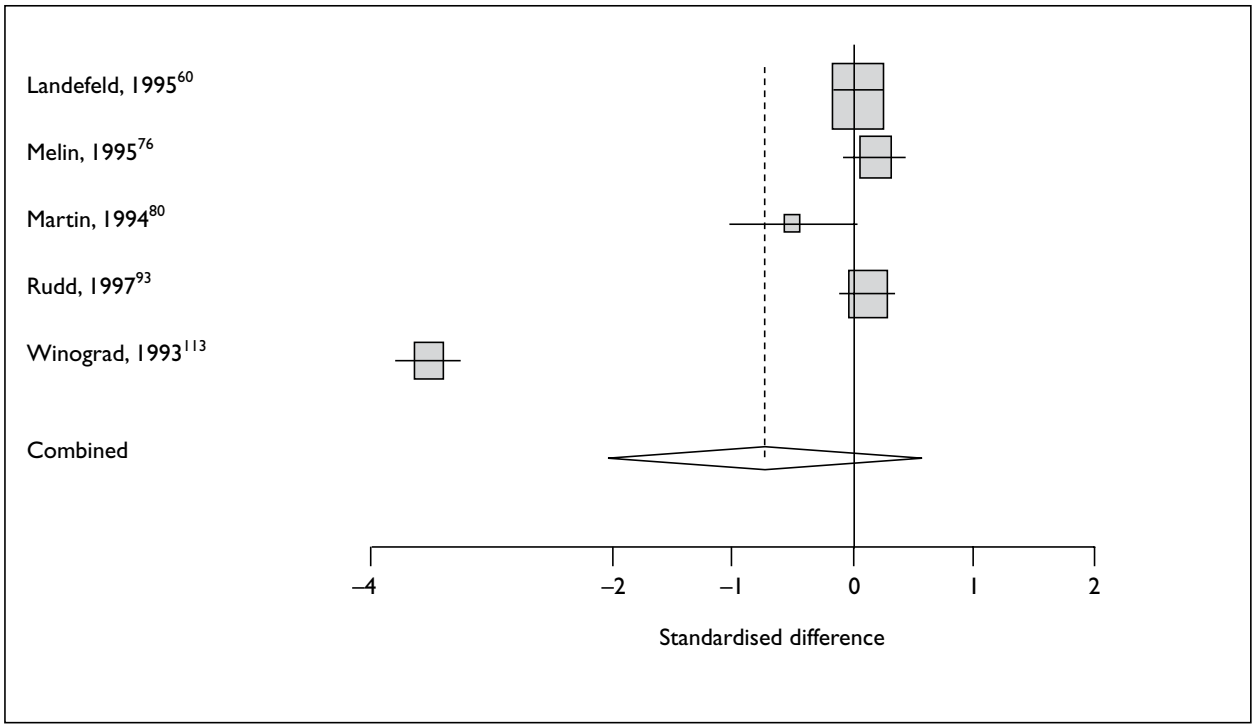

FIGURE 34 *Mental functioning: cognitive function scores*

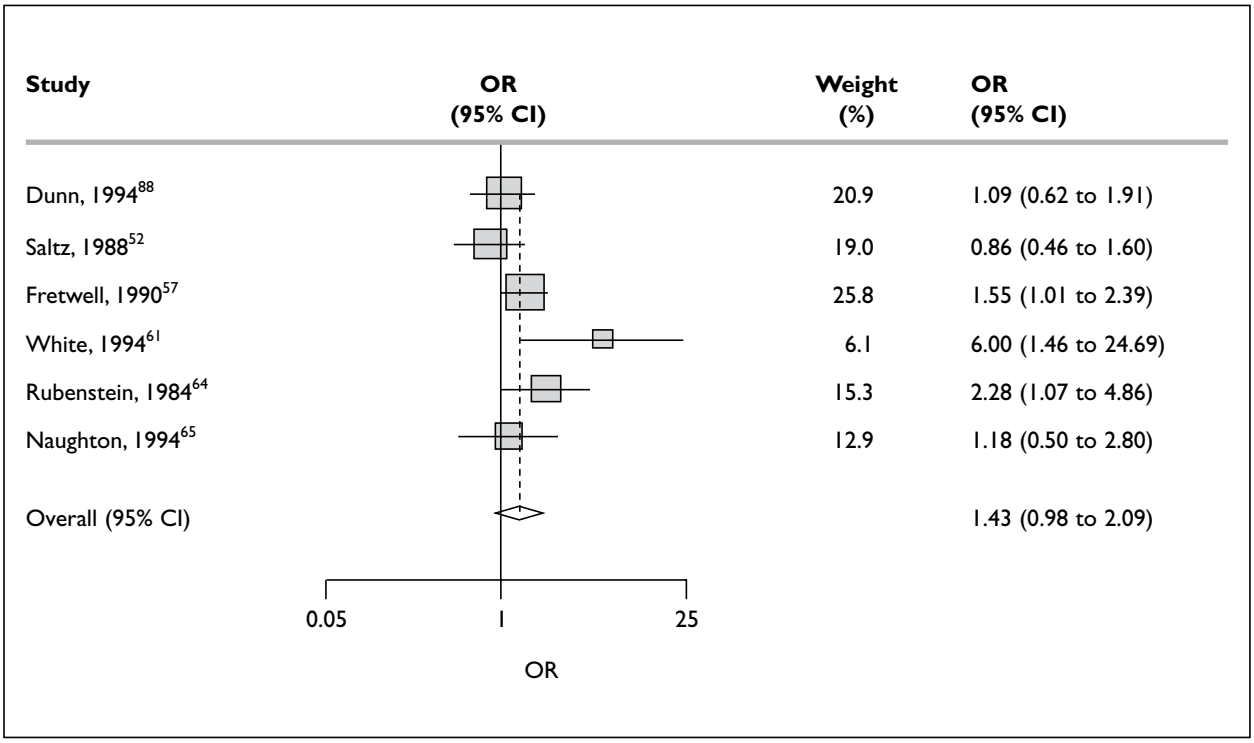

FIGURE 35 *Discharge destination: odds ratios for living at home*

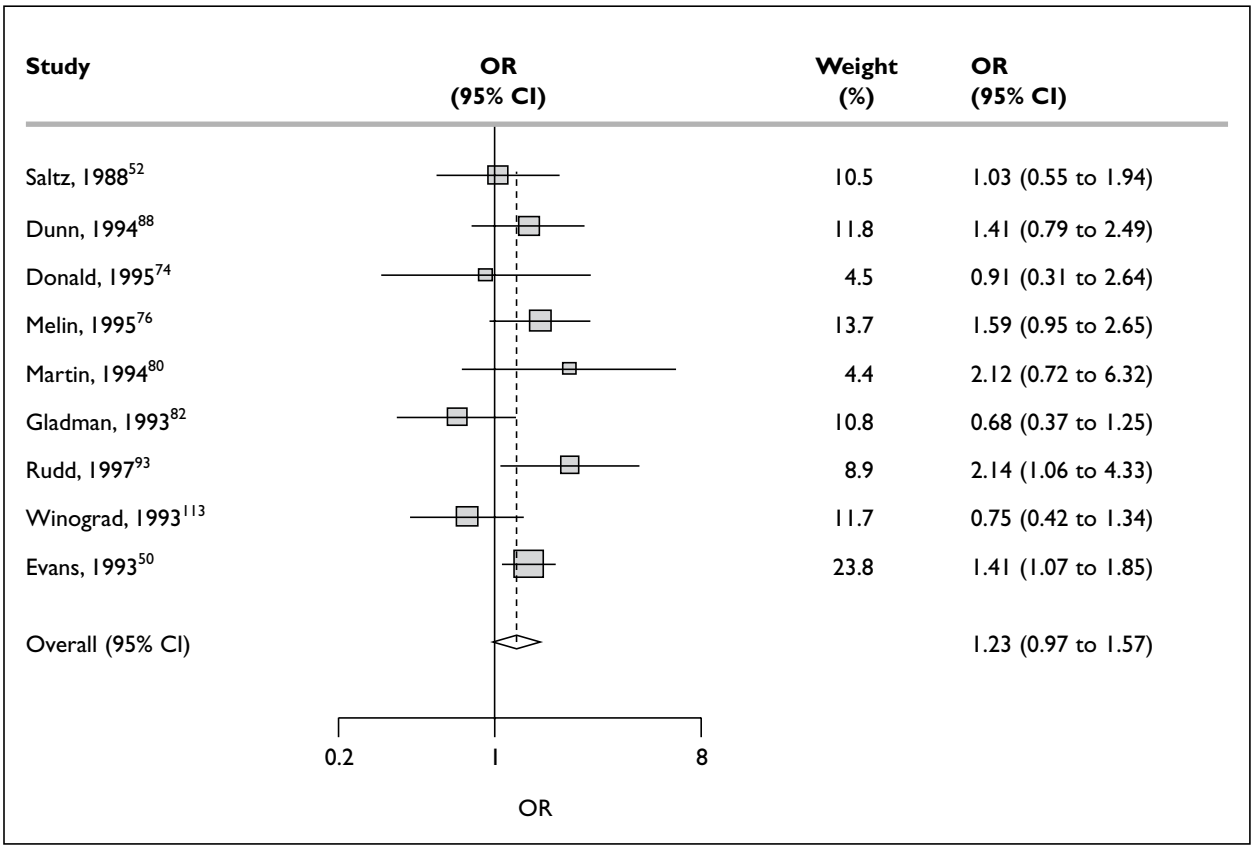

FIGURE 36 *Destination at follow-up: follow-up periods ranged from 3 to 12 months*

TABLE 13 *Destinational outcome at discharge and follow-up (3–12 months)*

Outcome	Measure	Number of studies	OR	95% CI	*p*
Discharge destination	Living in own home	6	1.43	0.98 to 2.09	0.64
Follow-up destination	Living in own home	9	1.231	0.97 to 1.57	0.094

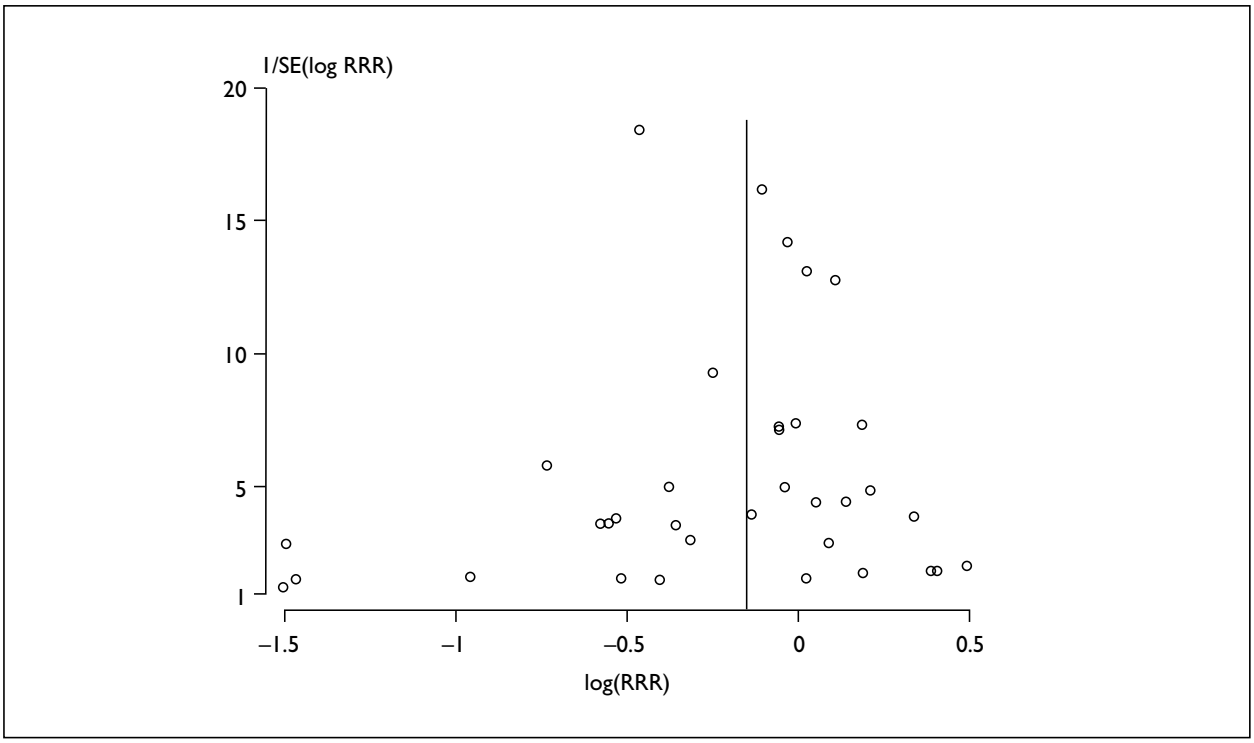

FIGURE 37 *Funnel plot*

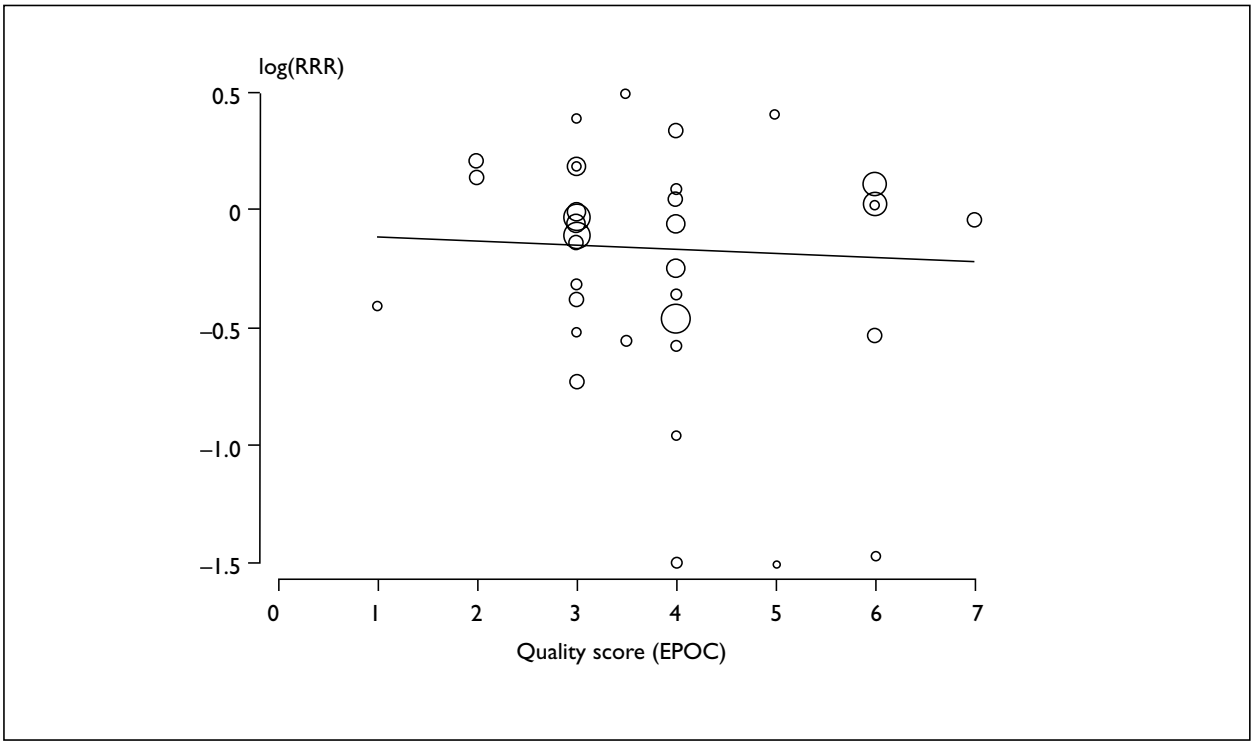

FIGURE 38 *Regression of quality scores against readmission data*

Chapter 4

Comprehensive discharge planning protocols

Introduction

This chapter is concerned with comprehensive discharge planning for older people being discharged from inpatient hospital care. Research advocates the importance of discharge planning commencing as near to the admission process as possible.[117] Studies conducted in the UK and abroad provide some evidence that a comprehensive approach to discharge planning, including a predischarge assessment of the patient and carer, the development of a patient-specific discharge plan, and the maintenance of communication with the patient's hospital team, can improve the operational and economic effectiveness of an individual's inpatient stay,[118,119] improving the utilisation of hospital beds, reducing bed blocking,[120,121] and reducing healthcare charges for the elderly.[122]

Previous systematic reviews

No previous systematic reviews which addressed the issue of comprehensive discharge planning from an inpatient hospital episode were identified. One review of discharge planning from hospital to home was found.[123] A comparison of the inclusion criteria of this review and the Shepperd and Parkes[123] protocol highlights fundamental differences. Their study includes both controlled trials and RCTs, although this review only included RCTs. The Shepperd and Parkes protocol included all patients irrespective of age, while this review concentrated on comprehensive discharge planning for older people being discharged from inpatient hospital care. The interventions listed in the Shepperd and Parkes protocol also included preadmission assessment, an area which was not included in this review.

Method

Search strategy

The details of the search are described on page 7.

Objectives of the review

To determine if comprehensive discharge protocols improve the outcomes and cost-effectiveness of elderly people being discharged from hospital.

Hypotheses

Comprehensive discharge planning protocols:

- reduce length of stay and readmission rates in older people experiencing discharge from inpatient hospital care
- improve health outcomes in older patients experiencing discharge from inpatient hospital stay
- reduce the need for older patients experiencing discharge from an inpatient hospital stay to move into institutional care
- improve patient and carer satisfaction
- are cost-effective.

Types of participants

This review included evaluations of discharge planning protocols for patients aged 65 years and over experiencing discharge from inpatient hospital care. Discharge from day hospitals, outpatient settings, nursing homes and other settings not providing acute or high technology care was excluded.

Types of interventions

We included studies that tested the effect of interventions involving standardised actions or interventions carried out by an individual, including assessment, coordination and implementation of the discharge plan, which projected needs post-discharge with the aim of preventing unnecessary readmission, maintaining the health status of patients or lessening the burden on carers.

Study designs

We included RCTs only. The methods for assessing studies for relevance and quality are described on page 9.

Data extraction

For those studies included in the review, data were extracted independently by two reviewers. The reviewers were blind to the study authors. The procedures followed for data extraction are described on page 10.

Results from this review

All studies within this review pertain to patients who have experienced discharge from an acute inpatient hospital stay and all but one study[114] were conducted in the USA. The studies evaluated a comprehensive discharge protocol implemented by an individual who was either a specialist nurse, a social worker or an admitting clerk (*Table 14*). Therefore, while team members may be referred to, a single-profession intervention is examined rather than a multiprofessional or team one. The comprehensive discharge protocols were similar in design and were compared with usual discharge care. The protocols all had similar elements, including the assessment of patients, liasing with the patient carer and other professionals to co-ordinate discharge and providing follow-up visits or telephone calls (*Table 15*). Patients in the studies had no single specific condition, although in one study[49] subjects had cardiac-related conditions, and in another study[51] a range of diagnosis related groups were used to define the study population.

All studies except two excluded individuals without a telephone, or who were unable to speak English (*Table 16*). While two studies carried out face-to-face follow-up visits, there was generally a reliance on telephone follow-up as the means of support. This exclusion criterion reduces the probability of the poor or ethnic minority groups being included in the sample, and therefore excludes groups that may be the most vulnerable and the most in need of a specialist discharge service. Studies also excluded individuals with cognitive impairment, and yet many of the interventions are still appropriate and could have been completed with the assistance of a relative or carer. Three studies[50,51,115] did introduce selection or screening criteria associated with poor postdischarge outcomes to ensure that a 'high risk' sample or subjects were studied.

Interventions

The description of the protocols in the trials are similar and contain many common elements (*Table 17*). Not only did the specialist nurse or social worker assess, coordinate and provide post-discharge follow-up support, they also educated or reinforced education required for discharge. Another very common element was a 24-hour predischarge visit. In one study[50] the social worker interventions included health education, financial planning, referrals to community placements and help with medical follow-up. There was a slightly different emphasis in the interventions in this study compared with studies where a nurse implemented the protocol, although core interventions such as assessment, planning and coordinating functions appear similar. Another study[114] comprised a screening questionnaire and then referral to the appropriate multidisciplinary team member.

TABLE 14 *Type of input and members of staff involved in the comprehensive discharge studies included in this review*

Study	Single person or team	Inpatient/ phone/clinic/ home	Doctor	Nurse	PT	OT	SALT	SW	Pharm.	Assist.	Comments
Kennedy, 1987[46]	Single	Inpatient/home		Yes							
Naylor, 1990[48]	Single	Inpatient/phone		Yes							
Naylor, 1994[49]	Single	Inpatient/phone		Yes							
Evans, 1993[50]	Single	Inpatient						Yes			Risk screening plus SW as discharge planner using a protocol
Naylor, 1999[51]	Single	Inpatient/phone/ home		Yes							
Parfrey, 1999[114]	Single	Inpatient/home									Admitting clerk
McInnes, 1999[115]	Team	Inpatient/home	Yes								GP visit in addition to discharge planning by hospital geriatric team

Assist., assistant responsible to professional team member; OT, occupational therapist; Pharm., pharmacist; PT, physiotherapist; SALT, speech and language therapist; SW, social worker

TABLE 15 *Discharge planning: range of models, settings and conditions studied*

Study	Country	Model of care (intervention type)	Setting	Condition
Kennedy, 1987[46]	USA	Comprehensive discharge protocol implemented by a nurse specialist compared with usual care	Acute teaching hospital	All admissions other than intensive care
Naylor, 1990[48]	USA	Pilot study of a comprehensive discharge protocol implemented by a specialist nurse compared with usual care	Urban hospital/ medical centre	Patients from medical and surgical units
Naylor, 1994[49]	USA	Comprehensive discharge protocol implemented by a specialist nurse compared with usual care	University hospital	Patients with medical or surgical cardiac related DRGs
Evans, 1993[50]	USA	Selection of patients for early discharge planning	Veterans medical centre	Medicine, neurology or surgery
Naylor, 1999[51]	USA	Comprehensive discharge protocol implemented by a nurse with postdischarge follow-up compared with usual care	University hospital and medical centre	Patients with CHF, myocardiol infarction, respiratory tract infection, CABG, cardiac valve replacement, major or small bowel surgery. Orthopaedic procedures
Parfrey, 1999[114]	Not stated	Discharge questionnaire to establish early identification of need	Hospital	A variety of surgical and medical conditions
McInnes, 1999[115]	Australia	GP predischarge visit compared with usual care	Hospital/community	Not stated

The study by McInnes and co-workers[115] investigated the additional value of a home visit by the patient's GP to patients discharged under the usual multidisciplinary discharge planning process of a geriatric inpatient unit which included (in 80% of cases) a 24-hour predischarge home visit. Generally, the timing of interventions was not explicit in the studies, which is unfortunate as this may have shed more light on the most opportune and effective time to carry out interventions.

There are areas which the studies appear not to have considered. Communication between the secondary care and primary care interface is an area which causes many difficulties in the NHS but was specifically tested in only one study.[115] The other study which referred to this issue,[51] commented that for the first 4 weeks after discharge the study nurse was substituted for the visiting or district nurse. The interaction and the division of responsibilities between the study nurse and the patient's named nurse during the inpatient hospital stay and how these roles overlapped were not addressed.

To translate these models of care into the UK context may be difficult. The numbers of specialist gerontological nurses within the NHS may not be sufficient to offer a similar service to those described in the studies. However, many of the interventions are common to the process of discharge in all age groups and are normally carried out by a patient's primary nurse. Perhaps if greater numbers of nurses were educated in gerontological nursing or the issues of discharging elderly patients from inpatient care, interventions could be successfully carried out by the patient's named nurse.

While the studies suggest that patients and caregivers were highly satisfied with their discharge preparation, there was little detailed analysis of the interventions, the difficulties and the patient's

TABLE 16 *Characteristics of included studies: inclusion and exclusion criteria*

Study	Setting	Inclusions	Exclusions
Kennedy, 1987[46]	Acute teaching hospital	> 75 years old non-ITU; English speaking; LoS not less than 72 h	No telephone; language
Naylor, 1990[48]	Urban hospital/ medical centre	Alert and orientated; English speaking, able to respond to questions; admitted from home	No telephone; language; cognitive impairment
Naylor, 1994[49]	University hospital	CHF, angina/myocardiol infarction, CABG, cardiac valve replacement; ≥ 70 years old; admitted from home	Cognitive impairment; language; no telephone
Evans, 1993[50]	Veterans affairs medical centre	'At-risk score' of > 3 (at risk of readmission or discharge to nursing home)	Critical illness
Naylor, 1999[51]	University hospital and medical centre	≥ 65 years old with a particular diagnosis, including myocardiol infarction, CABG, bowel surgery, orthopaedic procedures, angina, CHF; admitted from own home; met at least one criterion associated with poor discharge outcomes*	Speak English; be alert and orientated; contact by telephone postdischarge; reside in a particular geographic area
Parfrey, 1999[114]	Hospital	See exclusion criteria, no additional inclusion criteria stated	Cognitive impairment; short-stay patients; receiving chemotherapy; obstetric or unconscious patients; age > 85 years; previously entered in the study; deaf; intoxicated
McInnes, 1999[115]	Hospital/community	Dependence in self-care/ambulation; multiple service user; refusal of community or health services; high carer stress; frequent readmissions	Opposite of inclusions

ITU, intensive treatment unit

* *Age ≥ 80 years, inadequate support systems, multiple/chronic health problems, history of depression, moderate to severe functional impairment, multiple hospitalisation during 6 months, hospitalisation in the past 30 days, fair or poor self-rating of health or non-adherence to therapeutic regimen*

perspective of or satisfaction with the interventions. The protocols were considered by all the studies to be individualised to the patient's needs, but the interventions and the outcome measures appear to have been provider rather than patient focused.

Subjects studied

Data were extracted from eight papers representing seven studies, all of which were controlled trials. A total of 3954 patients were randomised to receive a comprehensive discharge protocol implemented or supplemented by a healthcare professional. One study was a pilot study. A gerontological nurse specialist implemented the protocol in all studies with three exceptions: after initial risk screening it appears that the social worker implemented the protocol;[50] a screening questionnaire was used prior to referral to the appropriate multidisciplinary member;[114] and both intervention and control groups received comprehensive multidisciplinary discharge planning from a geriatric medical unit, and the intervention group could also receive a home visit by their GP[115] (*Table 18*).

In two studies[46,48] the number of patients assessed and the number eligible for the trial were the same; there was no indication from the studies of the total number of patients assessed. In another study[49] the difference between the number of patients eligible and the number randomised was due to death occurring in the initial hospitalisation or the week after discharge.

Age and sex

The participants in each study, with the exception of one[114] had a mean age of ≥ 70 years and, with

TABLE 17 *Discharge planning protocol interventions*

Intervention	Kennedy, 1987[46]	Naylor, 1990[48]	Naylor, 1994[49]	Gladman, 1993[82]	Naylor, 1999[51]	Parfrey, 1999[114]	McInnes, 1999[115]
Professional carrying out intervention	Nurse	Nurse	Nurse	Social worker	Nurse	Admitting clerk	Doctor (GP)
Patient and carer assessment within 24–48 h	✔	✔	✔	✔ (day 3)	✔	✔	Not stated
Formulation discharge care plan with collaboration	✔	✔ (< 24 h)	✔	✔	✔	Not stated	Not stated
Liaising with multidisciplinary team	✔		✔	✔	✔	✔	Not stated
Patient education	Not stated	✔	✔	Not stated	✔	Not stated	Not stated
Visiting patient every 24 or 48 h whilst an inpatient	Not stated	✔ At least two visits	✔	Not stated	✔	Not stated	Not stated
Discharge visit 24 h prior to discharge	Not stated	✔	✔	Not stated	✔	Not stated	✔ (80%)
Coordination of discharge plans during inpatient stay and after discharge	✔	✔	✔	Not stated	✔	Not stated	Not stated
Telephone availability of nurse during hospitalisation for patient and carer	Not stated	✔	✔	Not stated	✔	Not stated	No
Phone availability after discharge		✔	✔	Not stated	✔	Not stated	No
Phone calls initiated by nurse		✔ At least two calls	✔ At least two calls	Not stated	✔	Not stated	No
Follow-up visit	✔				Not stated	✔ *	✔ (52% of cases)

* *At least two home visits (first within 48 hours of discharge and the second 7–10 days postdischarge)*

TABLE 18 *Number of patients admitted, eligible for trial, randomised and included in analysis*

Study	Number of patients assessed	Number of patients eligible for trial	Number of patients randomised	Sample size	
				Intervention	Control
Kennedy, 1987[46]	80	80	80	39	41
Naylor, 1990[48]	40	40	40	20	20
Naylor, 1994[49]	Not stated	364	276	140	136
Naylor, 1999[51]	1296 screened	363	363	177	186
Evans, 1993[50]	6859	923	835	417	418
Parfrey, 1999[114]	3161	1996	1996	841	758
McInnes, 1999[115]	Not stated	427	364	205	159
Total	> 11,436	4193	3954	1839	1718

* *Combined medical and surgical patients*

the exception of the surgical patient in the studies by Naylor and co-workers[49] and Evans and Hendricks,[50] the populations were generally evenly distributed between men and women (*Tables 19* and *20*). Thus, in comparison with an unselected population of people in this age group, males were overrepresented in the studies. There also appears to have been a larger percentage of females in the control groups compared with the study groups.

Quality of studies

The sample sizes varied in range, although they were generally small, and the study by Naylor[48] was described as a pilot study. Only one study included a power calculation.[51] In two of the studies[49,115] it was poorly explained how the samples had been derived, with no indication of the number of people assessed. Only two studies reported whether the data collection had occurred blind to the patients' allocated study groups. Two papers[46,47] report the same study and describe it as double blind. Both papers state that the research assistant collected the data blind to the intervention group, but there was no detail of how the research subjects were blinded to the intervention and the professional implementing the intervention. Naylor and co-workers[49] assigned patients and carers to study or control groups; however, they appeared to have randomly assigned patients but not carers. Some patients did not have carers and therefore comparisons are limited. Carer outcomes in this paper were only briefly mentioned.

TABLE 19 *Gender distribution*

Study	Intervention group		Control group	
	Men (%)	Women (%)	Men (%)	Women (%)
Kennedy, 1987[46]	51	49	44	56
Naylor, 1990[48]	55	45	35	65
Naylor, 1994[49]				
Medical DRG*	57	43	41	59
Surgical DRG†	82	18	61	39
Naylor, 1999[51]	54	46	46	54
Parfrey, 1999[114]				
Hospital A	55	45	56	44
Hospital B	42	58	45	55
Evans, 1993[50]	96	4	94	6
McInnes, 1999[115]	43	57	46	54

* *Medical patients*
† *Surgical patients*

TABLE 20 *Age distribution (years)*

Outcome	Age of subjects	Age of controls	Units of measurement
Kennedy, 1987[46]	76 (5.2)	76 (4.9)	Mean (SD)
Naylor, 1990[48]	80.05 (75–93)	80 (75–94)	Mean (age range)
Naylor, 1994[49]			
Medical DRG	76 (5.2)	76 (4.9)	Mean (SD)
Surgical DRG	75 (4.4)	75 (4.3)	
Naylor, 1999[51]	75.5 ± 6.3	75.3 ± 6.0	Mean ± SD
Parfrey, 1999[114]			
Hospital A*	± 19	± 18	Mean ± SD
Hospital B†	56 ± 18	56 ± 18	
Evans, 1993[50]	> 70 (44%)	> 70 (47%)	
McInnes, 1999[115]	81 ± 8	81 ± 8	Mean ± SD

SD, standard deviation
* *Medical patients*
† *Surgical patients*

Objective or validated measures were used in all except one of the trials, where the instruments used were described as having face validity.[46] Baseline measures were conducted on all research participants and generally subjects and controls were equivalent at baseline. Difficulties with interventions in the protocols were not considered, and time frames for interventions were not reported in some papers. This was coupled with generic descriptions of patient assessment and coordination of care, limiting the analysis of the interventions.

Outcomes

Range of outcomes reported

Reported outcomes are given in *Table 21*. Four of the seven studies reported mortality. No deaths were reported in the study by Naylor.[48] All the studies reported length of stay, and five of the six studies reported readmission rates. Three studies reported on costs. Surprisingly, there is little information on physical or mental function, the cost to the patient or quality of life (QoL) and the information from the studies concerning satisfaction was minimal. One study[51] stated that the mean satisfaction scores changed little over the period of the study, while others simply stated that the patient was satisfied with their discharge.[46,49] Carers did not feature prominently. One study[49] included carers in their sample, although carer outcomes were not reported in any detail. From the range of outcomes it is apparent that the studies were predominately provider focused. It is surprising that functional outcomes and the destination of the patient after discharge were only reported in two studies.

Mortality

As previously stated, mortality was reported in four of the seven studies. Mortality at up to 3 months is shown in *Figure 39*. Only two studies reported this outcome. At 6 months only one study reported mortality results, and at 12 months one study reported mortality. No major advantage or disadvantage was shown.

Functional outcomes

The lack of information on functional status is surprising, with only two studies considering outcomes related to physical function, one of which was infection rates (33% for subjects, 50% for controls).[48] In the study by Naylor and co-workers[51] the intervention and the control groups were similar in mean functional status ($p = 0.33$) and depression scores. At 24 weeks both functional and mental health scores were similar between groups. No further information was given.

Length of stay

Length of stays and readmission rates were the key outcome measures in the studies (*Tables 22* to *24*). The index length of stay was reported in all trials, presumably in most cases to consider if the protocol and the specialist nurse were increasing index length of stay. The initial length of stay in all studies was decreased when compared to the control group, with the exception of the surgical group in one study[49] and the intervention group in another[115] (in which both groups received comprehensive discharge planning). The mean difference in length of stay was +1.423 days (95% CI, –2.463 to +5.282; $p = 0.47$). *Figure 40* illustrates the results of index length of stay, with a positive index indi-

TABLE 21 *Range of outcomes reported in studies*

Outcome	Kennedy, 1987[46]	Naylor, 1990[48]	Naylor, 1994[49]	Naylor, 1999[51]	Gladman, 1993[82]	Parfrey, 1999[114]	McInnes, 1999[115]
Mortality	✔	NA	✔	✔	✔	✔	✔
Readmission	✔	✔	✔	✔	✔		✔
LoS	✔	✔	✔	✔	✔	✔	✔
Physical function		✔		✔			
Mental function				✔			
Service use					✔		
Cost to service	✔	✔	✔				
Cost to patient							
QoL							
Satisfaction							✔
Carer impact							
Destination	✔				✔		

NA, not available; QoL, quality of life

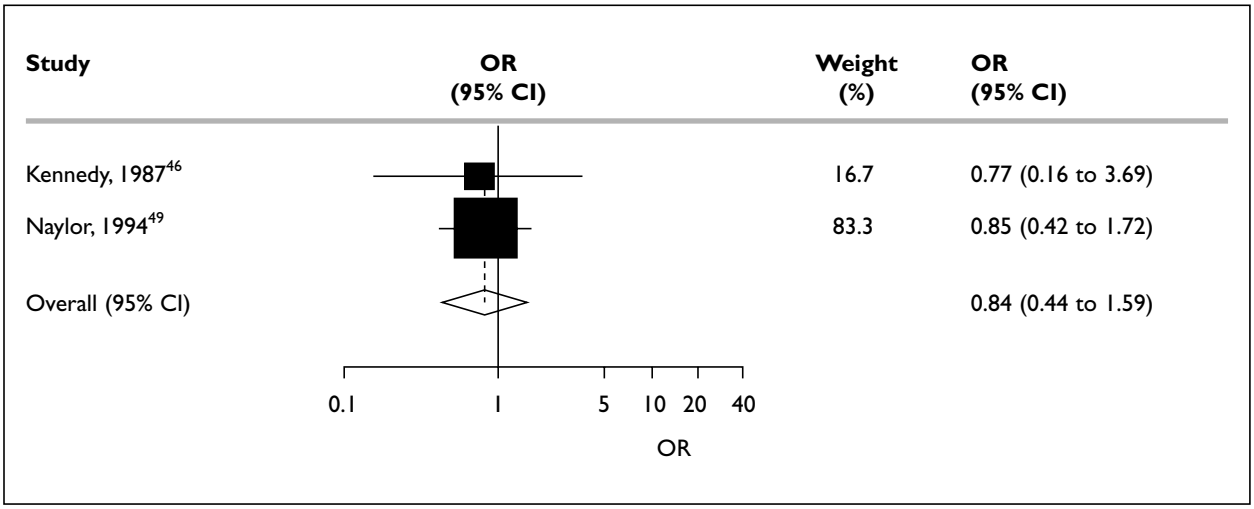

FIGURE 39 *Discharge planning: mortality at 3 months*

TABLE 22 *Initial length of stay*

Study	Units of measurement (in days)	Subjects	Controls	Significance
Kennedy, 1987[46]	Mean LoS	7.8	9.7	$p = 0.3$
Naylor, 1990[48]	Mean ± SD	8.2 ± 4.9	9.05 ± 7.66	NS
Naylor, 1994[49]				
Medical DRG	Mean ± SD	7.4 ± 3.8	7.5 ± 5.2	NS
Surgical DRG		15.8 ± 9.4	14.8 ± 8.3	NS
Naylor, 1999[51]	Total (range) days	1587 (2–54)	1670 (1–60)	$p = 0.80$
	Median [IQR]	9.2 [± 6.7]	9.1 [± 6.7]	Wilcoxon
Parfrey, 1999[114]	Median (%)	Hospital A: 7.4 @ 75% LoS, 14.0 @ 90% LoS, 22.9	Hospital A: 8.2 @ 75% LoS, 16.1@ 90% LoS, 27.0	Hospital A: $p = 0.03$
		Hospital B: 7.0 @ 75% LoS, 12.7 @ 90% LoS, 22.7	Hospital B: 7.0 @ 75% LoS, 13.3 @ 90%, LoS, 25.1	Hospital B: NS Mantel Cox statistics
Evans, 1993[50]	Mean ± SD	11.9 ± 12.7	12.5 ± 13.5	NS
McInnes, 1999[115]	Mean ± SD	25 ± 20	22 ± 16	NS

IQR, interquartile range; NS, not significant

TABLE 23 *Readmission rates*

Study	Baseline			Subjects		Controls	
	Subjects	Controls	Months follow-up	*n*	Per 100 per month	*n*	Per 100 per month
Kennedy, 1987[46]	39	41	2	29	37.18	35	42.68
Naylor, 1990[48]	20	20	3	16.7%	4.65	64.7%	21.57
Naylor, 1994[49]							
Medical DRG	72	70	3	11	5.09	11	5.24
Surgical DRG	68	66	3	7	3.43	5	2
Evans, 1993[50]	418	417	1	24%	5.75	35%	8.39
			9	55%	13.16	61%	14.63
McInnes, 1999[115]	205	159	6	30%	5.00	25%	4.17

TABLE 24 *Readmission to hospital*

Study	Time	Unit of measurement (in days)	Length of readmission (days)		Significance
			Subjects	Controls	
Naylor, 1990[48]		Mean (range)	15 (4–23)	15 (2–28)	
Naylor, 1994[49]					
Medical DRG	2 weeks	Total	21	73	Difference (95% CI):
	2–6 weeks		16	49	–52 (–78 to –26),
	6–12 weeks		94	100	p = 0.002
					–33 (to –13), p = 0.01
					–6 (–83 to +71)
Surgical DRG	2 weeks	Total	34	32	2 (–13 to +17)
	2–6 weeks		63	52	11 (–20 to –52)
	6–12 weeks		52	26	26 (–8 to +60)
Naylor, 1999[51]	LoS and hospital days 24 weeks postdischarge from index stay	Total	270	760	p = 0.001 Wilcoxon
	Mean LoS per patient	Mean	7.5 ± 4.8 (n = 36)	11.0 ± 10.6 (n = 69)	$p \leq 0.001$ Wilcoxon
Evans, 1993[50]	Average number of days; readmitted within 30 days	Mean	2.2 ± 5.1	3.2 ± 6.8	t test p = 0.01
	Average number of days; readmitted within 90 days	Mean	10.1 ± 8.3	12.1 ± 9.1	p = 0.001

cating that the intervention is beneficial. The intervention appears not to take longer or block beds.

Readmission rates

Six studies reported readmission episodes and, with the exception of one[49] at 6–12 weeks all control groups had higher readmission rates. In the study by McInnes and co-workers[114] readmission was reported as days to first readmission, with no significant difference being seen between groups. In the two studies that reported readmission rates at three specific time intervals the data show different trends. In the study by Naylor[48] readmission rates increase with time in the control group and are four times greater than in the subjects a month after discharge; this trend continues, suggesting that the comprehensive discharge protocol and the specialist nurse are able to reduce the readmission rate over at least a 3-month period. In the second study,[49] the difference in readmission rates between the control and study groups was greatest during the first 2 weeks postdischarge, the difference between the two groups decreasing with time. Patients in the surgical intervention group[49] reported a higher rate of infection than the control patients in the first 2 weeks postdischarge (26% versus 8%, p = 0.004). When the groups were controlled for the rates of infection in the first 2 weeks after discharge, the prevalence of readmission in the intervention group was 17% compared with 40% in the control group. Overall, for discharge planning protocols the RRR was 0.795 (95% CI, 0.574 to 1.100; p = 0.166). *Figure 41* illustrates the analysis of the readmission rates. The trend for reduction in readmission with discharge planning intervention is not statistically significant.

Two studies commented on the reasons for readmission. A high proportion of readmissions were directly related to the index length of stay, indicating the chronic nature of illness, or that the patient was not medically fit for the initial discharge. Three studies also reported days to readmission, it was found that study participants had a longer time at home prior to readmission.

Duration of readmission

There was a general trend that the length of stay in the subject groups was shorter during readmission to hospital. The data on the length of the readmission stay are not consistent across the trials (see *Table 24*). In one study,[49] the total

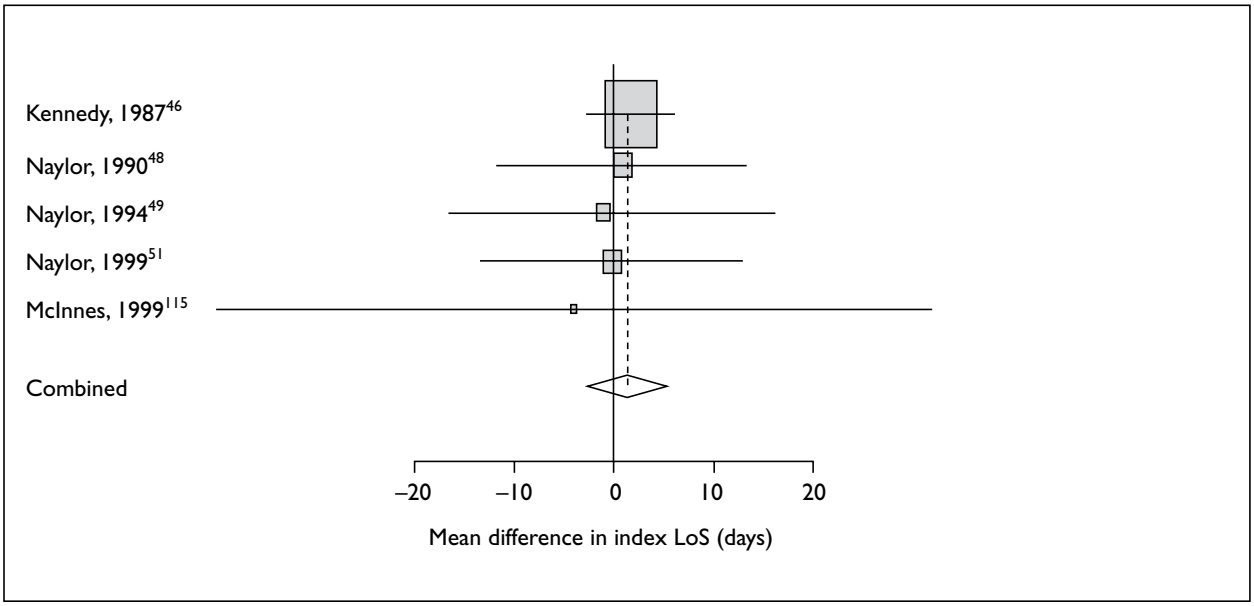

FIGURE 40 *Discharge planning: index length of stay*

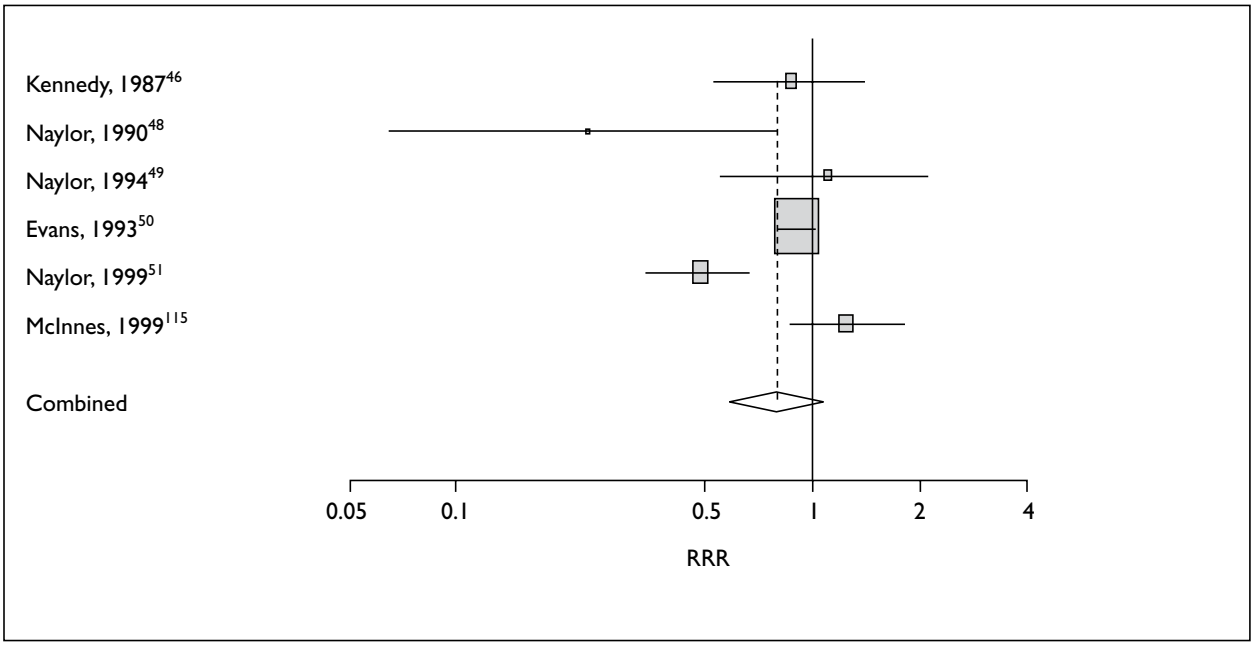

FIGURE 41 *Discharge planning: RRRs*

re-hospitalisation days for the medical subject group was less than the control at 2 weeks after discharge and also between 2 and 6 weeks, but was similar between 6 and 12 weeks. In two studies,[50,51] the total amount of hospital days (at 9 months) in the study group was significantly lower, but in another study[48] the length of stay was similar in both groups. In the surgical group of the study by Naylor and co-workers[49] the length of stay in the subject group was greater than in the control group. This may be due to the high infection rate experienced by this group.

Cost of interventions

The costs of the index hospitalisation were reported in three studies (*Table 25*). In two studies[48,49] the mean charge for the index stay was greater for subjects than for the controls, although previous data show that the index length of stay in the subjects was shorter than for the controls. However, in the study by Neidlinger and co-workers[47] the mean charge was higher in the control group. This study also calculated the gross excess revenues, which is calculated by subtracting the hospital cost from the diagnosis-related group payment. The gross excess

TABLE 25 *Cost of index length of stay*

Study	Cost for subjects ($)	Cost for controls ($)	Significance
Kennedy, 1987[46] and Neidlinger, 1987[47]			
Mean charge	3,069	4,380	p = 0..036
Range	523–11,140	643–11,685	
Gross excess revenue (DRG–hospital costs)	4,263–3,069 = 1,194	4,663–4,380 = 283	p = 0.14
Naylor, 1990[48]			
Mean charge (95% CI)	13,335 (2.594 to 64.445)	10,789 (2,457 to 46.933)	Not stated
Naylor, 1994[49] (medical DRG)			
Medical DRG, mean charge	24,352 ± 15,920	23,810 ± 18,449	Difference (95% CI):
Surgical DRG, mean charge	105,936 ± 52,356	98,640 ± 52,331	542 (–5,121 to 6,205)

revenue in the subject group was higher, producing a saving to the hospital. With a difference of $911 between groups this was deemed to be financially significant. In the study by Naylor[48] one-quarter of the readmission costs are missing, the range of costs per group is large and the sample size is small.

The cost of readmission

The charges for rehospitalisation (*Table 26*) were not consistent in the trials. In two studies[48,49] the cost was higher for subjects than controls, but in another study[51] costs were greater in the control group. The study by Naylor and co-workers[49] showed that costs were lower in the study group prior to 6 weeks, but then increased between 6 and 12 weeks.

The cost of the specialist nurse service was reported in four studies. In the study by Naylor and co-workers[49] the total cost for the medical group which consisted of 72 patients and 26 care-givers was $5692. For the surgical group of 68 patients and 48 care-givers the cost was $7374. The mean charge for each patient and care-giver was $93.30. The mean cost in another study by the same group[51] was cheaper at $61.60 per patient. In a further study,[48] the mean specialist nursing cost was only $43.80 per patient. However, in this study the costs of the nursing service did not include administrative costs, which may explain the large difference; it was estimated in the paper that if this other cost was included the cost would be $70.08. The average charge per patient in the study by Neidlinger and co-workers[47] was $20.80, making this the cheapest. However, this study was undertaken in the mid-1980s, some of the other studies being undertaken a decade later. Also, interventions within the trials were slightly different. For example, in two studies[46,47] there were some additional community follow-up visits, whereas in another study[51] the nurse followed the patient into the community for 4 weeks after discharge, replacing the district nurse and therefore increasing the cost. Neidlinger and co-workers[47] when calculating gross excess revenues (hospital cost – diagnosis-related group reimbursements) and the cost of the clinical nurse specialist, found savings in the initial hospitalisation of subjects, proving the specialist nurse and protocol to be cost-effective. Naylor[48] reported charges for readmissions for three of four subjects and eight of 12 controls.

Destinational outcome

A change in destination of patients after discharge was featured in two studies (*Table 27*). In one study,[46] changes in destinational outcomes were measured at 2 and 4 weeks postdischarge and for at least 87% of surviving patients in both groups no change in placement had occurred. No further information was given. In another study,[50] 97% of the experimental subjects received social services compared with 30% of the control group. Generally, the use of services was greater in the subject group, but a greater number of the controls entered nursing homes.

Conclusions

One of the limitations of drawing conclusions about the effectiveness of comprehensive discharge planning protocols is the small number of trials, with only six RCTs reviewed. Furthermore, four of the six studies excluded subjects who did not have access to a telephone, were cognitively impaired or were unable to speak English. Therefore, potentially vulnerable and underprivileged groups were systematically excluded. Most of the studies were performed in the USA, further hamp-

TABLE 26 *Cost of rehospitalisation and health charges after discharge*

Study	Costs calculated to health service	Cost for subjects ($)	Cost for controls ($)	Significance
Kennedy, 1987[46] and Neidlinger, 1987[47]	Specialist nurse: total cost	811.20	–	
	Specialist nurse: per patient	20.80	–	
Naylor, 1990[48]	Cost of rehospitalisation	15,375 (4210–31,506)	11,570 (2194–30,599)	
	Specialist nurse: mean cost per subject of programme	43.80	–	
	Specialist nurse: total cost	875.78	–	
Naylor, 1994[49]				
Medical DRG	Total charges for first rehospitalisation: within 2 weeks	68,754	239,002	Difference (95% CI): –170,248 (–2 to –87)
	2–6 weeks	52,384	189,892	–137,508 (–210 to –67)
	6–12 weeks	471,456	340,496	130,960 (–205 to +467)
	Charges for health services postdischarge: within 2 weeks	89,088	252,946	–163,858 (–246 to –81)
	2–6 weeks	87,559	219,299	–131,740 (–292 to –132)
	6–12 weeks	501,770	36,027	141,643 (–60 to +323)
	Cost of nurse specialist	5,692		
Surgical DRG	Total charges for first rehospitalisation: within 2 weeks	111,316	104,768	6,548 (–43 to +56)
	2–6 weeks	209,536	170,248	39,288 (–66 to +144)
	6–12 weeks	170,248	85,124	85,124 (–28 to +198)
	Charges for health services postdischarge: within 2 weeks	130,554	123,721	6833 (–73 to +87)
	2–6 weeks	242,254	202,629	39,625 (–169 to +248)
	6–12 weeks	189,611	100,939	88 (–90 to +267)
	Cost of nurse specialist	7,374	–	
Naylor, 1999[51]	Reimbursement costs, total readmission at 24 weeks	427,217	1,024,218	$p < 0.001$
	Total cost of home visits, including nurses and other multidisciplinary team at 24 weeks	215,378	214,710	$p = 0.72$
	Total cost for readmission, acute care costs and home visits at 24 weeks	642,595	1,238,928	$p < 0.001$
	Advance practice/specialist nursing cost	61,600		

TABLE 27 *Destinational outcome*

Study	Destination outcome	Time of assessment	Results, *n* (%)		*p* value
			Subjects	Controls	
Kennedy, 1987[46]	A change in destinational outcome	2 and 4 weeks	13%	13%	NS
Evans, 1993[50]	Home	Discharge	330 (79)	305 (73)	0.05
	Nursing home		61 (15%)	91 (22)	
	Dead		16 (2)	11 (2)	
	Other		10 (2)	11 (2)	
	Home	9 months	259 (62%)	225 (54)	0.05
	Nursing home		79 (19)	109 (26)	
	Dead		66 (16)	67 (16)	
	Other		13 (3)	17 (4)	

ering the potential of these trials to offer results that are generalisable and applicable to current practice in the UK. There was a larger proportion of men in the sample groups than would have been expected in an elderly population, and the data also show a greater number of women in control groups compared to the intervention groups, which may have influenced results.

Discharge planning, and the appointment of discharge planning nurses or other professionals is common practice in the UK. Indeed, elements of discharge planning are enshrined in the current (and influential) joint recommendations of the ADSS, the Royal College of Nursing and the BGS, which suggest that written discharge procedures should be agreed and made available to community- and hospital-based participants in care, and that a single named member of the multidisciplinary team should hold responsibility for discharge preparation. Therefore, it is of great interest and relevance to current practice in the UK to see the extent to which these recommendations are supported by the evidence from RCTs. The trials selected for this review are particularly relevant to this debate.

These trials suggest that, generally, the initial length of stay in the study groups is shorter and there is a lower readmission rate, with a greater number of days between discharge and readmission. However, the data are not statistically significant.

The cost of the index hospital stay was greater in study groups than in controls (except in one study[56]), but the data on the cost of rehospitalisation and health charges after discharge are not consistent. The studies generally did not address overall costs, by considering the cost of the nurse and by examining if the cost of the initial hospitalisation in the subject group are offset by reduced readmission rates and reduced health and social service costs after discharge.

These studies appear to be provider focused, with very little detailed analysis of functional or mental outcomes, patient and carer satisfaction and no data on the cost to patients or QoL. The studies also do not describe any of the difficulties of implementing the protocol or the impact of the intervention on their multiprofessional colleagues.

Chapter 5

Comprehensive geriatric assessment programmes

Introduction

This chapter considers the impact of CGA programmes on the outcomes of older people undergoing discharge from hospital. The studies included in this chapter describe programmes based either in hospital or supporting older people recently discharged from hospital.

CGA is a term that has become associated with a set of approaches to service provision in the care of older people. The models can be used in a variety of settings, including hospital inpatients,[44,61,124] ambulatory care and nursing home care.[125–127] The majority of the evaluative literature on the topic comes from the USA, although the approaches are recognisably derived from the multidisciplinary models of assessment and rehabilitation first described in the UK.[128–130] In CGA programmes the multidisciplinary, multidimensional nature of the assessment of health, rehabilitation and social care needs is formalised, often using standardised assessment instruments. The results of these formal assessments are then used either to inform or prompt treatment and management recommendations, which may be carried out in dedicated inpatient units (geriatric evaluation and management units [GEMUs]), provided as recommendations to the referring physician or team (geriatric consultation service), or delivered in the patient's home or other ambulatory care setting such as the day hospital or outpatient clinic.

For older people who are hospital inpatients, the GEMU has been shown in previous systematic reviews (e.g. Stuck and co-workers[44]) to be the most effective way to deliver in-hospital CGA, and is said to be associated with benefit to patients in terms of both immediate functional outcome and subsequent mortality.

Discharge planning is usually regarded as an important component of inpatient CGA programmes, although most are not focused on discharge itself, but on improving functional health status, and thereby independent living, through medical intervention and rehabilitation. Some CGA programmes include postdischarge support, and therefore, where relevant, this review has included schemes which have also been considered in the chapter on post-discharge support.

Previous systematic reviews

A previous systematic review of CGA was published in 1993 by Stuck and co-workers.[44] They searched for studies of CGA programmes using a MEDLINE literature search, reviewing the bibliographies of identified articles, examining abstracts from scientific meetings and talking to experts in the field. By this means they identified 36 controlled CGA studies, eight of which they subsequently excluded, to leave 28 studies. The authors classified the CGA programmes they identified as follows:

- hospital GEMUs – these were designated inpatient units for CGA and rehabilitation
- IGCSs – CGA is provided on a consultative basis to hospitalised patients in non-designated units
- HHASs – in-home CGA for patients recently discharged from hospital
- home assessment services (HASs) – in-home CGA for community-dwelling older persons
- outpatient assessment services (OASs) – CGAs provided in an outpatient setting.

We anticipated identifying studies from the first three of Stuck's categories (GEMU, IGCS and HHAS), as these would potentially include patients being discharged from hospital. We did not, however, anticipate identifying studies for the present review from the latter two categories, as these relate to older patients in community and outpatient settings who would, by definition, not be undergoing discharge from hospital. The number of studies identified by both the CGA review[44] and the current discharge review is shown in *Table 28*.

Through our searching we identified 16/17 of the studies in the three CGA categories in which we anticipated there to overlap with the previous review[44] (GEMU, IGCS, HHAS). We included

TABLE 28 *Comparison of papers in the review of CGA by Stuck and co-workers and the present discharge review*

Type of CGA programme	CGA review[44]	Discharge review (present study)			
		Studies			
		Identified	Included	Not included	
				Number	Reason
GEMU	6	6	2	4	1 geriatric orthopaedics (not generalisable) 1 accident and emergency (not inpatient) 1 community rehabilitation hospital (not acute) 1 controlled, not randomised
IGCS	8	7	4	3	1 not identified by searches 2 controlled, but not randomised 1 CGA for proximal fracture (not generalisable)
HHAS	3	3	3	0	
HAS	7	1	0	6	1 identified by citation searches
OAS	4	3	0	1	1 not identified 3 identified by citation searches

nine of the 16 identified studies in the current review. The remainder did not meet our criteria for inclusion in the review because: they were controlled but not randomised studies ($n = 4$); they were disease-specific interventions which we did not consider generalisable to all older inpatients;[4] or they did not take place in acute care situations ($n = 2$).

A further seven studies of CGA were identified by the discharge review that were not included in the previous review,[44] all of which have been published since the review by Stuck and co-workers in 1993.

This demonstrates that there is a good level of agreement between the previous and current reviews. Our search terms and inclusion criteria enabled us to identify the majority of studies from the Stuck review in the three anticipated categories, while excluding all studies based in the community and thus not having a discharge component, as well as those not meeting our inclusion criteria relating to random allocation, generalisability and setting of the programme delivery.

We believe that the current review contributes to the debate about CGA, due to its specific focus on the impact of CGA programmes on the outcomes of older people undergoing discharge from hospital, in addition to bringing the literature up to date.

Stuck and co-workers demonstrated that, although individual studies rarely demonstrated that CGA had an impact on mortality, the combined results showed that GEMU programmes reduced mortality risk at 6 months by 35%, improved the likelihood of living at home at 12, 24 and 36 months, and improved both 6- and 12-month physical function. They concluded that CGA programmes in which geriatric evaluation was linked with strong long-term management were the most effective for improving survival and functional abilities in older people.[44]

Method

Types of studies included in the discharge review

Studies were included in this chapter if they described inpatient units for CGA and rehabilitation (GEMUs), CGA provided on a consultative basis to hospitalised patients in non-designated units (IGCSs) or in-home CGA for patients recently discharged from hospital (HHASs), as previously defined.[44]

Not included in this review were studies of patients discharged from non-acute inpatient facilities (e.g. nursing or residential homes) or from ambulatory care (outpatient departments, accident and emergency units).

Search strategy

The details of the search are described on page 7.

Objectives of the review

To determine whether CGA programmes improve the outcome and cost-effectiveness of the discharge of older people from hospital.

Hypotheses
CGA programmes targeting the discharge of older people from acute hospital care:

- reduce length of stay, and readmission rates
- reduce rates of institutionalisation
- improve health outcomes
- improve well-being and satisfaction among older people and their carers
- are cost-effective.

Types of participants
This review includes evaluations of CGA interventions targeted at patients aged 65 years and over experiencing discharge from inpatient hospital care. Studies in which older people were undergoing discharge from day hospitals, outpatient settings, nursing homes and other settings not providing acute or high technology care were excluded.

Types of interventions
We included studies that tested the effect of CGA programmes delivered either in hospital by a team or on a consultative basis, or in support of older people discharged home from hospital.

Study designs
We included RCTs only. The methods for assessing studies for relevance and quality are described on page 9.

Data extraction
For those studies included in the review data were extracted independently by two reviewers. The reviewers were blind to the study authors. The procedures followed for data extraction are described on page 10.

Results from this review

Models of care, settings and conditions studied
What is immediately striking about the group of studies is the overwhelming predominance of studies from the USA (n = 11/15), with a further study from each of Canada, Australia, Denmark and The Netherlands (*Table 29*). With only two studies derived from the European population and none from the UK there would appear to be no evidence derived from RCTs and controlled studies on the outcome of CGA programmes relating directly to the UK. This is not to say that findings will not be applicable to the UK population, but the difference in systems for the delivery in healthcare in the USA may need to be taken into account when interpreting the findings from the review.

All the studies are based on groups of older people undergoing discharge from acute care, in accordance with our inclusion criteria. However, within this framework each of the three types of CGA programme anticipated are represented in the review.

The majority of studies have patients derived from general medical and/or psychiatric admissions, with the exception of the study by Fishman and Emro,[66] which selected patients on the basis of their falling into one of eight primary DRGs upon admission.

Service description
The studies of CGA are distinctive insofar as the interventions were almost wholly undertaken by a multidisciplinary team (*Table 30*). The study by Siu and co-workers[58] was an exception to this, insofar as the assessment and delivery of the intervention was provided by a single healthcare professional (the geriatric nurse practitioner), but with support and advice from the wider interdisciplinary team, including a geriatrician, physical therapist and social worker. This intervention was thus defined as a single-person intervention, but in fact lies somewhere at the interface between single and team interventions. Furthermore, the studies were carried out predominantly in an inpatient setting, with a small number of studies also providing follow-up into the postdischarge period. The teams most usually comprised medical, nursing, physiotherapy and social work colleagues.

Participants included
Participants tended to be recruited from patients aged 70 (n = 5 studies) or 75 (n = 3) years and over, but with a number of other (often varied) characteristics (see *Table 31*). Common exclusions were admissions to intensive therapy or intensive care units, coronary care units, patients with terminal or severe or disabling illness, nursing home admissions or those for whom a short length of stay was anticipated.

Subjects studied
Participants
Data were extracted from 17 papers, representing 15 RCTs in which a total of 3472 older participants were randomised to either a CGA programme (n = 1702) or to usual care (n = 1770) (*Table 32*).

Age and sex
As would be anticipated in a study of CGA, the average age of participants in the majority of studies was in the late 70s or early 80s (*Table 33*). In most studies, the age distribution between the

TABLE 29 *CGA: range of models, settings and conditions studied*

Study	Country	Model of care (intervention type)	Setting	Condition
GEMUs				
Harris, 1991[56]	Australia	Geriatric assessment unit	DGH	All emergency medical admissions
Fretwell, 1990[57]	USA	Multidisciplinary geriatric assessment on a senior care unit	DGH	Admissions to DGH
Rubenstein, 1984[64]	USA	Geriatric assessment unit	Veterans medical centre	Persistent medical functional or psychosocial problems interfering with discharge home
Naughton, 1994[65]	USA	Geriatric evaluation and assessment unit	Acute medical centre	Admission via the emergency department
IGCSs				
Saltz, 1988[52]	USA	Inpatient geriatric consultation team	Veterans medical centre	Medical, psychiatric and surgical patients (aged ≥ 75 years)
Hogan, 1987[55]	Canada	Inpatient geriatric consultation team	DGH	All emergency admissions (aged ≥ 75 years)
White, 1994[61]	USA	Nurse-managed interdisciplinary geriatric service	Urban university hospital	Admissions to a geriatric service
Thomas, 1993[62]	USA	Inpatient geriatric consultation team	Non-academic community hospital	Inpatients
Winograd, 1993[113]	USA	Inpatient geriatric consultation team	Veterans medical centre	Frail, functionally impaired older (aged > 65 years) inpatients
HHASs				
Rubin, 1992[63]	USA	Outpatient care management and treatment programme by a geriatric assessment team	Acute care urban teaching hospital	Medical admissions admitted via emergency department at high risk of readmission for chronic conditions or good patients for outpatient management
Hansen, 1995[59]	Denmark	Postdischarge geriatric follow-up by an interdisciplinary geriatric consultation team	University acute care hospital	All admissions to subacute geriatric ward
Other				
Slaets, 1997[67]	The Netherlands	Multidisciplinary joint geriatric/psychiatric assessment team	Acute care teaching hospital	Patients aged ≥ 75 years
Siu, 1996[58]	USA	Pre- and postdischarge geriatric assessment	University hospital (DGH?)	Medical/surgical admission patients aged ≥ 65 years
Fishman, 1994[66]	USA	Functional assessment coordinating treatment and transition programme	Urban community teaching hospital	Eight target DRGs: cerebrovascular disease, transient ischaemic attack, COPD, pneumonia/pleurisy, CHF + shock, gastrointestinal haemorrhage, kidney infection + urinary tract infection
Landefeld, 1995[60]	USA	Enhanced inpatient, nurse-led geriatric assessment	Private, acute, non-profit teaching hospital	General medical care admissions

intervention and control groups was broadly similar. The exception to this was the study by White and co-workers,[61] in which control participants were a mean of 5 years younger than participants.

With the exception of three studies conducted in veterans medical centres,[52,64,113] the majority of participants in the studies were women, as would be anticipated for this age group (*Table 34*).

Quality of studies

Generally the quality of the studies included in this review was good. The sample sizes of the included studies were reasonable, with the exception of one study[61] in which only 20 patients were randomised

TABLE 30 *CGA: type of input provided by the CGA programmes and the staff involved*

Study	Single person or team intervention	Inpatient/ phone/ Inpatient/ clinic/home	Doctor	Nurse	PT	OT	SALT	SW	Pharm.	Assist.	Comments
Saltz, 1988[52]	Team	Inpatient + phone	Yes	Yes				Yes			
Hogan, 1987[55]	Team	Inpatient	Yes	Yes	Yes						Discharge planning
Harris, 1991[56]	Team	Inpatient	Yes	Yes	Yes	Yes		Yes			
Fretwell, 1990[57]	Team	Inpatient	Yes		Yes			Yes	Yes		Dietician
Siu, 1996[58]	Single	Inpatient + home		Yes							Team was supportive; intervention provided by nurse
Hansen, 1995[59]	Team	Home	Yes	Yes	Yes						Discharge support arrangement
Landefeld, 1995[60]	Team	Inpatient	Yes	Yes	Yes	Yes		Yes			Dietician
White, 1994[61]	Team	Inpatient									Dietician
Thomas, 1993[62]	Team		Yes	Yes	Yes			Yes	Yes		Discharge planning, care-giver education; dietician
Rubin, 1992[63]	Team	Clinic	Yes	Yes				Yes			
Rubenstein, 1984[64]	Team	Inpatient + clinic	Yes	Yes				Yes			
Naughton, 1994[65]	Team	Inpatient	Yes					Yes			
Fishman, 1994[66]	Team	Inpatient		Yes				Yes			
Slaets, 1997[67]	Team	Inpatient	Yes	Yes	Yes						
Winograd, 1993[113]	Team	Inpatient	Yes	Yes				Yes			Other disciplines available as required

Assist., assistant responsible to professional team member; OT, occupational therapist; Pharm., pharmacist; PT, physiotherapist; SALT, speech and language therapist; SW, social worker

into each of the intervention and control groups. Two studies[56,67] did not describe the sample from which the study population was derived, or give attrition rates. These factors were, however, adequately described in all other studies.

The studies included were all described as randomised and in ten of 15 studies enough information was given to state that the randomisation process was appropriate. In the remaining five studies it was less clear from the description given in the methodology to state that the sample was truly random.

The majority of studies ($n = 13$) did measure baseline patient characteristics prior to intervention and then repeated them as outcome measures. Primary outcome measures were also described as objective or reliable, except in two studies.[56,67]

However, from the reported methodologies it was apparent in only five studies[52,60,63,65,113] that the allocation of intervention or control status was concealed at baseline and in only three studies were primary outcomes assessed blind by the researcher.[52,55,58,113]

Range of outcomes reported

The most frequently reported outcome was index length of stay or readmission (13/15 studies), followed closely by physical function (12/15 studies). Mortality and discharge destination (10/15) were also considered to be important outcome measures. Only one study reported QoL or patient satisfaction when undergoing a CGA programme, and none of the studies considered carers' outcomes. Other outcomes were reported more variably (*Table 35*).

Mortality

Eleven of the 15 studies reported mortality data for one or more time points (*Table 36*). Eight studies reported mortality rates at dis-

TABLE 31 *Characteristics of included studies: inclusion and exclusion criteria*

Study	Inclusion criteria	Exclusion criteria
Saltz, 1988[60]	Age ≥ 75 years; consecutive admissions	ITU patients, previous admission, expected LoS < 48 h
Hogan, 1987[55]	One or more of the following: impaired mobility, falls, urinary incontinence, confusion, from nursing home, an acute admission in the previous 3 months	ITU admissions, acute cerebrovascular accident, refusal by physician or patient
Harris, 1991[56]	Non-elective, age ≥ 70 years, in geographical region	Not readmissions, not resident in a nursing home
Fretwell, 1990[57]	Age ≥ 75 years	ITU, coronary care unit admissions
Siu, 1996[58]	Target group: functional limitations, unstable medical problems, potentially reversible geriatric clinical problems	Residence > 24 km from hospital, nursing home admissions, terminal illness, in hospital < 48 h, non-English speakers
Hansen, 1995[59]	Simultaneous need for medical treatment, physical rehabilitation + adjustment of social services prior to discharge	None stated
Landefeld, 1995[60]	Age ≥ 70 years, general medical admissions	Admissions to specialist units, including ITU, cardiology, telemetry, oncology
White, 1994[61]	Age ≥ 65 years, medically stable elderly patients at risk for functional decline or with rehabilitation potential. Priority if complicated discharge or awaiting placement in another facility	Imminently terminal
Thomas, 1993[62]	Age ≥ 70 years	Admission to intensive care unit or coronary care unit, renal haemodialysis, resident > 50 miles from hospital, terminal illness
Rubin, 1992[63]	Age ≥ 70 years, target admissions	Terminally ill on admission, unable to give informed consent (severe CI or medically unstable), under care of private physician (too socially or medically stable and independent)
Rubenstein, 1984[64]	Admissions to acute care services, age ≥ 65 years, expected LoS of ≥ 1 week, with condition stated left	Severe CI, terminal illness, disabling disease (multiple sclerosis), very poor ADLs, no support network, severe medical disorder, too functionally capable
Naughton, 1994[65]	Age ≥ 70 years	In receipt of regular care from attending internist on staff at study hospital at time of admission; transfers to surgical service
Fishman, 1994[66]	Target conditions	None stated
Slaets, 1997[67]	Age ≥ 70 years	None stated
Winograd, 1993[113]	Age > 65 years, expected LoS 96 h, not enrolled in geriatric rehabilitation programme, had one of the following: confusion, dependence with ADLs, polypharmacy, disabling chronic illness, a stressed care-giving system	Independence in ADL, terminal illness, confused

ADL, Activities of Daily Living; CI, concurrent illness

TABLE 32 *Number of participants randomised to the studies*

Study	Hospital admissions	Attrition	Number enrolled	Sample size	
				Study	Control
Saltz, 1988[60]	297	112 not eligible (23 in intensive care unit, 26 admitted for < 48 h, 14 previously received care from geriatric service, 5 died before consent, 2 delayed consent)	185	93	92
Hogan, 1987[55]	Not stated	160 entered into study; 47 excluded due to not meeting inclusion criteria (42), swapping groups (4), refusal (1)	113	57	56
Harris, 1991[56]	Not stated		267	97	170
Fretwell, 1990[57]	4101	549 randomised; others not randomised due to the two-bed rule; 38 refusals, 45 unable to obtain consent, 30 randomisation errors	436	221	215
Siu, 1996[58]	6699	5303 immediately ineligible due to living > 24 km away (3559) or other reasons (1744). Of the 1396 considered eligible, 112 died in hospital and 234 did not meet 'final inclusion criteria'. Of the remaining 1050, 326 refusals, 370 transferred elsewhere, leaving 354 eligible and consenting (i.e. 5%)	354	178	176
Hansen, 1995[59]	227	Patients discharged home from subacute geriatric ward; 34 refusals	193	96	97
Landefeld, 1995[60]	3061	1794 for general medical care; 1143 not randomised due to non-availability of beds	651	327	324
White, 1994[61]	40	Consecutive admissions to geriatric consultation service	40	20	20
Thomas, 1993[62]	Not stated	132 randomised (68 intervention group, 64 control group); 3 and 4 patients in each group were lost to follow-up; 120 were eventually included in the study (i.e. excluded those lost to follow-up from analysis)	120	62	58
Rubin, 1992[63]	200	Consecutive admissions	200	100	100
Rubenstein, 1984[64]	3140	1442 in hospital at 1 week were screened, 8.5% eligible (47.5% had no problems interfering with discharge home; 17% terminally ill; 15% persistently unstable medical problems; 12% advanced dementia)	123	63	60
Naughton, 1994[65]	Not stated	141 randomised; 25 ineligible (17.7%); 5 4.3% soon to surgery	111	51	43
Fishman, 1994[66]	245	Admissions in appropriate DRGs; 141 discharged with target DRGs (59 receiving intervention, 82 controls)	245	98	147
Slaets, 1997[67]	Not stated		237	140	97
Winograd, 1993[113]	2728	1009 eligible for clinical screening; 249 satisfied clinical entry criteria; 49 refused to participate	197	99	98
Total			3472	1702	1753

TABLE 33 *Age distribution (years) of study participants*

Study	Mean age (SD) [± SEM] (or as otherwise stated)	
	Intervention group	Controls
Saltz, 1988[60]	80.9 (5.8)	82.0 (5.8)
Hogan, 1987[55]	82.2 (6.2)	83.3 (6.0)
Harris, 1991[56]	79.1 [± 0.6]	77.9 [± 0.4]
Fretwell, 1990[57]	83.5 (5.3)	83 (5.7)
Siu, 1996[58]	Aged ≥ 85 years: 32.0%	Aged ≥ 85 years: 26.7%
Hansen, 1995[59]	78.7 (range 59–94)	80.6 (range 49–95)
Landefeld, 1995[60]	80.2 ± 6.9	80.1 ± 6.6
White, 1994[61]	79.2	73.9
Thomas, 1993[62]	76 (5.4)	77 (5.4)
Rubin, 1992[63]	76.8 (5.8)	76.7 (5.4)
Rubenstein, 1984[64]	78.8 [± 0.95]	77.1 [± 1.11]
Naughton, 1994[65]	80.1 (6.6)	80.1 (6.4)
Fishman, 1994[66]	79.7 (9.6)	79.7 (7.4)
Slaets, 1997[67]	82.5 (4.9)	83.2 (5.1)
Winograd, 1993[113]	75.7 (9.0)	76.6 (9.7)

SEM, standard error of the mean

TABLE 34 *Gender of study participants*

Study	Intervention group (%)		Controls (%)	
	Men	Women	Men	Women
Saltz, 1988[60]	95.7	4.3	95.7	4.3
Hogan, 1987[55]	40	60	25	75
Harris, 1991[56]	34	66	40	60
Fretwell, 1990[57]	28.5	71.5	28.4	71.6
Siu, 1996[58]	32	68	48	52
Hansen, 1995[59]	30	70	35	65
Landefeld, 1995[60]	32	68	35	65
White, 1994[61]	37*	63*		
Thomas, 1993[62]	35	65	41	59
Rubin, 1992[63]	42	58	27	63
Rubenstein, 1984[64]	95.2	4.8	96.7	3.3
Naughton, 1994[65]	51	49	36.6	63.4
Fishman, 1994[66]	37	63	37	63
Slaets, 1997[67]	32.9	67.1	24.7	75.3
Winograd, 1993[113]	100	0	100	0

* *Overall*

TABLE 35 *Range of outcomes reported*

Study	Mortality	LoS/ re-admissions	Changes in physical function	Changes in mental function	Use of services	Costs to service providers	Costs to patients	QoL	Patient satis-faction	Discharge destination	Other*
Saltz, 1988[60]	✔	✔	✔							✔	✔
Hogan, 1987[55]	✔	✔	✔	✔	✔	✔					✔
Harris, 1991[56]	✔	✔	✔	✔	✔					✔	✔
Fretwell, 1990[57]	✔	✔	✔	✔						✔	
Siu, 1996[58]	✔	✔	✔	✔						✔	✔
Hansen, 1995[59]	✔	✔			✔					✔	
Landefeld, 1995[60]	✔	✔	✔	✔	✔	✔				✔	
White, 1994[61]		✔	✔		✔	✔				✔	✔
Thomas, 1993[62]	✔	✔	✔	✔	✔						
Rubin, 1992[63]						✔					
Rubenstein, 1984[64]	✔	✔	✔	✔	✔	✔				✔	✔
Naughton, 1994[65]	✔	✔				✔				✔	
Fishman, 1994[66]		✔	✔								
Slaets, 1997[67]		✔	✔							✔	
Winograd, 1993[113]	✔	✔	✔	✔				✔			✔
Total	11	14	12	8	7	6	0	1	0	10	7

* *Primarily medication usage*

charge. In total these eight studies reported that 84/976 intervention group patients (8.6%) and 88/1034 control group patients (8.5%) died prior to discharge from hospital. At 6 months, 123/609 (20.0%) of intervention group patients and 160/673 controls (23.8%) had died, whereas 107/316 (33.9%) intervention group and 163/384 (42.4%) of control group patients had died within 12 months of discharge.

Three of the trials reported results of mortality at 3 months, six at 6 months and three at 12 months in a form that allowed the calculation of a mortality odds ratio. The odds ratios for mortality for the CGA trials at the different time periods were:

- 3 months, 1.09 (95% CI, 0.82 to 1.45)
- 6 months, 1.42 (95% CI, 0.51 to 3.94)
- 12 months, 0.73 (95% CI, 0.45 to 1.19).

An odds ratio of less than one indicates that the intervention is beneficial (i.e. there is a relative reduction in the risk of death). The distribution of odds ratios is shown in *Figures 42* to *44*.

Index length of stay

In general, index length of stay appears to have been little affected by the CGA programmes, with eight studies indicating a possibly shortened stay and three studies reporting a lengthened index admission whilst undergoing a CGA intervention (*Table 37*). In most of the studies the difference in index admission was only 1 or 2 days, and the study authors reported these differences to be non-significant. The exception to this was the study by Slaets and co-workers,[67] who reported a reduction in index admission of 5 days for patients undergoing the CGA programme, and this was found to be significant ($p = 0.02$). One further study[61] also reported a considerably shorter index length of stay in its intervention group patients, which was reported to be non-significant (probably due to the small sample, $n = 40$).

Seven of the trials reported results of index length of stay in a form which allowed the calculation of an odds ratio which was analysed using a random-effects meta-analysis model. The odds ratio for length of stay for CGA trials was 1.430 (95% CI, –2.251 to +5.112; $p = 0.466$). A positive odds ratio indicates that the intervention is beneficial (i.e. there is a relative reduction in index length of stay). The distribution of odds ratios is shown in *Figure 45*.

Readmission to hospital

Ten studies reported on readmission to hospital at 6 months ($n = 4$), 12 months ($n = 3$) and one study at each of 1, 2 and 3 months

TABLE 36 *Mortality outcomes*

Study	Time period	Study group		Control group		Significance
		Number died	%	Number died	%	
Saltz, 1988[52]	Discharge	7/92	7.6	8/85	9.4	Included with discharge destination, NS overall
	6 months	17/86	19.8	23/87	26.4	As above
Hogan, 1987[55]	Discharge	10/57	17.5	10/56	17.8	Statistics not stated, NS
	6 months*	19/57	33.3	24/56	42.9	Statistics not stated
	12 months*	29/57	50.9	30/56	0.6	Peto-Pike log rank analysis, NS
Harris, 1991[56]	Randomisation – discharge*	8/97	8	11/170	6.5	Survival curve, statistics not stated
	Discharge – 3 months*	7/89	8	25/159	16	As above
	3–6 months*	5/82	6	9/134	7	As above
	6–9 months*	1/77	1	6/125	5	As above
	9–12 months*	4/76	5	2/119	1.5	As above
	6 month total*	20/97	20.6	45/170	26.5	As above
	12 month total	22/97	22.7	49/170	28.8	Statistics not stated, NS
Fretwell, 1990[57]	Discharge	22/221	10	20/215	9.3	Statistics not stated
	6 weeks	32/221	14.5	31/215	14.4	Statistics not stated
	3 months	47/221	21.3	38/215	17.7	Statistics not stated
	6 months	57/221	25.8	47/215	21.4	χ^2, NS
Siu, 1996[58]	2 months	7/178	3.9	8/176	4.5	Statistics not stated
Hansen,1995[59]	6 months	17/96	18	19/97	20	χ^2, NS
Landefeld, 1995[60]	Discharge	24/327	7.3	24/324	7.4	Statistics not given
	3 months	66/327	20.2	64/324	19.8	Statistics not given
Thomas, 1993[62]	Discharge	1/68	1.5	1/64	2.4	Statistics not stated
	6 months	3/62	4.8	12/58	20.7	χ^2, $p = 0.01$
Rubenstein, 1984[64]	Discharge	9/63	14.3	9/60	15.0	Statistics not stated
	12 months	15/63	23.8	29/60	48.3	z test, $p < 0.005$
Naughton, 1994[65]	Discharge	3/51	5.9	5/60	8.3	χ^2, NS
Winograd, 1993[113]	12 months	41/99	41	58/98	59	$p = 0.43$
Total						
At discharge ($n = 8$)		84/976	8.6	88/1034	8.5	
At 6 months ($n = 6$)		123/609	20.0	160/673	23.8	
At 12 months ($n = 3$)		107/316	33.9	163/384	42.4	

* *Figures derived from survival curves or bar charts*

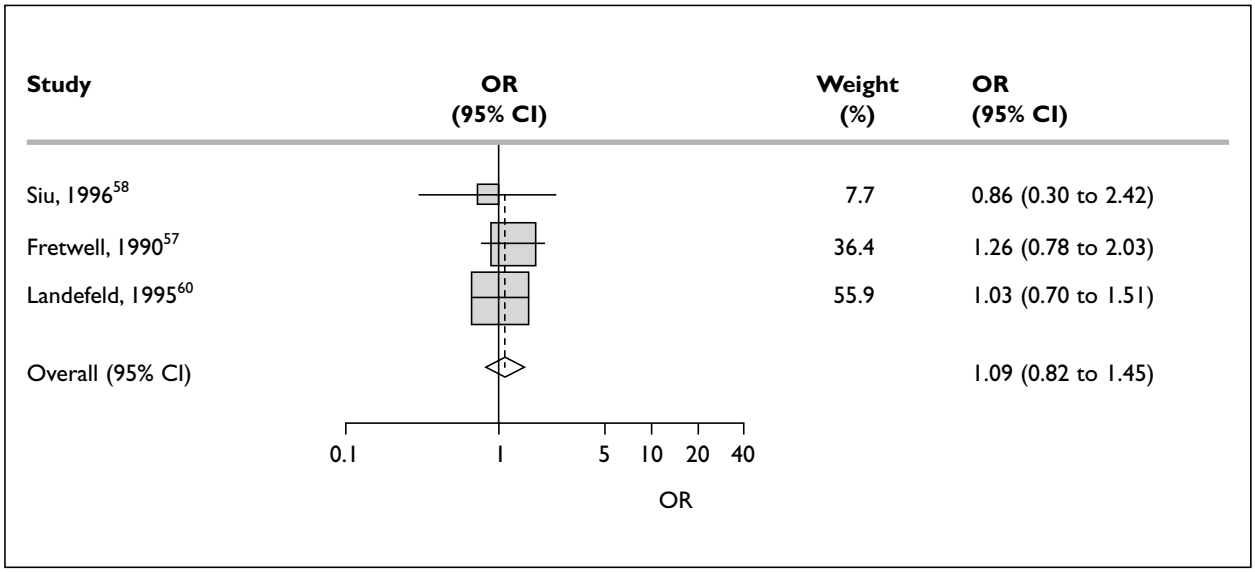

FIGURE 42 *CGA: mortality at 3 months*

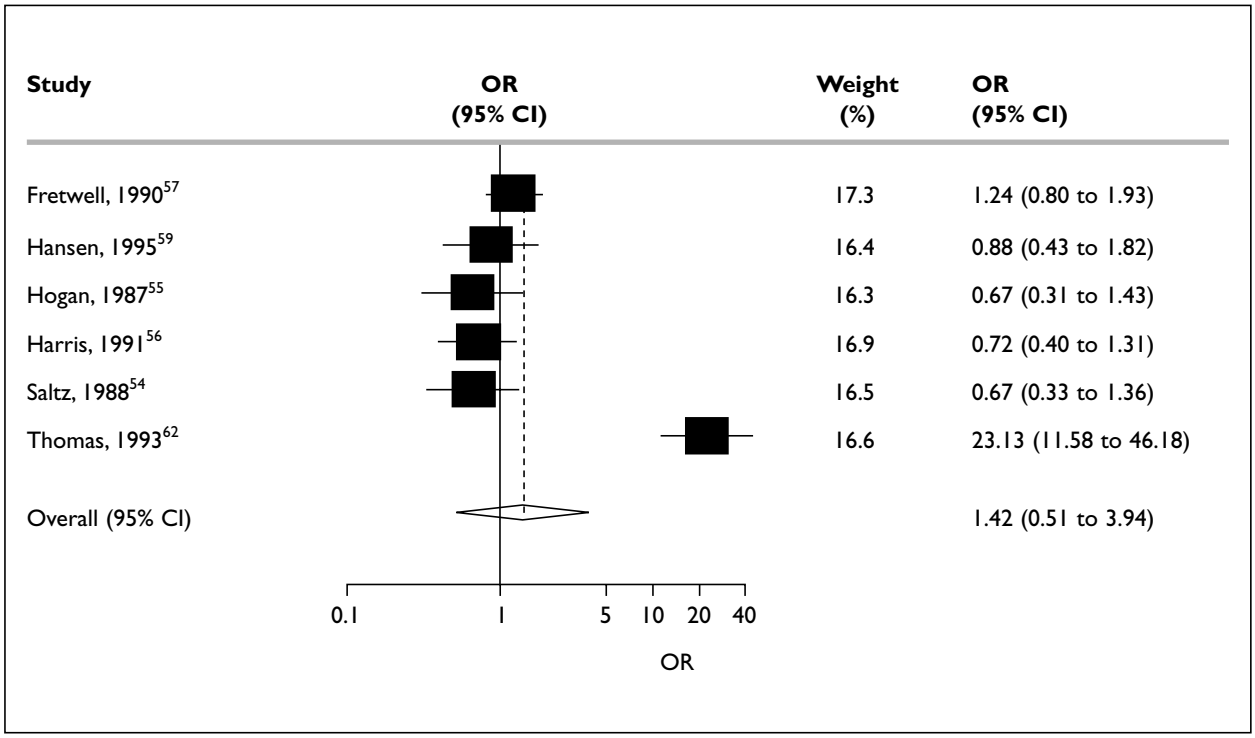

FIGURE 43 *CGA: mortality at 6 months*

postdischarge (*Table 38*). We calculated from these data the number of admissions per 100 patients per month. This figure ranged from 2.9 admissions/100 patients/month (an intervention group[64]) to 33.3/100 patients/month (controls[61]). In the majority of studies control group patients demonstrated a higher rate of monthly readmissions, with the exception of three studies.[52,55,58] Overall, the rate of readmission calculated from studies which reported data during the first 6 months postdischarge was higher among controls (7.5 readmissions/100 patients/month) compared with patients in the intervention group (5.3 readmissions/100 patients/month), but with little difference appearing to remain at 12 months.

Ten of the trials reported results of readmission rates in a form which allowed the calculation of an RRR, which was analysed using a random-effects

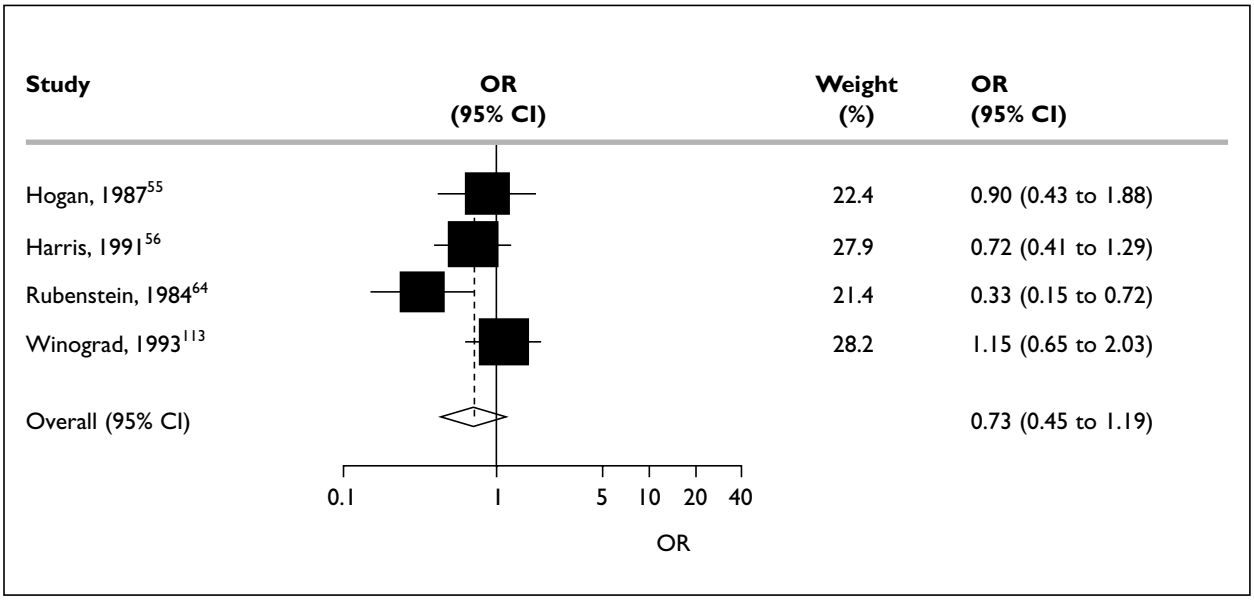

FIGURE 44 *CGA: mortality at 12 months*

TABLE 37 *Index length of stay (days)*

Study	Mean LoS (SD) [± SEM]		Significance
	Intervention group	Control group	
Saltz, 1988[52]	18.3	16.6	Statistics not stated, NS
Hogan,1987[55]	15.8 (12.7)	14.2 (13.3)	*t*-test, NS
Harris, 1991[56]	10.9 [0.8]	9.8 [± 0.6]	Statistics not stated, $p < 0.24$
Fretwell, 1990[57]	12.9 (12.9)	14.7 (17.4)	*t*-test, NS
Landefeld, 1995[58] (mean) (median)	7.3 6	8.3 6	Wilcoxon, $p = 0.4$
White, 1994[61]	20.3	32.7	χ^2, NS
Thomas, 1993[62]	9	10.1	*t*-test, NS
Rubenstein, 1984[64]	18.1*	34.2*	
Naughton, 1994[65]	5.4 (5.5)	7.0 (7.0)	*t*-test, $p = 0.193$
Winograd, 1993[113]	24.8 ± 22	26.7 ± 33	$p = 0.91$
Slaets, 1997[67]	19.7 [± 1.2]	24.8 [± 2.4]	Regression analysis controlling for age, sex, living conditions and physical function, $p = 0.02$

* *Combined total for index LoS and subsequent days rehospitalised during first 12 months after randomisation*

meta-analysis model. The readmission ratio for CGA trials was 0.897 (95% CI, 0.728 to 1.106; $p = 0.310$). An RRR of less than one indicates that the intervention is beneficial (i.e. there is a relative reduction in the risk of being admitted). The distribution of RRRs is shown in *Figure 46*.

Physical function

A variety of measures were used to report physical function outcomes in the studies. Five studies reported data from the Katz Activities of Daily Living (ADL) scale (although one of these,[58] only used the Katz at baseline, changing to the Short Form with 36 items [SF-36] at follow-up). A further seven studies also reported physical function data, but each used a different measure, thus making comparison problematic (*Table 39*).

The majority of studies appeared to have found no significant differences in the physical function outcomes of study and control patients over time. The exceptions to this were three studies.[60,64,67] Landefeld and co-workers[60] reported that 34% of intervention group patients compared with

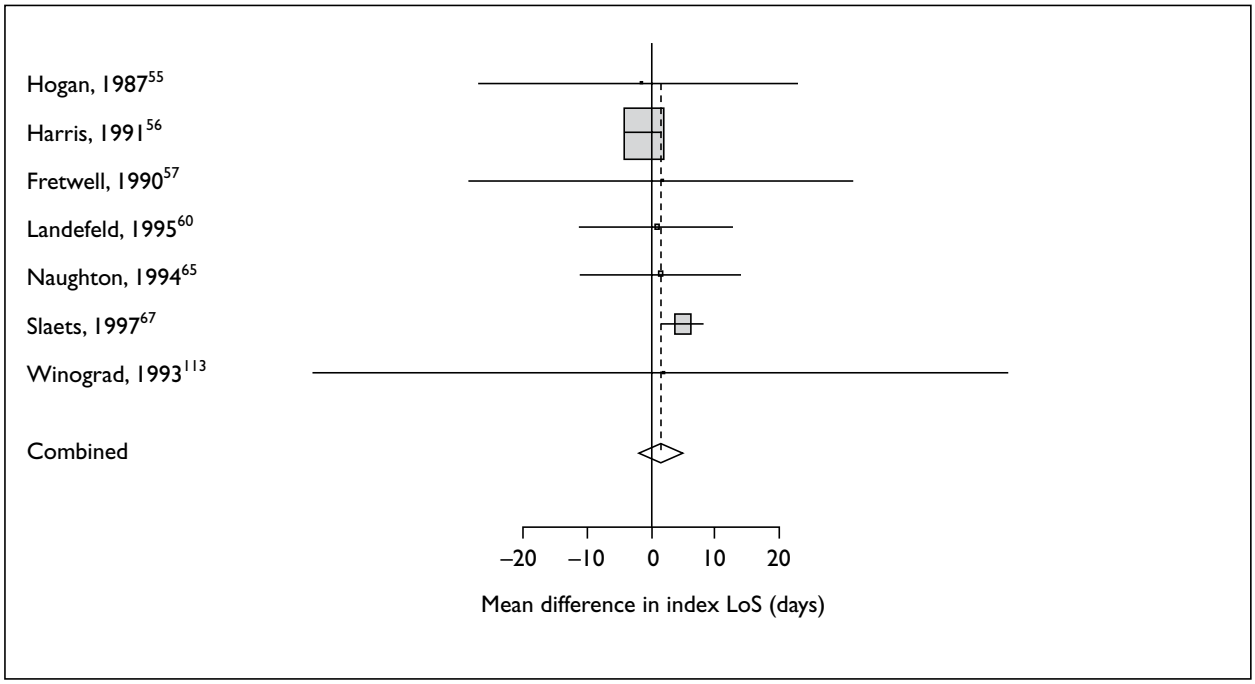

FIGURE 45 *Index length of stay*

TABLE 38 *Readmission to hospital*

Study	Follow-up period	Baseline sample		Readmissions			
		Study group	Control group	Study group		Control group	
				n/sample	per 100/ per month	*n*/sample	per 100/ per month
Saltz, 1988[52]	6 months	86	87	36/86	6.98	26/87	4.98
Hogan, 1987[55]	12 months	57	56	9/57	16	6/56	10
Siu, 1996[58]	2 months	178	176	43/178	12.1	37/176	10.5
Hansen, 1995[59]	6 months	96	97	42/96	7.3	62/97	10.7
Landefeld, 1995[60]	3 months	303	300	104/303	11.4	109/300	12.1
White, 1994[61]	1 month	20	20	4/19	21	6/18	33.3
Thomas, 1993[62]	6 months	62	58	21/62	5.65	35/58	10.1
Rubenstein, 1984[64]	12 months	63	60	22/63	2.91	30/60	4.16
Slaets, 1997[67]	6 months	140	97	24/140	2.9	29/97	5.0
Winograd, 1993*[113]	12 months	99	98	–	–	–	–
Total							
At 6 months (*n* = 4)		384	339	123/384	5.3	152/339	7.5
At 12 months (*n* = 2)		120	116	31/120	2.2	36/116	2.6

* *Reported as number of hospital readmissions at 1-year follow-up: controls 1.2 (1.7), experimental 1.0 (1.3),* p = *0.46*

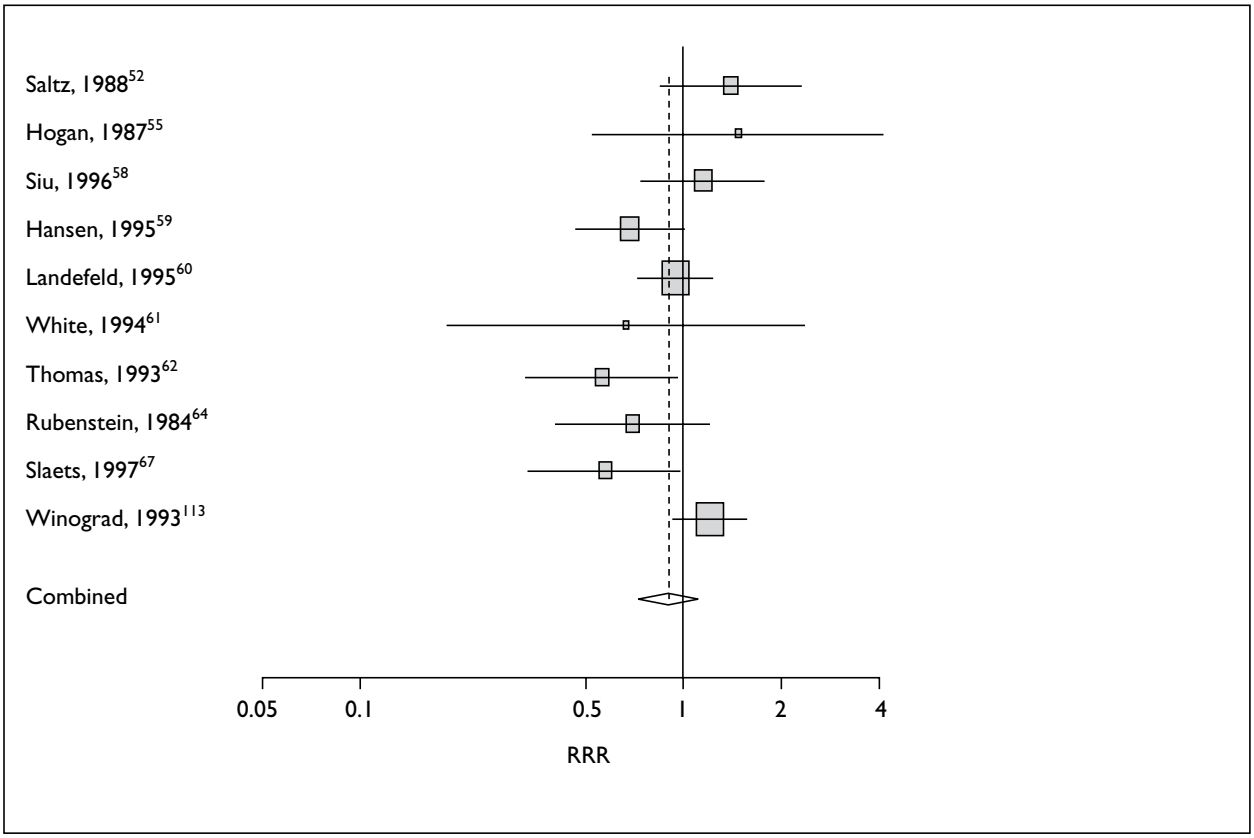

FIGURE 46 *CGA: risk of readmission to hospital*

24% of controls were 'better' or 'much better' in physical function as measured on the Katz ADL scale. Differences overall between the two groups in this study were reported to be statistically significant (χ^2, $p = 0.009$). Rubenstein and co-workers[64] reported that 48% of study patients compared with only 25% of controls improved in their score on the Personal Self-maintenance Scale, which was found to be significant at the $p < 0.01$ level (using a z test). A high mortality rate in the controls (see *Table 36*) does not, however, appear to have been taken into account when interpreting this finding.

Finally, Slaets and co-workers[67] used the 'SIVIS' physical function scale (developed and used as part of a registration system for nursing homes in The Netherlands) and reported the ADL and mobility subscales. The authors reported that 61% of subjects (46% of controls) improved on the ADL subscale; while 3% compared with 14% deteriorated in each group, respectively. They conducted a regression analysis on these findings to control for other variables which may have had some influence, and reported that this difference was statistically significant ($p < 0.01$). They also found differences in outcome on the mobility subscale to be statistically significant.

One study that considered ability to perform Instrumental ADLs (IADLs) as an outcome[64] also reported that significantly more patients in the intervention group improved in their functional ability than did controls. A second study[60] also showed a trend toward greater improvement in IADLs in the intervention group.

The odds ratio for improvement in physical function could be calculated for six of the trials and was 1.401 (95% CI, 1.031 to 1.904; $p = 0.03$), suggesting that the intervention was beneficial for physical functioning in these six studies (*Figure 47*).

Mental function

Eight studies reported on aspects of mental status (*Table 40*). These fall broadly into cognitive impairment and mental health. The two scales used to report cognitive impairment were the Mental Status Questionnaire (MSQ) ($n = 2$) and Mini-mental State Examination (MMSE) ($n = 4$). Four scales were used to report on mental health: the Zung depression scale ($n = 1$), Functional Assessment Instrument, psychological ($n = 1$), SF-36 – role functioning (emotional) and mental health index ($n = 1$) and the Geriatric Depression Scale (GDS) ($n = 1$).

TABLE 39 *Physical function*

Study	Measure	Time of measurement	Unit of measurement	Change		Significance
				Subjects	**Controls**	
Saltz, 1988[52]	Index of independence in the ADL	Baseline (< 48 h of admission); at discharge	% (*n*/sample): improved no change declined	34 (30/88) 38 (33/88) 28 (25/38)	26 (23/90) 39 (35/90) 36 (32/90)	% difference (95% CI): 8 (–5.4 to 21.4) 8 (–5.7 to 21.7) NS, $p = 0.24$
Hogan, 1987[55]	Barthel (0–100)	< 48 h admission; at discharge	Mean (SD) scores	(*n* = 47) 27.5 (23.3)	(*n* = 45) 19.8 (19.4)	Mann–Whitney, NS Mann–Whitney, NS
	Barthel (0–100)	< 48 h admission; at discharge	% change	85% (40/47)	76% (34/45)	
Harris, 1991[56]	Modified ADL index	At discharge; 12/12	Data presented as a figure and is uninterpretable			
Fretwell, 1990[57]	Katz	< 24 h admission; 6/12 post-randomisation	% (*n*/sample): improved maintained declined	31.8 (43/135) 0.0 (72/135) 15.1 (20/135)	33.3 (48/144) 57.6 (83/144) 9.1 (13/144)	$\chi^2 = 2.40$, NS
Siu, 1996[58]	(Katz/ baseline) SF-36 at follow-up reported here	60 days post-randomisation	SF-36 dimension (sample size):*	Estimated effects (differences in adjusted means)		
				Adjusted means:	Adjusted means:	Difference (95% CI):
			physical function (293)	40.34	40.21	0.13 (–6.08 to 6.33)
			pain (291)	68.84	69.94	1.10 (–8.26 to 6.07)
			role function – physical (222)	68.83	67.00	1.83 (–8.00 to 11.66)
			energy/fatigue (117)	51.27	52.37	–1.10 (–10.23 to 8.03)
			general health (114)	58.05	56.10	1.95 (–6.40 to 10.30)
Landefeld, 1995[60]	Katz	At discharge	% (*n*/sample) change:			
			much better better unchanged worse much worse	21 (65/303) 13 (39/303) 50 (151/303) 7 (22/303) 9 (26/303)	13 (40/300) 11 (33/300) 54 (163/300) 13 (39/300) 8 (25/300)	χ^2, $p = 0.009$
	IADL	Change between admission and discharge	*n* (%): better unchanged worse	44.9 (133/296) 29.4 (87/296) 25.6 (76/296)	33.2 (95/286) 40.2 (115/286) 26.5 (76/286)	χ^2, $p = 0.06$
	IADL	At 3 months	Mean No. ADLs	3.9	3.8	Wilcoxon, $p = 0.5$
White, 1994[61]	Katz	At entry to study At discharge	Mean scores	(*n* = 20): 3.3 4.0	(*n* = 20): 3.1 3.2	Statistics given for between-group comparisons at each time point, not for change

continued

TABLE 39 contd *Physical function*

Study	Measure	Time of measurement	Unit of measurement	Change		Significance
				Subjects	Controls	
Thomas, 1993[62]	Functional Assessment Instrument; physical score	In-hospital At 6 months	Mean (± SD) (sample size *n* value)	3.8 (± 0.6), (*n* = 62) 3.6 (± 0.8), (*n* = 59)	3.8 (± 0.8), (*n* = 58) 3.7 (± 0.7), (*n* = 46)	Statistics given for between-group comparisons at each time point, not for change
	Katz	In-hospital At 6 months	% change (*n*/sample): same worse better	 61 (36/59) 17 (10/59) 22 (13/59)	 70 (32/46) 23 (10/46) 7 (4/46)	χ^2, $p = 0.07$
Rubenstein, 1984[64]	Personal Self-maintenance Scale	Individuals improved between baseline and 12 months	% (*n*/sample): improved unchanged worse died	 48.4 (30/62) 17.7 (11/62) 9.7 (6/62) 24.2 (15/62)	 25.4 (15/59) 5.1 (12/59) 0.0 (3/59) 49.2 (29/59)	*z* test, $p < 0.01$ (row 1)
	IADL	Baseline; 12 months	% (*n*/sample): improved unchanged worse died	 46.8 (29/62) 11.3 (7/62) 17.7 (11/62) 24.2 (15/62)	 30.5 (18/59) 8.5 (5/59) 11.8 (7/59) 49.2 (29/59)	*z* test, $p = 0.07$ (row 1)
Fishman, 1994[65]	Revised Barthel index	Admission; discharge	Reported means for selected diagnoses only			
Slaets, 1997[67]	SIVIS – ADL	Admission; discharge	% (*n*/sample): better same worse	 61.3 (73/119) 36.1 (43/119) 2.5 (3/119)	 45.7 (42/92) 40.2 (37/92) 14.1 (13/92)	Statistics for change not stated (regression analysis of ADL at discharge only, $p < 0.01$)
	SIVIS – mobility	Admission; discharge	% (*n*/sample): better same worse	 47.9 (57/119) 52.1 (62/119) 0	 43.5 (40/92) 50.0 (46/92) 6.5 (6/92)	Statistics for change not stated (regression analysis of ADL at discharge only, $p < 0.01$)
	SIVIS – Help Index	Admission; discharge	% (*n*/sample): better same worse	 59.7 (71/119) 34.5 (41/119) 5.9 (7/119)	 35.9 (33/92) 41.3 (38/92) 22.8 (21/92)	Statistics for change not stated (regression analysis of ADL at discharge only, $p < 0.01$)
Winograd, 1993[113]	Physical Self-maintenance Scale	Admission Discharge 3 months 6 months 12 months	Mean (SD)	2.5 (2.1) 3.2 (1.9) 3.4 (2.0) 3.4 (2.0) 3.6 (2.0)	2.6 (1.9) 3.1 (2.2) 3.6 (2.1) 3.5 (2.2) 4.0 (2.1)	$p = 0.91$, repeated measures, ANOVA; possible scores 0 to 6, the lower the score the better the function
	IADL	Admission Discharge 3 months 6 months 12 months	Mean (SD)	4.2 (2.7) NA 5.0 (2.7) 4.2 (2.6) 4.6 (2.8)	4.5 (2.5) NA 5.0 (2.7) 4.2 (2.6) 4.6 (2.8)	$p = 0.69$, repeated measures, ANOVA; possible scores 0 to 8, the lower the score the better the function

ANOVA, analysis of variance

* *Values of* n *are for the whole group, not given separately for intervention and control groups*

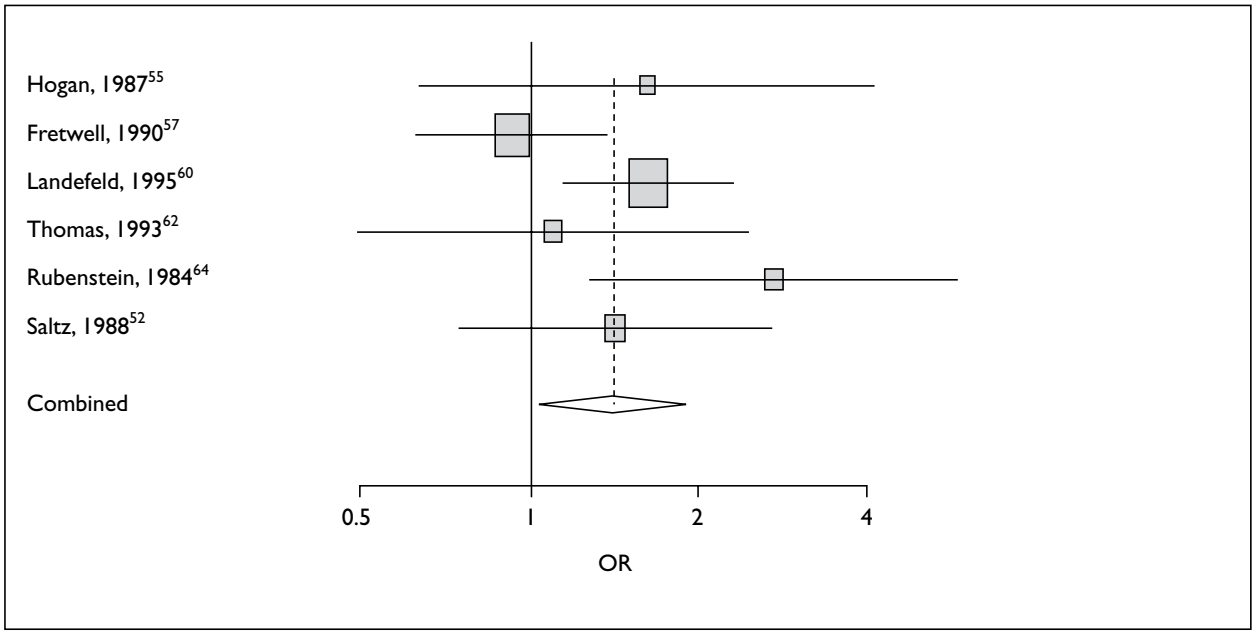

FIGURE 47 *Physical functioning*

Only one of the studies[55] reported a significantly greater improvement in cognitive scores in the intervention group than that found in controls. On the whole, however, the outcomes of intervention and control group patients were broadly similar, with no obvious benefit observable for patients undergoing CGA programmes.

Use of in-hospital and postdischarge services

Seven studies (*Table 41*) reported some outcome data on the use of health and social care services either in hospital ($n = 2$) or postdischarge ($n = 6$). The general picture was one of greater usage of both types of service inputs by patients undergoing the CGA programmes. However, in one study[62] there was a trend towards greater use of postdischarge outpatient physician visits by controls. There were examples of single studies demonstrating that patients undergoing CGA programmes were significantly more likely to be referred to in-hospital physiotherapy and occupational therapy,[55] to be referred to a community service prior to discharge from hospital[55] and to be in receipt of home help 6 months after discharge,[59] but these findings were not confirmed in other studies.

Costs to healthcare providers

Six studies reported some cost data, primarily relating to the index admission (*Table 42*). All five studies which reported total acute inpatient stay charges[60,61,63–65] found that costs were lower in the intervention group than for controls. Two of these studies did not report on statistical significance, two stated that the difference was not significant, and in one study[65] the difference tended towards, but again did not attain, statistical significance ($p = 0.09$).

There was a similar pattern true for postdischarge service costs, with nursing home costs,[64] monthly physician charges[55] and outpatient charges[63] all lower for study participants than controls. The exception to this was the study by Rubin and co-workers[63] in which total home health costs were higher for those who had undergone the CGA programme.

It is of note that costs to the healthcare sector were the only costs reported. Costs to healthcare providers, or to patients and their families, were not considered in any of the studies.

Long-term care use usage after discharge

Seven studies reported on long-term care use following discharge (*Table 43*). Two of these[52,64] reported on residence at specific time points after discharge (one at 6 months, one at 12 months). In both studies there was a tendency for more of the intervention group than the control group to be in nursing homes, whereas more controls had died by follow-up. Additionally, one of these studies[64] found that significantly more of its intervention group (56%) were living at home or in board and care than were controls (37%) ($p < 0.05$).

Five studies[55,58–60,64,67] reported the proportion of patients admitted to a long-term care facility

TABLE 40 *Mental function*

Study	Measure used	When measured (first and final assessment)	Unit of measurement	Change between first and final assessment		Significance
				Subjects	Controls	
Hogan, 1987[55]	MSQ	< 48 h after admission and at discharge	Mean (SD) change	(*n* = 34) 1.5 (1.4)	(*n* = 24) 0.8 (2.1)	Mann–Whitney, $p < 0.01$
Harris, 1991[56]	MMSE	At discharge and 12/12	Figure uninterpretable			
Fretwell, 1990[57]	MMSE	< 24 h after admission and 6 weeks post-randomisation	% (*n*/sample): improved maintained declined	See note* 18.0 (33/182) 70.7 (129/182) 11.4 (21/182)	 15.2 (27/175) 70.9 (124/175) 13.9 (24/175)	χ^2, NS
	Zung depression	< 24 h after admission and 6 weeks post-randomisation	% (*n*/sample): improved maintained declined	 30.8 (24/78) 49.8 (29/78) 19.4 (15/78)	 21.7 (18/83) 68.7 (57/83) 9.5 (8/83)	χ^2, $p = 0.45$
Siu, 1996[58]	SF-36	60 days post-randomisation	SF-36 dimension (sample size)†	Adjusted mean:		Difference (95% CI):
			Role functioning, emotional (218)	85.34	82.43	2.90 (–6.50 to 12.31)
			Mental health index (171)	70.84	74.62	–3.78 (–9.89 to 2.33)
Landefeld, 1995[60]	MMSE	Admission and discharge	Mean ± SD at admission	16.8 ± 3.9	16.9 ± 4.1	NS
			Mean at discharge	17.3	17.7	Wilcoxon, $p = 0.3$
	GDS	Admission and discharge	Mean ± SD at admission	4.3 ± 3.0	4.9 ± 3.4	NS
			Mean at discharge	3.7	4.6	Wilcoxon, $p = 0.02$
Thomas, 1993[62]	Functional Assessment Instrument (psychological)	In hospital At 6 months	Mean (± SD)	*n*: baseline = 62 follow-up = 59 2.7 (± 1.1) 2.6 (± 1.0)	*n*: baseline = 58 follow-up = 46 2.6 (± 0.9) 2.3 (± 0.7)	Statistics given for between-group comparisons at each time point, not for change Comparison of between-group follow-up scores: *t*-test, $p < 0.05$
Rubenstein, 1984[64]	MSQ change in scores	Baseline, 12 months postrandomisation	% (*n*/sample): improved unchanged worse died	 35.6 (21/59) 23.7 (14/59) 15.3 (9/59) 25.4 (15/59)	 22.4 (13/58) 15.5 (9/58) 12.1 (7/58) 50.0 (29/58)	χ^2, NS
Winograd, 1993[113]	MMSE	Admission Discharge: 3 months 6 months 12 months	Mean (SD)	20.3 (7.5) 22.6 (6.6) NA 24.3 (7.1)	21.7 (6.8) 22.5 (6.8) NA 21.4 (9.2)	$p = 0.2$, repeated measures ANOVA

* *Rounding error, as total* n *value is greater than the sample size*

† n *values given for this study are for the whole sample, not given separately for intervention and control groups*

TABLE 41 *Use of health and social care services*

Study	Services considered and how measured	Use of services by study group	Use of services by controls	Significance
Hogan, 1987[55]	In-hospital services,			
	% patients referred to:	% (*n*/sample):	% (*n*/sample):	χ^2
	social services	(30/57)	43 (24/56)	NS
	physiotherapy	44 (25/57)	21 (12/56)	$p < 0.025$
	dietary	32 (18/57)	21 (12/56)	NS
	occupational therapy	18 (10/57)	0 (0/56)	$p < 0.005$
	speech/audio therapy	0	2 (1/56)	NS
	Community referrals:			
	mean (SD) per patient	(*n* = 47)	(*n* = 46)	*t*-test, $p < 0.005$
		1.3 (0.6)	0.9 (0.6)	
Harris, 1991[56]	% receiving community services	Figures uninterpretable		
Hansen, 1995[59]	% (*n*/sample) allocated to social care at 24 weeks postdischarge:			
	home help	98 (73/74)	77 (54/70)	χ^2, $p < 0.05$
	home nurse	55 (42/74)	56 (39/70)	(row 1)
	day care at home	34 (25/74)	29 (20/70)	
	meals on wheels	38 (28/74)	33 (23/70)	
Landefeld, 1995[60]	Use of nurses, health aides or home-makers in 3/12 postdischarge	52 (158/303)	48 (143/300)	χ^2, $p = 0.3$
White, 1994[61]	Home health usage: % (*n*/sample) of those discharged home	83 (10/12)	75 (3/4)	χ^2, NS
Thomas, 1993[62]	Postdischarge outpatient physician visits: mean per patient	3.5	4.6	*t*-test, $p = 0.09$
	Community service referrals: mean per patient	0.6	0.4	*t*-test, $p = 0.10$
Rubenstein, 1984[64]	Mean number (sample size) specialist screening examinations (audiology, ophthalmology, etc.)	4.9 (*n* = 63)	1.7 (*n* = 60)	*z* test, $p < 0.001$

during different time periods. Two of the three studies which reported differences in admission to long-term care in the first 6 months after discharge[58,59] found the proportions of patients admitted to be small and the differences not to be of statistical significance. On the other hand, a third study[60] reported that a little over one-fifth of the intervention group and a little less than one-third of controls were admitted at some stage during the first 3 months postdischarge and that this difference was statistically significant (χ^2, $p = 0.03$). Furthermore, both studies[64,67] reporting on long-term care admission during the first 12 months after discharge reported that substantially greater proportions of controls had been admitted to a nursing home than had intervention group patients. In one of these studies[67] the difference was of statistical significance, whereas statistical significance was not stated in the other.[64]

Medication usage

The five studies which reported medication usage as an outcome tended to indicate that patients undergoing a CGA programme will be in receipt of fewer medications on discharge,[56,61] and that they are more likely to have their medication usage decreased during their hospital stay compared with admission use[55,64] (*Table 44*). The single study[58] which looked at the use of *pro re nata* – as required (p.r.n.) and non-p.r.n. medication usage 30 days postdischarge did not, however, find a difference between the two groups.

Discharge destination

Overall, ten studies reported destinational outcome: six at discharge (*Table 45*), three between discharge and 6 months, and three at 12 months after discharge. In general, the subjects in receipt of CGA tended to be discharged home more frequently and to long-term nursing care less

TABLE 42 *Costs to health and social care providers*

Study	How costs to the health service were calculated	Period of cost calculation	Costs ($)		Significance
			Subjects	Controls	
Hogan, 1987[55]	Average monthly charges per patient for physician services	1 year postdischarge	98.36	77.68	Statistics not stated
Landefeld, 1995[60]	Costs of inpatient stay (derived from standard billing data)	Duration of inpatient stay:			
		mean	10,289	12,412	*p = 0.3; 95% CI, 1212 to 392
		median	7,057*	7,839*	
	Costs of additional hours of clinical personnel	during 17 months of intervention	65,000	–	
	Capital costs	for special features of the unit	10,500	–	
	Additional cost of intervention per intervention-group patient		231 per patient	–	
White, 1994[61]	Mean pharmacy charges	Duration of hospital stay	462	1268	p = 0.06
	Mean laboratory costs		38	112	p = 0.02
	Mean radiology costs		45	273	p = 0.09
	Mean occupational therapy costs		279	126	p = 0.03
	Mean physiotherapy costs		163	165	NS
	Mean total hospital stay charges		23,906	45,189	NS
Rubin, 1992[63]	Total inpatient	Not stated, but in hospital and postdischarge	459,666	6701	Statistics not stated
	Total outpatient		108,186	128,570	Statistics not stated
	Total home health		99,125	57,838	Statistics not stated
	Total physician and other		138,244	156,188	Statistics not stated
	Total skilled nursing facility and hospice		7,508	1,668	Statistics not stated
	Total charges		812,729	1,014,795	Statistics not stated
	Median (range)		5,899 (34–47,467)	4,978 (119–67,946)	Wilcoxon, p = 0.95
Rubenstein, 1984[64]	Veterans administration hospital (costs/year survived):	12 months			Statistics not stated
	intensive care		2,695	2,310	
	acute care		6,499	14,414	
	intermediate care		10,823	4,540	
	Nursing home (costs/year survived):		2,580	6,562	
	Total		22,597	27,826	
Naughton, 1994[65]	Mean ± SD costs:	During hospital			*t*-test, *p*:
	total	stay	4525 ± 5087	6474 ± 7000	0.093
	laboratory		518 ± 523	813 ± 839	0.026
	diagnostic imaging		67 ± 145	84 ± 151	0.9
	pharmacy		165 ± 278	389 ± 886	0.068
	rehabilitation		98 ± 254	115 ± 201	0.696

TABLE 43 *Long-term care usage after discharge*

Study	Unit of measurement	Time period	Results		Significance
			Study group	Controls	
Saltz, 1988[52]	Home Nursing/residential home Deceased	6 months	66 (57/86) 14 (12/86) 20 (17/86)	66 (57/87) 8 (7/87) 26 (23/87)	χ^2, NS
Harris, 1991[56]	Referral to long-term care	12 months	Figures uninterpretable		
Siu, 1996[58]	Admission to long-term care	At 60 days	3.9 (7/178)	3.4 (6/176)	Statistics not stated
Hansen, 1995[59]	Admission to nursing home	At 24 weeks	7 (7/96)	8 (8/97)	χ^2, NS
Landefeld, 1995[60]	Residence in long-term care	During 3 months postdischarge	22.1 (67/303)	30 (90/300)	χ^2, $p = 0.03$
Rubenstein, 1984[64]	% (*n*) in receipt of: home/board and care nursing home hospital died	12 months	 55.6 (35/63) 17.5 (11/63) 3.2 (2/63) 23.8 (15/63)	 36.7 (22/60) 11.7 (7/60) 3.3 (2/60) 48.3 (29/60)	*z* test $p < 0.05$ NS NS $p < 0.005$
	Admission to nursing home (%)	12 months	26.9	46.7	*z* test, $p < 0.05$
	Mean days per year survived in institutional care: veterans administration hospital intensive care acute care intermediate care non-veterans administration hospital nursing home	12 months	 3.5 21.1 92.5 2.2 30.0	 3.0 46.8 38.8 3.8 76.3	Statistics not stated
Slaets, 1997[67]	Admission to nursing home (%)	Within 12 months	18	27	Regression analysis, $p < 0.05$

TABLE 44 *Medication usage*

Study	Measure	Results*		Significance
		Study group	Control group	
Hogan, 1987[55]	Prescribed oral medications (mean [SD] change)	0.04 (0.27) ($n = 45$)	0.62 (1.9) ($n = 45$)	Mann–Whitney, NS
	Prescribed oral medications (% with decrease)	47% ($n = 45$)	24% ($n = 45$)	χ^2, $p < 0.05$
Harris, 1991[56]	Number of drugs per patient at discharge (mean ± SEM)	2.6 ± 0.2 ($n = 07$)	3.1 ± 0.2 ($n = 170$)	NS, $p < 0.04$
Siu, 1996[58]	Number of non-p.r.n. medications at 30 days ($n = 295$ altogether)	4.15	4.04	0.11 (–0.52 to 0.75)
	Number of p.r.n. medications at 30 days ($n = 295$ altogether)	0.50	0.51	–0.01 (–0.18 to 0.17)
White, 1994[61]	Mean number of medications at discharge	5.5 ($n = 20$)	7.9 ($n = 20$)	χ^2, $p = 0.02$
Rubenstein, 1984[64]	% decrease in mean number of drugs prescribed during hospital stay	17	14	Statistics not stated

* n, *sample size*

TABLE 45 *Discharge destination*

Study	Measure of discharge destination outcome used	Subjects, % (*n*)	Controls, % (*n*)	Significance
Saltz, 1988[52]	Home	65 (60)	69 (61)	NS, statistics not stated (χ^2 probably)
	Nursing/residential home	20 (19)	20 (18)	
	Other hospital	7 (6)	2 (2)	
	Deceased	8 (7)	9 (8)	
Harris, 1991[56]	Referral to long-term care	Figures uninterpretable		
Fretwell, 1990[57]	Prior residence own home, discharge to:			
	home	79.0 (113/143)	78.6 (121/154)	χ^2, NS
	nursing home	21.0 (30/143)	21.4 (33/154)	
	Prior residence nursing home, discharge to:			
	home	2.4 (1/41)	7.1 (4/56)	χ^2, NS
	nursing home	97.6 (40/41)	92.9 (52/56)	
Landefeld, 1995[60]	Discharge to long-term care	14.2 (43/303)	22.3 (67/300)	χ^2, $p = 0.01$
White, 1994[61]	Number (%) at discharge:			
	home	60 (2)	20 (4)	χ^2, $p = 0.03$
	nursing home	30 (6)	65 (13)	χ^3, $p = 0.03$
Rubenstein, 1984[64]	Home/board and care	46 (73.0)	32 (0.3)	*z* test, $p < 0.05$
	Nursing home	8 (12.7)	18 (30.0)	*z* test, $p < 0.05$
	Died	9 (14.3)	9 (15.0)	*z* test, NS
Naughton, 1994[65]	Died	3 (5.9)	5 (8.3)	χ^2, NS
	Returned to previous living situation	39 (76.5)	44 (73.3)	
	Another acute care facility	3 (5.9)	6 (10.0)	
	Rehabilitation facility	3 (5.9)	3 (5.0)	
	Nursing home	3 (5.9)	2 (3.3)	

frequently than were controls. However, in only three studies[60,61,64] did this effect reach statistical significance, indicating that patients who had undergone CGA tended to be discharged home more frequently than did controls, whereas the latter were more likely to be discharged to long-term care destinations. No consistent effects were seen on longer term follow-up. The odds ratio for discharge to own home for these six studies was 1.56 (95% CI, 0.98 to 2.49; $p = 0.062$) (*Figure 48*).

Other outcomes

A number of other outcomes were reported (*Table 46*). These included: the compliance of healthcare professionals with recommendations following assessment,[52] which was better for study patients; patient medication adherence,[58] which was identical in both groups; use of in-hospital diagnostic tests,[61] which were significantly fewer in the study group; and in-hospital acquired illness,[65] which was uniformly higher among controls and significantly so for decubitus ulcers. Only one study[113] additionally reported data for the Philadelphia Geriatric Centre Morale Scale, which indicated no difference in morale between groups at a range of time points up to 12 months.

Conclusions

The predominance of trial evidence on the impact of CGA on discharge outcomes is derived from study populations in the USA. We did not identify any RCTs of in-hospital CGA programmes that were focused on improving discharge outcomes for older people in acute care within the UK, and only two from any European country. Differences in the delivery of healthcare and the means of paying for it between the USA and the UK are not inconsequential. The generalisability of the studies reported in this chapter to the UK healthcare system is therefore questionable. Thus, although the principles of geriatric assessment were first described in the UK, it would appear that CGA programmes have not been rigorously evaluated here.

The quality of the studies of CGA reported in this review was generally good. However, still

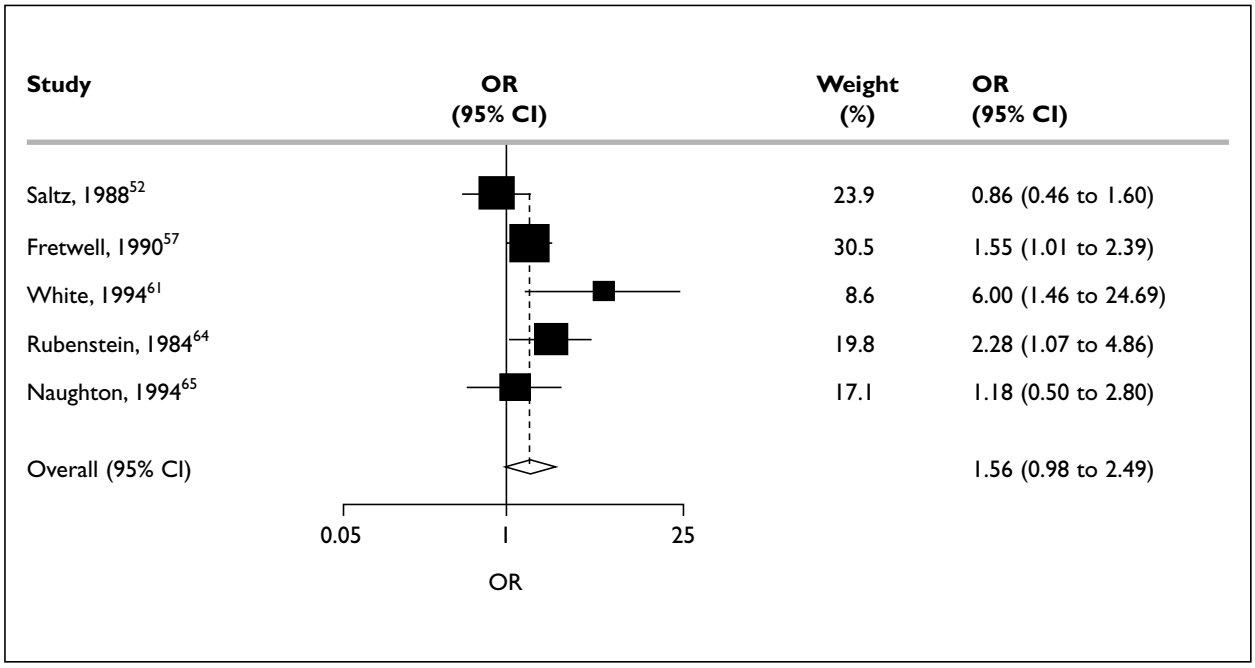

FIGURE 48 *Discharge to own home*

TABLE 46 *Other outcome measures*

Study	Outcome measure	Results (sample size *n* values)		Significance
Saltz, 1988[52]	Compliance with recommendations* (figures given for overall *n* (%) recommendations initiated, i.e. compliance)	559 (71.7%)	377 (27.1%)	Compliance/ implementation† ratio, 2.6
Siu, 1996[58]	Medication adherence scale (0–4) at 30 days	3.55 (*n* = 274 altogether)	3.55 (*n* = 274 altogether)	0.00 (–0.25 to 0.24)
White, 1994[61]	Mean number of diagnostic tests in hospital	4.4 (*n* = 20)	16.9 (*n* = 20)	χ^2, $p = 0.01$
Fishman, 1994[65]	% (*n*/sample) patients with in-hospital acquired illness:			
	pneumonia	18.4 (18/98)	23.1 (34/147)	
	pulmonary disease	14.3 (14/98)	23.1 (34/147)	
	septicaemia	5.1 (5/98)	8.8 (13/147)	
	electrolyte disorder	51.0 (50/98)	79.6 (117/147)	$p < 0.01$
	decubitus ulcers	4.1 (4/98)	6.8 (10/147)	
	Mean (SD) per group	98 (4.97)	147 (6.07)	$p < 0.01$
Winograd, 1993[113]	Philadelphia Geriatric Centre Morale Scale, mean (SD) at:	Subjects	Controls	Repeated measures, ANOVA, $p < 0.23$
	admission	13.5 (2.3)	14.0 (2.6)	
	discharge	13.7 (2.4)	13.6 (2.2)	
	3 months	14.2 (2.7)	14.3 (2.8)	
	12 months	14.1 (2.8)	14.2 (2.7)	

* *Compliance with individual recommendations scored 0, not complied, or 1, complied (intervention group). Compliance rate = (Sum of scores/No. of recommendations) × 100*

† *Implementation of concealed recommendation scored 0, not implemented, or 1, implemented (control group). Implementation rate = (Sum of scores/No. of concealed recommendations) × 100*

lacking in some reports of CGA trials are descriptions of the sample populations from which the study samples were derived. This makes it difficult to draw conclusions about how generalisable the findings of the trials are and whether the study samples in fact relate only to a fairly small proportion of the target group. This clearly has implications in terms of putting findings into practice, since narrowly targeted interventions, which may be valuable in the specific context of a similarly constituted patient group, may have a very diluted effect if applied more generally. This can be demonstrated with reference to the study by Siu and co-workers[58] (see *Table 32*) which, from an initial group of 6699 hospital admissions, immediately excluded 3559 as ineligible due to living more than 24 km away from the hospital and a further 1744 for other reasons. Following further exclusions the eventual sample randomised represented only 5% of total admissions during the study period.

The inclusion and exclusion criteria reported in these 15 trials seemed, on the whole, to be reasonable, but it should still be of concern that studies continue to exclude participants on the basis of how far they live from the trial hospital,[58,62] inability to speak English[58] and cognitive impairment.[63,64,113] Overly exclusive criteria reduce the usefulness of the trial data to others wishing to emulate interventions in other populations, and can also result in the disenfranchisement of the most vulnerable older people from the research process. If CGA is to be targeted at our frailest elders, it must also include their experiences via the reporting of outcome data.

A range of outcome measures were used in the studies, but very few patient-focused outcomes were reported. Only two studies reported on patient satisfaction or quality of life[58,113] and none considered the costs of interventions to patients or carers. It may well be that identifying these costs is not straightforward, but nor is it impossible. In the UK there is an emphasis on the NHS working in partnership with patients and those who care for them.[131] If this is to be realised then we need to be clear about whether the reduction of costs to healthcare providers due to particular interventions have been gained at the expense of social care, patients or carers. Furthermore, the wholesale absence of carers from these studies is a cause for concern. We cannot claim to be caring for carers if there are no robust trials to indicate how the role of geriatric assessment in the discharge of older people from hospital impacts on their caring responsibilities. Clearly there is scope for extending the range of outcomes for CGA programmes beyond the usual confines of mortality, physical function and provider-focused outcomes relating to the costs of providing health and social care (such as length of stay, readmissions and discharge destination). Indeed, a recent German study of geriatric evaluation, whose findings were reported after the conclusion to study identification for this review (to be included in the first update), again restricted its focus to survival, readmissions, nursing home placement, physical function and cost outcomes.[133,134]

Another related point is that there is clearly a need to standardise the study methodologies for trials of CGA, in particular by the use of standardised outcome measures and the reporting of outcomes data. The heterogeneity of the standardised instruments used to report data relating to physical function, mental function and others impedes any formal synthesis of study data and the possibility of drawing definitive conclusions about the impact of specific intervention types on the full range of patient- as well as provider-focused outcomes.

The CGA programmes reported here were quite distinct from other types of discharge-focused interventions identified during the review process. They were almost exclusively team based and were most frequently focused on inpatient assessment, thus making them distinct from the discharge support schemes reported above. Patients were predominantly female and in older age groups, as would be anticipated. One positive aspect is that there were relatively few exclusions of people with cognitive impairment or whose spoken language was not English (common exclusions in many studies), which would indicate that the study conclusions are generalisable in these respects to other groups of patients undergoing CGA.

The general picture of the outcomes from the CGA studies included in this review was variable. Mortality and physical function are perhaps considered to be the primary focus of geriatric assessment programmes and, for this reason, were reported in the majority of the studies described here. Most of the individual reports of mortality did not find a significant difference in deaths at any given time period, with a couple of exceptions,[62,64] yet when considered as a whole the studies reporting mortality at 12 months (n = 3) demonstrated a substantial, though not statistically significant, difference in outcome between

the two groups. The formal data synthesis confirmed a trend towards a reduction in mortality at 12 months only. Neither index length of stay nor the risk of readmission to hospital were significantly reduced by the CGA interventions.

Discharge destination is considered to be important in relation to geriatric assessment, with two-thirds of the studies reporting this as an outcome. These studies generally indicated that older people discharged from hospital under a CGA programme were more likely to be discharged home, although only three studies found a statistically significant association with this outcome, two of which derived from small study populations. Thus, whereas there may be an indication that CGA has the potential to prevent inappropriate or premature admission to long-term care for this group of patients, this needs to be confirmed with further sufficiently powered studies.

One conclusion to be drawn from this is that, from the available data derived from RCTs and controlled trials, geriatric assessment programmes do not adversely affect any of the three major parameters (mortality, length of stay, readmissions) considered to be of importance when discharging older people from hospital. Conversely, we were unable to identify conclusive evidence to suggest that such programmes conferred an overall benefit to older people in these respects when being discharged via CGA-type interventions.

With the physical function data, it would seem that some CGA programmes would appear to have an effect on outcome, but this again is not shown in all studies and may not in fact persist over time. A similarly inconclusive picture is evident across the range of different outcomes reported in the studies included in this chapter. The variability in study design, the wide range of measures used and the difference in modes of reporting results for each outcome make comparison particularly problematic.

In conclusion, therefore, the available evidence for the effectiveness of programmes of geriatric assessment used in the process of discharging older people from acute inpatient hospital care is derived largely from the USA. It is perhaps ironic that the UK, from where the principles of geriatric assessment derived, is unable to point to robust trials data to support what is a widespread health technology in the care of older people at the particularly vulnerable time of being discharged across the primary–secondary care interface. Even leaving the lack of UK data aside, a formal synthesis of the best available data reported on mortality, index length of stay and readmission to hospital did not demonstrate any significant effects overall. While it is reassuring that at least outcomes were not demonstrably worse for older inpatients undergoing a discharge-focused geriatric assessment (indeed the trends were the reverse), it leaves open the question of what benefits are conferred on the discharge process by such programmes. Moreover, in the almost complete absence of high-quality data relating to patient- and care-focused outcomes, we cannot say with any confidence the ways in which discharge-focused geriatric assessment impacts on the users of the service themselves.

Chapter 6

Discharge support arrangements

Introduction

This chapter deals with schemes which are designed to provide support for older people after experiencing discharge from inpatient hospital care. Between 1990 and 1995 the average length of stay for 'geriatric' inpatients dropped by over 45%.[134] A shorter hospital stay means earlier discharge and, potentially, an increased need for support around the discharge period. Health and social care systems have produced a range of responses to this situation. A recent national survey of health authorities and trusts[135] has shown that over one-third of UK trusts provided 'a home based service which provides medical and/or nursing care in the patients own homes immediately after discharge from hospital' and that these services are targeted predominantly at older people. In practice, in the UK in 1998,[135] a wide range of interventions was identified, with community and mental health trusts being more likely to provide multidisciplinary intervention. Two-thirds of these services had been developed since 1993.

In view of the apparent widespread adoption of postdischarge support schemes for older people in the UK, it is clearly of interest to examine the evidence for and against the range of interventions that fall under this umbrella. This will provide some reflection of the extent to which current practice in service development and delivery has taken account of published evidence.

The literature identified in this chapter includes a wide range of types of intervention, from a telephone call after discharge at the simplest level, to complex multidisciplinary interventions with elements of rehabilitation at the other extreme. Some of these interventions have focused on achieving early discharge, but most have been concerned with preventing complications after discharge, particularly with the aim of preventing readmission to hospital.

Previous systematic reviews

No previous systematic reviews were identified which specifically addressed the issue of the effect of discharge support arrangements on discharge of older people from hospital inpatient care.

However, one review[136] has looked specifically at hospital at home schemes as alternatives to hospital inpatient care. All the studies considered in this review dealt with patients experiencing discharge from hospital. A comparison of the inclusion criteria of the current review and the review by Shepperd and Parkes[123] is shown in *Table 47*. The criteria appear to be sufficiently different that the current review will offer a distinctive overview of a different area of the literature. In particular, the current review would only be expected to retrieve those studies in the Shepperd review which dealt with older people. In practice this has proved to be the case. The current review only included hospital at home schemes where they have been evaluated as alternatives to hospital inpatient care for older people experiencing discharge from hospital.

Method

Search strategy

The details of the search are described on page 7.

Objectives of this review

To determine if discharge support arrangements improve the outcome and cost-effectiveness of the hospital discharge process.

Hypotheses

Discharge support arrangements:

- reduce length of hospital stay, and readmission rates in older patients experiencing discharge from inpatient hospital care
- improve health outcomes in older patients experiencing discharge from inpatient hospital care
- are preferred to inpatient care by patients and carers
- are cost-effective.

Types of participants

This review includes evaluations of arrangements that provide support for patients over the age of 65 years experiencing discharge from inpatient hospital care. Discharge from inpatient facilities not potentially providing acute or high technology

care (e.g. nursing homes) or ambulatory care settings (e.g. day hospitals and outpatient departments) were excluded.

Types of interventions

We included studies that tested the effect of interventions in which hospital or community staff are in contact with the patient around the time of hospital discharge, with the specific intention of providing support during the post-discharge period. They include 'early discharge' schemes, although not all the interventions were specifically designed to hasten discharge. The interventions may be limited to postdischarge telephone contact at one extreme, or, at the other extreme, involve teams of professionals providing services in the patient's home after discharge from hospital.

Study designs

We included RCTs only. The methods for assessing studies for relevance and quality are described on page 9.

Data extraction

For those studies included in the review, data were extracted independently by two reviewers. The reviewers were blind to the study authors. The procedures followed for data extraction are described on page 10.

Results from this review

Models of care, settings and conditions studied

In contrast to other interventions described in this review, discharge arrangement trials emanated largely from northern Europe (ten trials from the UK, four from elsewhere in northern Europe, seven from North America, one from Hong Kong, one from Australasia, and four not stated). All the studies selected for inclusion in this section were conducted among patients experiencing discharge from inpatient hospital care. However, a wide range of intervention types were found (*Table 48*).

Discharge support provided by hospital at home schemes has already been discussed and is represented by two trials in this review.[74,96] Other types of intervention included in this review were:

- interventions in which rehabilitative care was provided by therapy and/or nursing staff in patients' own homes
- supervision of discharge arrangements by the primary healthcare team
- a variety of forms of surveillance
  - visits from health professionals
  - visits from other trained visitors
  - telephone follow-up.

Some of the studies included groups in which discharge support was provided in hospital settings in ambulatory care (e.g. a geriatric day hospital). Four of the studies[68,70,95,98] selected for this review provided telephone follow-up by a single discipline only (*Table 49*), this was invariably a nurse. Telephone follow-up and support for clinic visits was tested in two studies.[73,81] In the study by Fitzgerald and co-workers[75] this support was provided by a nurse and in the study by Weinberger and co-workers[73] support was provided by a doctor/nurse team. Single discipline intervention was provided in 12 of the studies, usually by a nurse or care assistant. In one study[86] an occupational therapist was used. The largest group of studies provided team-based intervention in the patient's home.

The studies were carried out in a wide range of patient types. For example: three studies[82,86,90] were carried out in patients recovering from stroke; in three studies[82,90,93] a multidisciplinary team provided team rehabilitation at home in patients discharged from inpatient care after a stroke; and in one study[86] a home visit was made by an occupational therapist after discharge from inpatient stroke care. Hospitalised older people often have rehabilitation needs which can be met in inpatient rehabilitation units or by providing home-based alternative care. These 'stroke discharge support' trials provide potential models for the development and evaluation of generic home-based discharge support and rehabilitation schemes for patients with other (or multiple) medical problems, and were therefore included in the review as 'disease specific' but of interest because of the potentially generalisable nature of the interventions.

The studies selected for this section of the review provided an overview of current models of discharge support arrangements and offer an opportunity to explore the impact of this range of models on discharge-related outcomes such as length of stay and readmission.

Participants included

While all the trials included older people experiencing discharge from inpatient hospital care, subjects were excluded for a variety of reasons (*Table 50*). Severe disability or disabling

co-morbidity was an exclusion factor in seven trials,[72,76,80,90,93,102,116] cognitive impairment in five trials[68,72,73,75,76] and difficulty with language or literacy in four trials.[58,68,73,95] Patients with terminal illness,[63,73,82,99] visual or hearing impairment[72] or without access to a telephone[73] were also excluded from some of the trials. Overall, in excess of 30,000 subjects were screened for entry into the trials and over 10,800 were eligible for inclusion. The total number of subjects studied was 8920.

Subjects studied

Participants

Overall, data were extracted from 33 papers, representing 28 controlled trials in which a total of 8920 patients were randomised to receive some form of support arrangement focused on patients being discharged from inpatient hospital care (*Table 51*).

Age and sex

In general, included studies were conducted in older patients, with a tendency towards including patients aged ≥ 70 years (*Table 52*). With the exception of two studies in men, the studies were conducted among populations which tended to have more women than men (*Table 53*). This is not surprising considering the demography of the older population.

Quality of studies

All the studies were controlled trials and reported randomisation to have occurred. Ten of the studies described the randomisation procedure sufficiently for them to be regarded unequivocally as randomised trials by the reviewers; one was pseudo-random with alternate allocation by birth date. In the rest, randomisation was stated but the method not described. The majority (n = 13) of trials described withdrawals and dropouts. None of the trials was regarded as truly double blind, because of the difficulty in achieving blinding of patients in receipt of manifestly different services. Six of the studies used blinded assessment of primary outcomes.[68,70,72,73,76,108]

All except one[87] of the studies carried out baseline assessment of the subjects to allow comparison between groups at or around randomisation and managed to achieve acceptable levels (> 80%) of follow-up. Protection against contamination was less readily achieved.

Range of outcomes reported

Most studies reported mortality (*Table 54*). Surprisingly, even though these studies were all designed to evaluate a discharge support arrangement, and 13 reported on duration of inpatient stay, only six reported on the index length of stay. Physical health outcomes were reported in 17 studies, and mental health (anxiety depression and cognitive function) in 11. Other outcomes (service use, costs, patient satisfaction, carer outcomes) were reported even more variably, making comparisons between studies and quantitative synthesis of results problematic, either due to lack of data or to lack of uniformity between studies.

Mortality

Mortality was the most consistently available outcome, being reported in 17 of the trials studied (*Table 55*). Overall there appears to be little difference in mortality between the subjects receiving discharge support and those receiving conventional hospital-based alternatives. This is true at all intervals at which the outcome is reported. In the five trials reporting mortality at 3 months or less, the odds ratio for mortality was 1.08 (95% CI, 0.71 to 1.63). Mortality at 6 months was reported in eight studies (odds ratio 0.90; 95% CI, 0.58 to 1.38) and at 12 months in nine studies (odds ratio 0.99; 95% CI, 0.83 to 1.19). This is illustrated in *Figures 49* to *51* which report the results of the meta-analysis of mortality, with an odds ratio indicating that the intervention is beneficial. All results were obtained using a random-effects meta-analysis model.

These results are reassuring to service providers who may be trying to prevent use of expensive hospital services by using community-based support arrangements. If mortality outcomes were markedly different between the models then there would be little point in proceeding to explore the impact on length of stay, readmission or health status.

Index length of stay

Six trials reported index length of stay (*Table 56*). Overall these studies did not show a significant effect of the intervention on length of stay. The mean difference in length of stay between intervention and control groups was 3.941 days (95% CI, –9.914 to +2.035; p = 0.196) (*Figure 52*).

It is surprising that this outcome is not more widely reported. The general absence of measurements of initial in-hospital stay in these studies suggests that the interventions were not being evaluated primarily as 'early discharge' schemes, with the intention of reducing stay, but rather they were focused on the postdischarge experience

of patients and their carers. If the choice of outcome measures can be regarded as reflecting the priorities of the investigators, then this implies that the main focus of interventions lay outside of providing early discharge, and was more oriented to supporting patients in the community after discharge and preventing readmission. Subsequent need for rehospitalisation might be taken as a proxy for the quality of the postdischarge experience and the outcome of readmission to hospital is more consistently reported in these trials.

Readmission to hospital

Mortality and use of hospital services through readmission and/or prolonged inpatient stay may be regarded as the key measures of the feasibility and acceptability of these services. A service that either kills people, blocks inpatient beds or precipitates readmission to hospital should not be advocated as a discharge arrangement for older people.

Eighteen of the trials reported on readmission. The results for the number of readmission episodes and the duration of hospital bed use after readmission are shown in *Tables 57* and *58*. In two of the studies there appears to be a trend to more early readmissions in the control groups. However, numbers are small, 6-week follow-up being reported separately in only 128 subjects randomised to the discharge support and control groups. Eighteen of the trials reported results of readmission rates in a form which allowed the calculation of the RRR, which was analysed using a random-effects meta-analysis model. The overall RRR for discharge support trials was 0.916 (95% CI, 0.805 to 1.042; $p = 0.183$). An RRR of less than one indicates that the intervention is beneficial (i.e. there is a relative reduction in the risk of being re-admitted). Overall the duration of hospital inpatient stay appears to be similar between the intervention groups and the controls in these trials. The distribution of RRRs is shown in *Figure 53*.

Physical function

Nineteen trials reported on some aspect of physical functioning[58,69,71–80,82,84,86,88,90,93,95,96,99,102] (*Table 59*). Eleven of these studies used physical function scales (e.g. Katz index, two trials; Barthel index, nine trials), which focus on the need for help with core or Personal Activities of Daily Living (PADLs) such as walking, transferring and toileting. Unfortunately, the trials reported changes in physical function in a variety of ways, so that not all these data were available for meta-analytic synthesis. Other scales used to measure physical function outcomes include IADL (such as the Nottingham Extended Activities of Daily Living [EADL] scale) or perceived functional health status in the physical function domain (SF-36, Nottingham Health Profile). PADL scales are crude tools for exploring differences between services, often lacking sensitivity to changes in health status and suffering from floor and ceiling effects.[138] However, the outcomes that they represent are important, and therefore worthy of consideration. A service which causes deterioration in physical function will add to the sum of health and social care costs, human misery and litigation.

The data are presented in *Table 59*. A standardised standardised difference could be calculated using eight of the trials. The mean difference was –0.135 (95% CI, –0.590 to +0.319; $p = 0.6$) (*Figure 54*) and overall there is no convincing evidence for advantage or disadvantage of any of the studies in the physical functioning domain. It can be seen that the absolute difference in physical function shows a tendency to better functioning in the intervention groups and that those trials that reported a relative change recorded levels of improvement among subjects in receipt of discharge arrangements.

Mental function

Nine trials reported on mental functioning, including cognitive function (five trials) and measures of anxiety (three trials) or depression (two trials). This is an important outcome domain which may be affected by a demoralising or unhappy experience of discharge from hospital, or by inadequate preparation for discharge. It is measured in a variety of ways and in multiple domains, which makes interpretation of synthesis across studies problematic. In general, these measures remained unchanged between intervention and control groups (*Table 60*).

No trials reported the impact of the intervention on carers' mental health, even though stress and ill health among carers is well recognised.

Morale, health status and social interaction

Sixteen trials reported on these dimensions of QoL. However, in seven of these trials only brief or descriptive information was given. The remaining nine trials used eight different standard instruments, each addressing multiple domains (*Table 61*). This reflects a general lack of consensus on the measurement of quality of life, or use of patient-based outcome measures[138] in clinical studies. Overall the data do not suggest a major impact of discharge support arrangements on the QoL of subjects when compared to controls.

Patient satisfaction

Little generalisable information is available in the data on patient satisfaction in the six trials in which it was recorded. Four of the trials suggested some increased satisfaction with the service provided, but the data are not consistently or reliably reported (*Table 62*).

Service use and costs

Data on service use (*Table 63*) tend to reflect the construction of the discharge support arrangement studied, with no overall pattern of benefit for services external to the intervention. Costs are variably reported (*Table 64*), the cost data are limited and much of it is not from the UK. This makes it difficult to generalise the results to a UK setting.

Discharge destination

Overall 13 studies reported destinational outcome: two at discharge, six between discharge and 6 months, five at 12 months and one during the study period (*Table 65*). One reported reduced long-term care use at discharge (3/45 versus 5/46) and the other study reporting destination at discharge reported increased discharge to home (63/102 versus 61/102). Neither of these results were statistically significant and no general conclusion about the impact of discharge support arrangements on disposition at discharge can be drawn from these figures.

Six studies reported on long-term care use between discharge and 6 months, three studies reporting essentially no difference between the groups, and three suggesting destinational outcomes in favour of the discharge planning group (increased numbers at home, two studies: 44/102 versus 61/102;[88] 87/150 (58%) versus 46/99 (46%); $p = 0.03$[76]). Significantly decreased long-term care use between discharge and 6 months was not shown in any of the five studies reporting this outcome. The odds ratio for being at home at follow-up was 1.34 (95% CI, 0.93 to 1.93, $p = 0.115$) (*Figure 55*).

Conclusions

This is an apparently heterogeneous group of studies, yet the trials presented under the heading 'Discharge support arrangements' do share some common features that make them distinct from the other categories of intervention presented in this report. This group of interventions tended to be delivered in the patient's home. The trials were conducted more commonly in northern Europe and the UK than were other categories of intervention (e.g. discharge planning protocols, CGA). This would be helpful if the studies as a whole gave a clear, obvious and potentially generalisable conclusion, but unfortunately this is not the case.

The interventions were of variable intensity, ranging from a telephone call at one extreme, to a multidisciplinary assessment with home-based rehabilitation at the other. The participants in the trials were generally not excluded on the grounds of being aged, but exclusions for other 'disadvantaged' states such as severe disability, terminal illness, cognitive dysfunction, illiteracy or not being a native English speaker were common. Some of the trials were restricted to specific disease groups (such as stroke), but were included because of the potentially generalisable nature of the intervention.

The variety of outcomes studied was somewhat broader than in other chapters, but the reporting of physical function, mental health, health status, service use and costs was inconsistent and variable.

The hypothesis that discharge support arrangements reduce mortality in older patients experiencing discharge from inpatient hospital care is not supported by the findings of this review.

The hypothesis that discharge support arrangements reduce length of hospital stay in older patients experiencing discharge from inpatient hospital care is not supported by the findings of this review.

The hypothesis that discharge support arrangements reduce readmission rates in older patients experiencing discharge from inpatient hospital care is not supported by this review.

No firm conclusions can be drawn about functional health outcomes for patients. Physical function was not consistently reported, but where available, physical function outcomes did not appear to be adversely affected by the interventions.

No conclusions can be drawn about carer health outcomes, or patient and career preferences.

Elements of service use and cost were not consistently recorded or reported in these studies, and no general conclusions can be drawn about the cost or cost-effectiveness of discharge support arrangements as evaluated in these studies.

In summary, therefore, it is not possible on the basis of the available evidence, to state that discharge support arrangements improve either mortality, length of stay or physical function. They have not been shown to carry disadvantage to patients.

TABLE 47 *Comparison between a recent systematic review of hospital at home schemes with the present review, which deals with discharge support arrangements*

	Shepperd and Parkes[123]	**This review**
Selection criteria	Study design: RCTs	Study design: RCTs
Comparisons	All studies that compared hospital at home care with acute hospital inpatient care	All studies undertaken in inpatient hospital settings (teaching or DGHs, community hospitals) or in the community after patient discharge from such institutions
Participants	Patients aged ≥ 18 years. Patients with long-term care needs, paediatric and obstetric patients, and those requiring mental health services were excluded	Patients aged > 65 years experiencing discharge from inpatient hospital care. Discharge from inpatient facilities not potentially providing high technology care (such as nursing homes), or ambulatory care settings such as day hospitals and outpatient departments were excluded
Intervention	Hospital at home care had to offer a specific service to patients in their home which required healthcare professionals to take an active part in the patient's care. If hospital at home care did not exist, the patient would be admitted to hospital	A variety of models in which new and existing services were targeted at recently discharged patients

TABLE 48 *Models of care, settings and conditions studied*

Study	Model of care (intervention type)	Setting	Condition
Beckie, 1989[68]	Postdischarge follow-up, supportive/educative telephone programme	Teaching hospital	Undergoing CABG
Townsend, 1988[69]	Community support/ standardised after care	DGH and community	Patients aged > 75 years discharged to own home
Smith, 1988[70]	Postdischarge telephone support by nurses using standard protocols addressing unmet need, medication, clinic appointments and barriers to keeping appointments	Acute hospital and patients' homes. Nurses followed people up if attending hospital for clinics, etc.	General medical patients
Mor, 1983[71]	To examine impact of friendly visitor programme compared with a group who received a rehabilitation nurse visit compared with usual treatment (no follow-up) three groups were compared on readmissions	Rehabilitation units and community	Patients were classified into different diagnostic groups and then randomised to ensure comparability between groups, but there was no specific condition
Wong, 1990[72]	Inpatient education and community nurse follow-up at home	General hospital orthopaedic units	Hip arthroplasty
Weinberger, 1996[73]	Increased access to primary care to prevent readmission	Nine veteran medical centres/hospitals	Patients to be discharged at risk of readmission (e.g. patients with diabetes, COPD or CHF)
Siu, 1996[58]	Pre- and postdischarge geriatric assessment	University hospital	Medical/surgical admission, aged ≥ 65 years
Donald, 1995[74]	Hospital at home scheme	Geriatric inpatient unit	Not specific
Hansen, 1995[59]	Postdischarge geriatric follow-up by an interdisciplinary geriatric consultation team	University acute care hospital	All admissions to subacute geriatric ward
Hui, 1995[75]	Early discharge with day hospital rehabilitation after stroke	Acute hospital neurology unit	Stroke
Melin, 1995[76]	Comprehensive in-home primary healthcare team	DGH (Stockholm), acute medical discharges, primary care (patient's home)	Patients were recruited from the department of medicine and orthopaedics
Martin, 1994[80]	Evaluation of a home treatment team and usual care on readmission rates	Patients from medical and rehabilitation wards	Medical and rehabilitation patients
Fitzgerald, 1994[81]	To evaluate if case management prevented readmission	University and affiliated medical centre	No specific condition, medical patients
Gladman, 1993[82]	Compare function/perceived health status of stroke patients receiving domiciliary care compared with usual/hospital-based rehabilitation team in three different settings: healthcare of elderly, general medicine, stroke unit	Two acute trusts and three rehabilitation hospitals in Nottingham	Stroke patients
Williams, 1992[84]	Evaluation of postdischarge visits by health visitor assistants	Community	Patients discharged from hospital to their own home or relative's home. No specific condition

continued

TABLE 48 contd *Models of care, settings and conditions studied*

Study	Model of care (intervention type)	Setting	Condition
Hansen, 1992[85]	A feasibility study to evaluate postdischarge follow-up home visits	Patient's home following hospital discharge	No specific disease group, discharged from medical/surgical and geriatric wards
Rubin, 1992[63]	Outpatient care management and treatment programme by a geriatric assessment team	Acute care urban teaching hospital	Medical admissions admitted via emergency department at high risk of readmission for chronic conditions or good patients for outpatient management
Logan, 1997[86]	To determine whether stroke patients would benefit from enhanced occupational therapy service compared with usual service	Community discharged stroke patients	Stroke patients
Williams, 1994[87]	Home visits by military staff nurses	Military hospital and community	Internal medicine service patients
Dunn, 1994[88]	Single visit from health visitor	DGH and community	Not specific
Rodgers, 1997[90]	Early discharge community-based rehabilitation team in stroke	Acute hospital and community	Stroke
Rudd, 1997[93]	Early discharge supported by community rehabilitation team compared with usual care inpatients with stroke	Acute hospital and community	Stroke
Rawl, 1922[95]	Telephone and clinic or home follow-up by specialist nurse practitioner	Community hospital	Rehabilitation unit inpatients
Richards, 1998[96]	Early discharge hospital at home scheme	Acute hospital	General medical, care of the elderly, orthopaedic and general surgical ward discharges
Phillips, 1993[98]	Nurse supported early hospital discharge, telephone follow-up with education and counselling	Acute hospital	Abdominal and back surgery
Stewart, 1998[99]	Home-based intervention. Counselling before discharge on medications and signs of clinical deterioration; home visit at 1 week by nurse and pharmacist to check medication use, advise care-giver, improve liaison with community services	440-bed hospital	All admissions to medical and surgical units
Widen Holmqvist, 1998[102]	Home rehabilitation after stroke	Department of neurology and patients' homes	Stroke
Nielsen, 1972[116]	Home aid service or geriatric rehabilitation hospital home aid service assisted in continued care rehabilitation (e.g. house cleaning, meal planning, shopping, bathing)	Hospital	No specific conditions

TABLE 49 *Type of input provided by discharge support schemes and staff involved*

Study	Single person or team intervention	Inpatient/ phone/ Inpatient/ clinic/home	Doctor	Nurse	PT	OT	SALT	SW	Pharm.	Assist.	Comments
Beckie, 1989[68]	Single	Phone		Yes							
Townsend, 1988[69]	Single	Home								Yes	
Smith, 1988[70]	Single	Phone		Yes							
Mor, 1983[71]	Single	Home		Yes						Yes	
Wong, 1990[72]	Single	Inpatient + home			Yes						
Weinberger, 1996[73]	Team	Phone + clinic	Yes	Yes							
Siu, 1996[58]	Single*	Inpatient + home		Yes							Nurse supported by team
Donald, 1995[74]	Team	Home		Yes	Yes	Yes				Yes	Hospital at home
Hansen, 1995[59]	Team	Home	Yes	Yes	Yes						Discharge support arrangement
Hui, 1995[75]	Team	Inpatient + clinic									Team membership not stated
Melin, 1995[76]	Team	Home	Yes	Yes	Yes	Yes					Secretarial staff
Martin, 1994[80]	Single	Home		Yes						Yes	
Fitzgerald, 1994[81]	Single	Phone + clinic			Yes						Case manager
Gladman, 1993[82]	Team	Home			Yes	Yes					
Williams, 1992[84]	Single	Home								Yes	Health visitor assistants
Hansen, 1992[85]	Team	Home	Yes	Yes							
Rubin, 1992[63]	Team	Clinic	Yes	Yes				Yes			
Logan, 1997[86]	Single	Home				Yes					Stroke
Williams, 1994[87]	Single	Home		Yes							
Dunn, 1994[88]	Single	Home		Yes							Health visitor
Rodgers, 1997[90]	Team	Home			Yes	Yes	Yes	Yes		Yes	Secretarial/stroke
Rudd, 1997[93]	Team	Home	Yes		Yes	Yes	Yes			Yes	Stroke
Rawl, 1922[95]	Single	Phone		Yes							
Richards, 1998[96]	Team	Home		Yes	Yes	Yes				Yes	
Phillips, 1993[98]	Single	Phone		Yes							
Stewart, 1998[99]	Team	Hospital + home			Yes					Yes	
Widen Holmqvist, 1998[102]	Team	Home			Yes	Yes	Yes	Yes			
Nielsen, 1972[116]	Team	Home	No	No	No	No	No	No	No	Yes	Postdischarge community support assistants under team supervision

Assist., assistant; OT, occupational therapist; Pharm., pharmacist; PT, physiotherapist; SALT, speech and language therapist; SW, social worker

* *Received home-based intervention from either a nurse or an assistant*

TABLE 50 *Characteristics of included studies. Inclusion and exclusion criteria*

Study	Inclusions	Exclusions
Beckie, 1989[68]	Uncomplicated CABG, no psychiatric complaints, able to speak English, telephone at home, intend to attend follow-up	Language, cognitive impairment, poor reading ability
Townsend, 1988[69]	Discharged to own home, age > 75 years	Not stated
Smith, 1988[70]	Discharged from general medical service, discharged with follow-up appointment to hospital service, consent	Discharged to institutional care, in other studies
Mor, 1983[71]	"Appropriate postrehabilitation discharges"	No separate inclusion criteria stated
Wong, 1990[72]	Post hip replacement, English speaking, no severe postoperative complications, satisfactory operation and hip mobility, satisfactory ambulation ability	Cognitive impairment, visual/hearing impairment, severe/disabling co-morbidity
Weinberger, 1996[73]	General medical patients with CHF, COPD, diabetes	Language, cognitive impairment, not contactable by telephone, already receiving primary care at primary care clinic, receiving chemotherapy living in a nursing home
Siu, 1996[58]	Target group: functional limitations, unstable medical problems, potentially reversible geriatric clinical problems	Residence > 24 km from hospital, nursing home admissions, terminal illness, in hospital < 48 h, non-English speakers
Donald, 1995[74]	Referred to hospital at home scheme, discharge to home, carers ready to consider discharge, expected to benefit from rehabilitation	None stated
Hansen, 1995[58]	Simultaneous need for medical treatment, physical rehabilitation and adjustment of social services prior to discharge	None stated
Hui, 1995[75]	Target condition admissions (stroke)	Age < 65 years, previous stroke/dementia, outside area, Barthel score 20
Melin, 1995[76]	Reside in study area, clinically ready for discharge, consent, dependent in categories 1–5 in Katz index	Cognitive impairment, aphasic dependent (category 6) on Katz ADL/functions, nursing home resident
Martin, 1994[80]	Still at risk of failing to cope at home	Patients who needed the assistance of two to transfer
Fitzgerald, 1994[81]	Age > 45 years, telephone, catchment area	< 60 days to live
Gladman, 1993[82]	WHO criteria for stroke	Discharged to a nursing/residential home, needing respite or terminal care, prior receipt of outpatient rehabilitation, no significant disability hospital stay < 7 days
Williams, 1992[84]	Age > 75 years, discharged to own or a relative's home	Those at the end of the study that had less than four visits
Hansen, 1992[85]	Age > 75 years, resident in locality	None stated
Rubin, 1992[63]	Age > 70 years, target admissions	Terminally ill on admission, unable to give informed consent (severe concurrent illness or medically unstable), under care of private physician (too socially or medically stable and independent)
Logan, 1997[86]	First stroke and discharged from hospital	Not stated

continued

TABLE 50 contd *Characteristics of included studies. Inclusion and exclusion criteria*

Study	Inclusions	Exclusions
Williams, 1994[87]	Age > 45 years, geographical location, internal medicine service admission, previous three readmissions, chronic medical illness	Resident not more than 25 miles from hospital
Dunn, 1994[88]	All discharges from a geriatric medicine ward	None stated
Rodgers, 1997[90]	Stroke, geographical location, medically stable, Barthel index > 4 and < 20 at 72 h poststroke	Nursing home resident, severe pre-existing handicap
Rudd, 1997[93]	Stroke, able to transfer	Unable to transfer
Rawl, 1922[95]	Age > 18 years, not homebound, consent	Unable to read/write English
Richards, 1998[96]	Age > 16 years, positive rehabilitation outcome anticipated, GP accepted clinical responsibility, anticipated need for services, available carer support	Not awaiting nursing home placement, expected to remain in hospital < 1 day and > 28 days
Phillips, 1993[98]	Age > 18 years, abdominal or back surgery, discharged home without follow-up, able to respond to questions	Not stated
Stewart, 1998[99]	Discharged home taking medication for chronic condition	Terminal malignancy, outside catchment area
Widen Holmqvist, 1998[102]	Acute stroke, independence in feeding and continence, MMSE > 23, impaired motor capacity, dysphasia	Discharged within 5 days, progressive stroke, renal, heart or respiratory failure, non-stroke epilepsy, alcoholism, psychiatric disease, other co-morbidity likely to shorten life dramatically
Nielsen, 1972[116]	Age > 60 years, not in receipt of home care, not in need of nursing care	Living in a nursing home

TABLE 51 *Number of patients admitted, eligible for trial, randomised and included in the analysis*

Study	Number of patients			Sample size	
	Assessed	Eligible for trial	Randomised	Intervention	Control
Beckie, 1989[68]	74	74	74	37	37
Townsend, 1988[69]	903	903	903	464	439
Smith, 1988[70]	2376	1001	1001	499	502
Mor, 1983[71] *	Not stated	162	142	102	40
Wong, 1990[72]	Not stated	Not stated	146	50 (group 1) 48 (group 2)	48 48
Weinberger, 1996[73]	10192	3209	1396	695	701
Siu, 1996[58]	6699	1396	354	178	176
Donald, 1995[74]	Not stated	Not stated	60	30	30
Hansen, 1995[59]	Not stated	227	193	96	97
Hui, 1995[75]	Not stated	Not stated	120	59	61
Melin, 1995[76]	745	255	249	150	99
Martin, 1994[80]	54	54	54	29	25
Fitzgerald, 1994[81]	4245	1068	668	333	335
Gladman, 1993[82]	1119	327	327	165	162
Williams, 1992[84]	1190	595	470	231	239
Hansen, 1992[85]	Not stated	Not stated	404	199	205
Rubin, 1992[63]	200	200	200	100	100
Logan, 1997[86]	111	111	111	–	58
Williams, 1994[87]	Unclear	Unclear	75	35	40
Dunn, 1994[88]	Not stated	Not stated	204	102	102
Rodgers, 1997[90]	402	119	92	45	46
Rudd, 1997[93]	Unclear	Unclear	331	167	164
Rawl, 1922[95]	Not stated	Not stated	100	49	51
Richards, 1998[96]	383	246	241	160	81
Phillips, 1993[98]	Not stated	Not stated	62	32	30
Stewart, 1998[99]	Not stated 4100	Not stated 906	81 762	41 381	40 381
Nielsen, 1972[116]	Not stated	Not stated	100	50	50
Total	≥ 37,293	≥ 10,853	8920	4580	4339

**Average age of subjects and controls reported separately*

TABLE 52 *Age distribution (years) of study participants*

Study	Mean age (SD) or median (IQR)	
	Subjects	**Controls**
Beckie, 1989[68]	Overall age range 50–70 years	
Townsend, 1988[69]	82.0	81.8
Smith, 1988[70]	52.4 (18.4)	0.1 (17.6)
Mor, 1983[71]*	59.3	59.3
Wong, 1990[72]	63.3 (group 1) 71.7 (group 2)	64.8
Weinberger, 1996[73]	63.0 (11.1)	62.6 (10.9)
Siu, 1996[58]	> 85 (32.0%)	> 85 (26.7%)
Donald, 1995[74]	81.6 (5.4)	84 (6.0)
Hansen, 1995[59]	78.7 [59–94]	80.6 [49–95]
Hui, 1995[75]	73.1 (5.42)	74.1 (5.89)
Melin, 1995[76]	80.9 (7.2)	80.0 (7.8)
Gladman, 1993[82]	70	70
Martin, 1994[80]	< 75 (No.: 21) > 85 (No.: 10)	< 75 (No.: 22) > 85 (No.: 11)
Fitzgerald, 1994[81]	64.4 (± 7.7)	64.6 (7.7)
Hansen, 1992[85]	75–79 (43%) 80–84 (31%) > 85 (26%)	75–79 (46%) 80–84 (32%) > 85 (22%)
Rubin, 1992[63]	76.8 (5.8)	76.7 (5.4)
Logan, 1997[86]	71 (10.2)	74 (11.5)
Williams, 1994[87]	64.8 (15)	67.4 (12)
Dunn, 1994[88]	82.7 (range 66–103)	82.9 (range 68–97)
Rodgers, 1997[90]	73 [47–93]	73 [44–91]
Rudd, 1997[93]	70 (11)	72 (12)
Rawl, 1922[95]	69.9 (9.8)	68.5 (15.8)
Richards, 1998[96]	79 [72–84]	79 [74–84]
Phillips, 1993[98]	Overall: 44 (range18–80)	
Widen Holmqvist, 1998[102]	70.8 (7.6)	72.6 (8.9)
Stewart, 1998[99]	66.0 (15.7)	65.3 (15.8)
Nielsen, 1972[116]	73.6	74.3

**Average age of intervention and control subjects not reported*

TABLE 53 *Gender of study participants*

Study	Intervention group (%)		Control group (%)	
	Men	Women	Men	Women
Beckie, 1989[68]	86.5	13.5	Overall	
Townsend, 1988[69]	37.3	62.7	34.4	65.6
Smith, 1988[70]	47.7	52.3	47.0	0
Mor, 1983[71]	49.7	50.3	Overall	
Wong, 1990[72]	48 (group 1) 27 (group 2)	52 73	39.6	60.4
Weinberger, 1996[73]	99	1	98	2
Siu, 1996[58]	32	68	48	52
Donald, 1995[74]	27	73	23	77
Hansen, 1995[59]	30	70	35	65
Hui, 1995[75]	42.4	57.6	45.9	54.1
Melin, 1995[76]	29	71	27	73
Martin, 1994[80]	17	83	20	80
Fitzgerald, 1994[81]	100	0	100	0
Gladman, 1993[82]	30	70	30	70
Williams, 1992[84]	65	35	70	30
Rubin, 1992[63]	42	58	27	63
Logan, 1997[86]	43	57	57	43
Williams, 1994[87]	60	40	55	45
Dunn, 1994[88]	32	68	31	69
Rodgers, 1997[90]	57	43	52	48
Rudd, 1997[93]	55	45	57	43
Rawl, 1922[95]	28	72	31	69
Richards, 1998[96]	32	68	28	72
Phillips, 1993[98]	32	68	Overall	
Stewart, 1998[99]	54 51	46 49	55 50	45 50
Nielsen, 1972[116]	66	34	66	34

TABLE 54 *Range of outcomes reported in studies*

Study	Single person or team intervention	Inpatient/phone/ clinic/home	Mor-tality	LoS	Re-admission	Physical function	Mental function	Service use	Service cost	QoL	Satis-faction	Carer outcomes	Desti-nation	Other
Beckie, 1989[68]	Single	Phone			✔		✔	✔						
Townsend, 1988[69]	Single	Home	✔		✔	✔	✔	✔	✔	✔				
Smith, 1988[70]	Single	Phone			✔									
Mor, 1983[71]	Single	Home	✔	✔	✔	✔	✔	✔		✔				
Wong, 1990[72]	Single	Inpatient + home				✔								✔
Weinberger, 1996[73]	Team	Phone + clinic	✔		✔	✔				✔	✔			
Siu, 1996[58]	Single	Inpatient + home	✔		✔	✔	✔			✔	✔		✔	
Donald, 1995[74]	Team	Home	✔		✔	✔		✔		✔			✔	
Hansen, 1995[59]	Team	Home		✔	✔			✔					✔	
Hui, 1995[75]	Team	Inpatient + clinic	✔	✔	✔	✔			✔					
Melin, 1995[76]	Team	Home	✔		✔	✔	✔	✔	✔	✔				
Martin, 1994[80]	Single	Home	✔	✔	✔	✔	✔	✔	✔				✔	
Fitzgerald, 1994[81]	Single	Phone + clinic	✔		✔			✔	✔					
Gladman, 1993[82]	Team	Home	✔	✔		✔		✔		✔		✔		
Williams, 1992[84]	Single	Home	✔			✔	✔	✔						
Hansen, 1992[85]	Team	Home	✔		✔			✔						
Logan, 1997[86]	Single	Home	✔			✔		✔		✔				
Williams, 1994[87]	Single	Home			✔									
Dunn, 1994[88]	Single	Home	✔		✔	✔	✔	✔						
Rodgers, 1997[90]	Team	Home	✔		✔	✔		✔	✔	✔		✔	✔	
Rudd, 1997[93]	Team	Home	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	
Rawl, 1922[95]	Single	Phone			✔	✔	✔							✔
Richards, 1998[96]	Team	Home	✔	✔	✔	✔				✔	✔			✔
Phillips, 1993[98]	Single	Phone								✔	✔			
Stewart, 1998[99]	Team	Inpatient + home	✔		✔	✔		✔	✔	✔				
Widen Holmqvist, 1998[102]	Team	Home				✔	✔			✔				
Nielsen, 1972[116]	Team	Home	✔	✔	✔						✔		✔	

TABLE 55 *Mortality outcomes*

Study	Time period	Subjects		Controls		Subjects		Controls	
		Died	%	Died	%	Alive	%	Alive	%
Townsend, 1988[68]	3 months	34	7.3	25	6.2	430	92.7	404	94.2
	12 months	91	19.6	81	21.1	373	80.4	383	82.5
Mor, 1983[69]	12 months	13	12.7	4	11.1	89	87.3	36	90.0
Weinberger, 1996[73]	12 months	42	8.5	47	7.2	636	91.5	654	93.3
Siu, 1996[58]	2 months	7	3.9	8	4.5	171	96.1	168	4.5
Donald, 1995[74]	6 months	9	30	5	16.7	21	70	25	83.3
Hansen, 1995[59]	6 months	17	18	19	20	79	82	88	80
Hui, 1995[75]	3 months	2	3.5	2	3.3	57	96.5	59	96.7
	6 months	6	10.2	6	9.8	–	89.8	55	90.2
Melin, 1995[76]	6 months	40	26.7	26	35.6	110	73.3	73	73.7
Martin, 1994[80]	1 year	7	24.1	5	25.0	22	75.9	20	80.0
Fitzgerald, 1994[81]	1 year	35	10.5	35	11.7	298	89.5	300	89.6
Gladman, 1993[82]	6 months	16	9.9	7	4.5	146	90.1	155	95.7
Williams, 1992[84]	1 year	30	10.1	40	15.5	267	89.9	258	86.6
Hansen, 1992[85]	1 year	32	16.1	43	26.5	167	83.9	162	79.0
Logan, 1997[86]	6 months	4	7.5	6	11.5	49	92.5	52	89.7
Dunn, 1994[88]	6 months	15	15	25	25	87	85	77	75
Rodgers, 1997[90]	3 months	1	2	4	10	45	98	42	90
Rudd, 1997[93]	1 year	26	15.6	34	20.7	141	84.4	130	79.3
Richards, 1998[96]	3 months	12	7.5	6	7.4	148	92.5	75	92.6
Stewart, 1998[99]	6 months	12	3.1	29	7.6	369	96.9	352	92.4
Nielsen, 1972[116]	12 months	6	12	4	8	44	88	42	84
Total at final follow-up		457	12.2	461	12.8	3749	87.8	3610	87.2

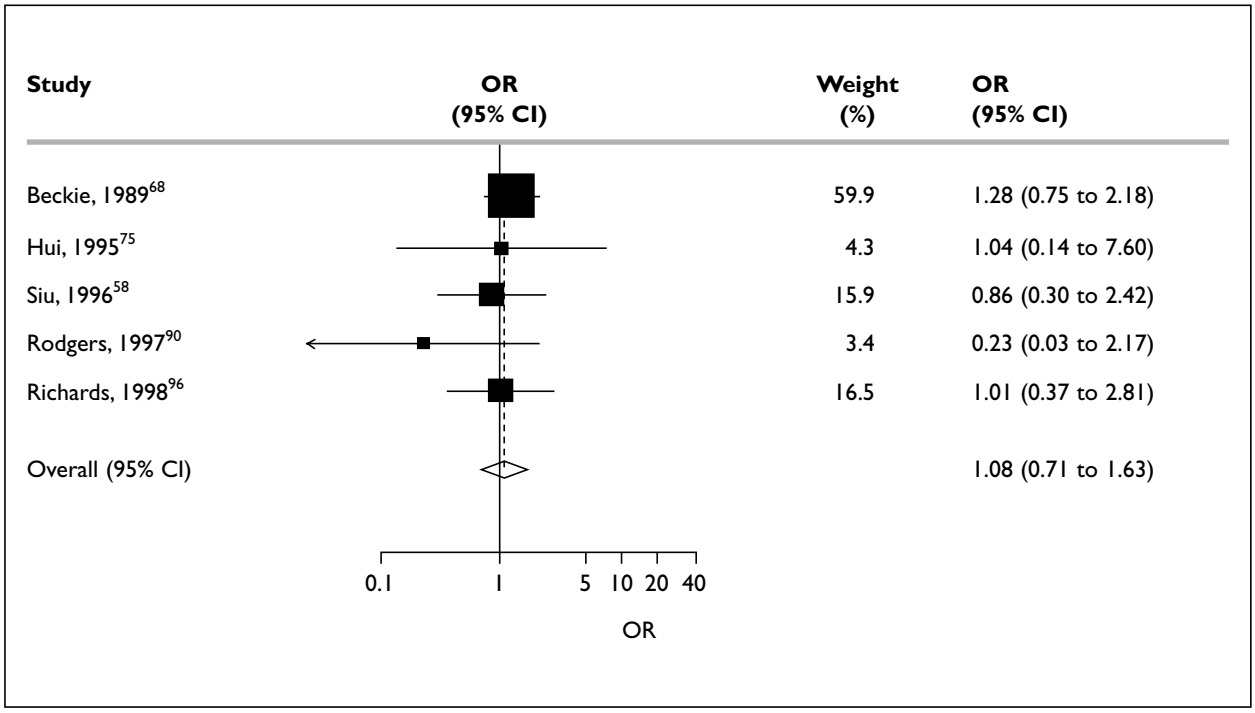

FIGURE 49 *Discharge support: mortality at 3 months*

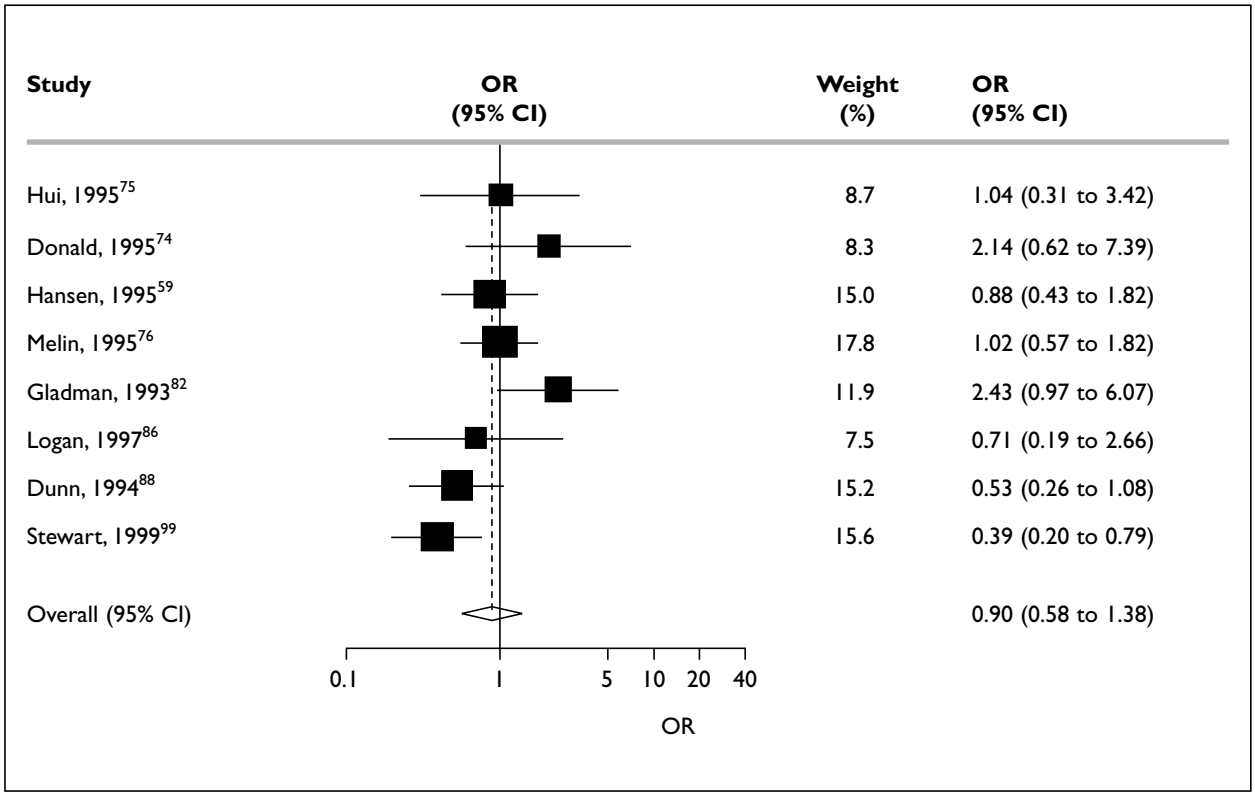

FIGURE 50 *Discharge support: mortality at 6 months*

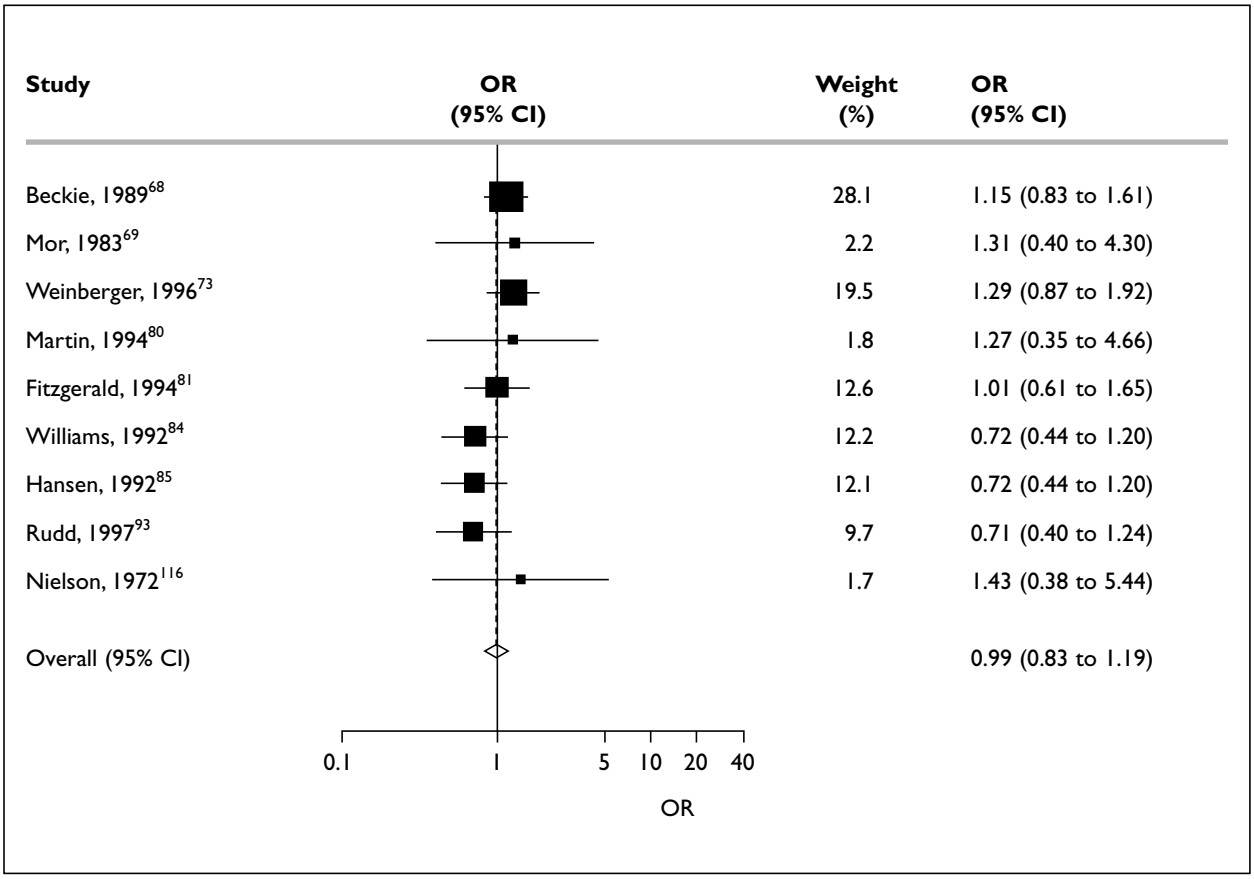

FIGURE 51 *Discharge support: mortality at 12 months*

TABLE 56 *Index length of stay*

	LoS (days)			
Study	**Intervention group**	**Control group**	**Comment**	**Significance**
Mor, 1983[71]				ANOVA, *F* ratio
Nurse (RN)	27.940 (3.29)	17.375 (1.97)	Index plus	0.641, $p = 0.5$
Visitor (FV)	13.288 (4.09)	17.375 (1.97)	readmission LoS (coefficient of variation)	
Hui, 1995[75]				
Acute ward	6.47 ± 3.62	5.45 ± 2.66	Includes readmissions	Mean ± SD
Rehabilitation ward	33.31 ± 24.02	34.87 ± 18.29		
Martin, 1994[80]	14 (0–54)	35 (0–99)		Median (range)
Gladman, 1993[82]	11.9 ± 12.7	12.5 ± 13.5		Mean ± SD, NS
Rudd, 1997[93]	12 ± 19	18 ± 24		Mean ± SD
Richards, 1998[96]	16.8	12.2		Mean only
Nielsen, 1972[116]	21.58	15.96		Difference 5.62, $T = 1.58$, p = NS

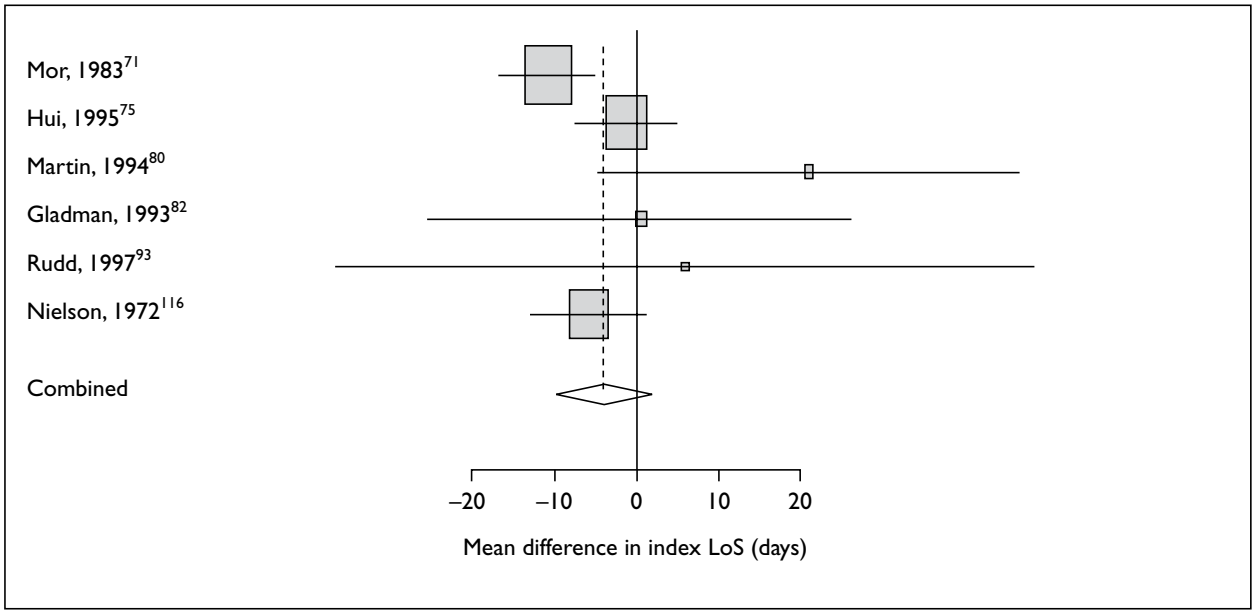

FIGURE 52 *Discharge support: index length of stay*

TABLE 57 *Readmissions to hospital*[*]

Study	Baseline			Subjects		Controls	
	Subjects	Controls	Months follow-up	*n*	(Per 100 patients per month)	*n*	(Per 100 patients per month)
Beckie, 1989[68]	37	37	1.5	2	3.604	9	16.216
	59	61	6	7	1.98	6	1.64
Townsend, 1988[69]	464	439	3	102	7.328	102	7.745
			18	176	2.107	173	2.189
Smith, 1988[70]	499	502	Variable	–[†]	11.6	–[†]	11.3
Weinberger, 1996[73]	695	701	6	343	8.233	310	7.367
Siu, 1996[58]	178	176	2	43	12.1	37	10.5
Donald, 1995[74]	30	30	6	9	5.000	6	3.333
Hansen, 1995[59]	96	97	6	42	7.3	62	10.7
Melin, 1995[76]	150	99	6	51	5.667	32	5.387
Martin, 1994[80]	29	25	1.5	4	9.195	9	24.000
	–	–	3	5	5.747	5	6.667
Fitzgerald, 1994[81]	333	335	12	–[‡]	9.900	–[‡]	10.200
Hansen, 1992[85]	199	205	12	107	4.500	111	4.500
Dunn, 1994[88]	102	102	6	49	8.007	51	8.333
Williams, 1994[87¶]	–	–	–	–	–	–	–
Rodgers, 1997[90]	45	46	3	5	3.704	5	3.623
Rawl, 1922[95]	49	51	4	11	5.6	7	3.4
Stewart, 1998[99]	381	381	6	154	6.737	197	8.618

[*] *Number of episodes normalised to number of admissions per 100 study participants per month of follow-up*
[†] *Reported as admissions per patient per month (mean ± SD): intervention 0.116 ± 0.244, controls 0.113 ± 0.206;* p *= 0.7 ANOVA*
[‡] *Reported as admissions per patient per month (mean ± SD): intervention 0.099 ± 0.15, control 0.102 ± 0.13;* p *= 0.79 ANOVA*
[¶] *Reported as follows: the intervention(s) allowed the patients to remain at home and not use the resources of the medical centre unnecessarily (*p *= 0.038); the actual readmission rate of the intervention patients was reduced from the prestudy rate of 17% to 4.89%; the control group comprised 40 patients; 35% were readmitted twice during the study, 8% were readmitted three times and the remaining 8% were readmitted four times*

TABLE 58 *Readmissions to hospital*[*]

Study	Duration of follow-up (months)	Mean (SD) or median [IQR] inpatient days		Inpatient days per patient per month	
		Subjects	Controls	Subjects	Controls
Townsend, 1988[69]	3	3.8	3.9	1.27	1.30
	18	17.1	30.6	0.95	1.70
Mor, 1983[71†]					
Nurse (RN)	12	17.375	27.94	1.45	2.33
Visitor (FV)	12	13.288	27.94	1.11	2.33
Weinberger, 1996[73]	6	10.2 (19.8)	8.8 (19.7)	1.70	1.47
Donald, 1995[74]	6	22.5 [5–30]	20.2 [8–27]	3.75	3.37
Hui, 1995[75]					
Acute	6	6.47 (3.62)	5.45 (2.66)	–	–
Rehabilitation	6	33.1 (24.02)	34.87 (18.29)	–	–
Martin, 1994[80]	12	14 [0–54]	35 [0–99]	1.17	2.92
Fitzgerald, 1994[81]	12	9.20	10.43	0.767 (1.27)	0.869 (1.42)
Dunn, 1994[88]	6	23.5 [4–120]	19.5 [2–258]	3.92	3.25
Rodgers, 1997[90‡]	3	14 [8–31]	23 [11–58]	4.67	7.67
Rudd, 1997[93¶]	12	12 (19)	18 (24)	1.00	1.5
Richards, 1998[96§]	3	16.8	12.2	5.6	3.7
Nielsen, 1972[116**]	–	–	–	–	–

[*] *Duration of inpatient stay normalised to number of days per patient per month of follow-up*
[†] *Reported as number of days in an acute hospital. Control: mean 17.375, coefficient of variation (c.v.) 1.97. Experimental nurse (RN): mean 27.940, c.v. 3.29. Experimental visit (FV): mean 13.288, c.v. 4.09.* F *ratio = 0.641,* p *= 0.42*
[‡] *Includes index LoS*
[¶] *LoS from randomisation*
[§] *Quoted as days postrandomisation in rehabilitative care and includes a mean of 12.8 days in a hospital at home scheme for subjects*
[**] *Reported as days rehospitalisation. Intervention 6.85, control 11.4, difference 4.6.* t *= 0.91,* p *= NS*

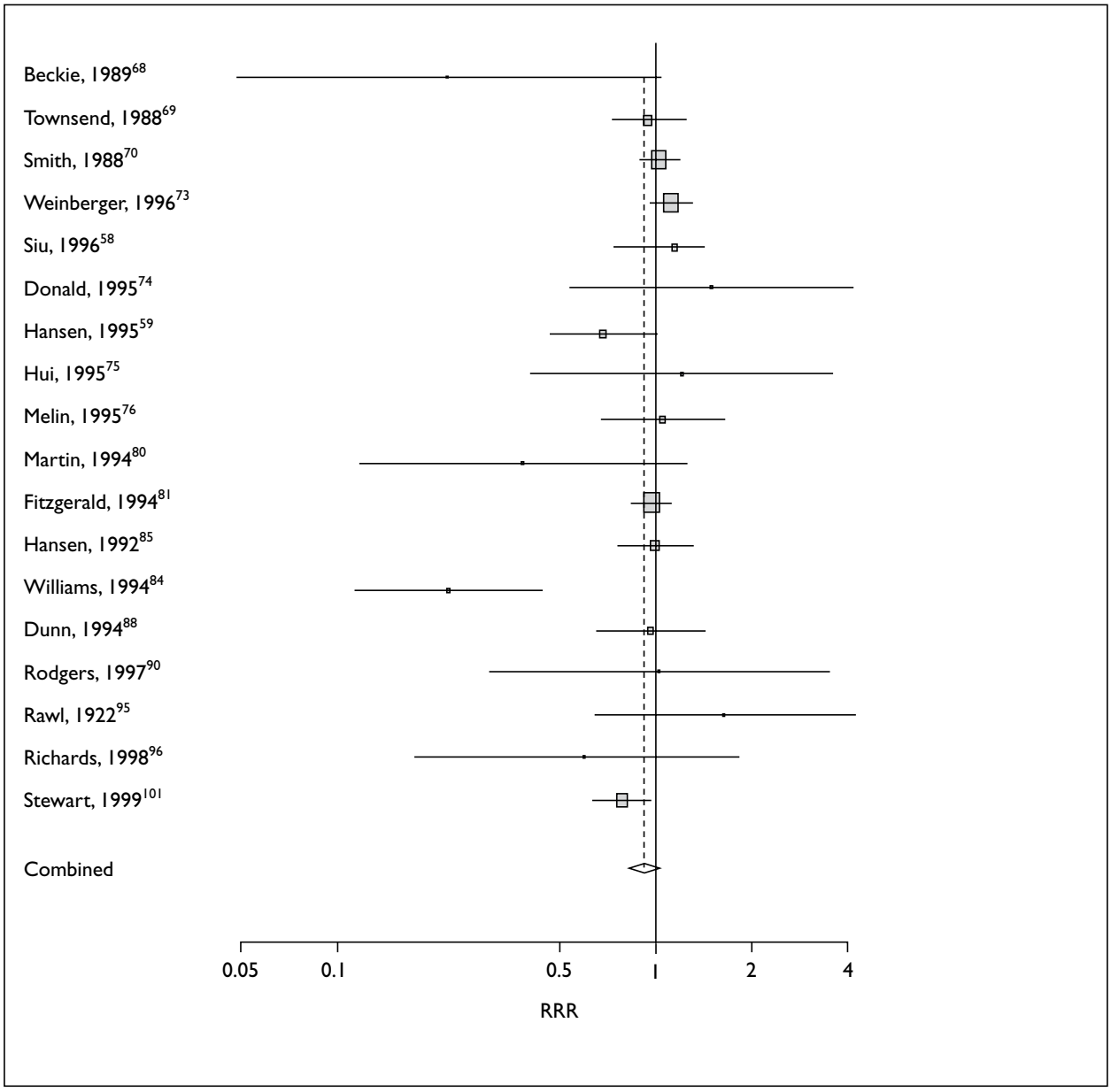

FIGURE 53 *RRR for 18 trials of discharge support arrangements*

TABLE 59 *Physical function*

Study	Measure	When measured	How reported	Subjects	Controls
Townsend, 1988[69]	ADL index	Baseline 2 weeks 3 months	Mean score Change at Change at	20.8 –0.4 –0.4	20.5 +0.2 +0.4
Mor, 1983[71]	Katz ADL	Baseline	Proportion able to climb a flight of stairs	41/107	50/141
	Rosow PFS	12 months	Proportion able to walk half a mile	17/107	21/141
Wong, 1990[72]	Subjective functional capacity index	6 months	Comparison between groups 1 and 3	$p = 0.34$	No figures
	Objective functional capacity index: muscle strength mobility walking stairs	6 months			See subjects column $p = 0.69$ $p = 0.70$ $p = 0.55$ $p = 0.46$
	Subjective functional capacity index	6 months			
	Objective functional capacity index: muscle strength mobility walking stairs	6 months	Comparison between groups 2 and 3	$p = 0.57$ $p = 0.17$ $p = 0.87$ $p = 0.71$ $p = 0.40$	
Weinberger, 1996[73]	SF-36	Baseline	Mean ± SD score on physical function subscale	44.4 ± 29.9	43.6 ± 30.2
Siu, 1996[58]	SF-36	60 days	SF-36 dimension (sample size) Physical function (293): mean (adjusted) mean difference (95% CI) Role function – physical (222): mean (adjusted) mean difference (95% CI)	 40.34 0.13 (–6.08 to 6.33) 68.83 1.10 (8.26 to 6.07)	 40.2 67.00
Donald, 1995[74]	Barthel index	Baseline 4 weeks 12 weeks 26 weeks	Mean	15.7 15.7 15.3 15.0	15.9 15.1 16.1 26.0
	Functional gait	Baseline 4 weeks 12 weeks 26 weeks	Number of patients	17 20 17 16	16 18 18 19

continued

TABLE 59 contd *Physical function*

Study	Measure	When measured	How reported	Subjects	Controls
Hui, 1995[75]	Barthel index	Baseline	Mean ± SD	10.4 ± 5.3	9.9 ± 4.9
		3 months		14.6 ± 5.8	16.1 ± 3.9
		6 months		15.6 ± 5.6	17.1 ± 3.6
		3 months	Number scoring:		
			< 16	23	13
			16–19	14	25
			20	18	12
		6 months	Number scoring:		
			< 16	23	9
			16–19	14	21
			20	18	13
Martin, 1994[80]	Barthel index	6 weeks	Median Barthel score (IQR)	16 (11–19)	15 (8–17.5)
		12 weeks		15 (10.5–19)	15 (9–18)
	Rivermead score	6 weeks	Median Rivermead score (IQR)	13 (10–18)	9 (9–17.5)
		12 weeks		13 (9–20)	9 (9–14.5)
Melin, 1995[76]	PADL (Katz)	Baseline	Mean ± SEM scores and mean ± SEM differences	2.4 ± 0.1	2.3 ± 0.2
		6 months		4.2 ± 0.2	3.9 ± 0.2
		Difference		1.8 ± 0.2	1.6 ± 0.3
	IADL	Baseline		6.0	6.0
		6 months		10.9 ± 0.6	9.2 ± 0.7
		Difference		4.9 ± 0.6	3.2 ± 0.7
	Walking indoors	Baseline		3.2 ± 0.1	3.0 ± 0.1
		6 months		4.1 ± 0.1	3.8 ± 0.1
		Difference		0.7 ± 0.1	0.8 ± 0.2
	Walking outdoors	Baseline		1.0	1.0
		6 months		2.1 ± 0.1	1.6 ± 0.1
		Difference		1.1 ± 0.1	0.6 ± 0.1
Gladman, 1993[82]	Barthel index	Baseline	Median score (IQR)	16.0 (14–17)	17.0 (15–18)
		6 months		17.0 (14–19)	18.0 (15–20)
	Nottingham EADL scale	3 months	Median total score (IQR)	8.0 (4–13)	8.5 (4–13)
		6 months		8.5 (4–14)	8.0 (4–14)
	Nottingham Health Profile – physical mobility	6 months	Median score (IQR)	36 (13–58)	33 (11–55)
Williams, 1992[84]	Physical status			*n* = 183	*n* = 172
		Baseline	Mean score	5.7	6.1
		1 year	Mean deterioration	0.9	0.9
	Disability level			*n* = 176	*n* = 188
		Baseline	Mean score	8.0	7.8
		1 year	Mean deterioration	2.1	2.6

continued

TABLE 59 contd *Physical function*

Study	Measure	When measured	How reported	Subjects	Controls
Logan, 1997[86]	PADL		Median (range)		
	IADL	3 months	Nottingham EADL scale (median (range)):		
			total score	8 (0–19)	3 (1–8)
			mobility	2 (0–6)	0 (0–6)
			household	4 (4–10)	2 (0–9)
			leisure	2 (0–5)	1 (0–5)
	PADL	6 months	Barthel index score (median (range)):	16 (1–20)	16 (2–20)
	IADL	6 months	Nottingham EADL scale (median (range)):		
			total	8 (0–21)	6 (0–18)
			mobility	2 (0–6)	1 (0–6)
			household	4 (0–4)	3.5 (0–10)
			leisure	2 (0–5)	1 (0–5)
Dunn, 1994[88]	Barthel index	Baseline	Mean only	17.9	18.1
		28 days		17.3	17.8
Rodgers, 1997[90]	Oxford handicap scale	3 months	Proportion scoring:		
			0–2	22 (52%)	28/45 (62%)
			3	10 (24%)	8/45 (18%)
			4–5	10 (24%)	9 (20%)
	Nottingham EADL		Median (range)		
			mobility	1 (0–6)	3 (0–6)
			kitchen	3 (0–5)	4 (0–5)
			domestic	0 (0–5)	1 (0–4)
			leisure	2 (0–6)	2 (0–4)
			total	7 (0–21)	10 (0–18)
Rudd, 1997[93]	Barthel index	1 year	Median score (range)	18 (12–20)	18 (3–20)
	5 m walk			10 (6–40)	9 (6–70)
	Motricity index			91 (36–100)	12 (0–36)
	Rivermead			25 (15–45)	25 (15–45)
	Frenchay aphasia			25 (0–30)	26 (1–30)
Rawl, 1922[95]	Fundamental Independence Measure	Discharge	Mean ± SD score	81.5 ± 14.8	82.6 ± 13.0
		4 months		100.9 ± 13.7	100.2 ± 15.0
Richards, 1998[96]	Barthel index	3 months	Median (IQR) total score	16 (14–17)	16 (14–17)
			Change in mean score ± SD:		
			baseline to 4 weeks	1.5 ± 2.93	1.0 ± 2.82
			baseline to 3 months	1.7 ± 2.68	1.9 ± 3.22

continued

TABLE 59 contd *Physical function*

Study	Measure	When measured	How reported	Subjects	Controls
Stewart, 1998[99]	Independent in PADL	Baseline 3 months	Proportion	22/41 36/41	24/40 32/40
	Independent in IADL	Baseline 3 months	Proportion	2/41 16/41	3/40 12/40
	Independent Barthel index	3 months	Proportion	28/41	25/41
	Motor capacity: arm leg coordination mobility balance total		Median (IQR)	 56 (–) 36 (35–36) 11 (9–12) 27 (26–27) 18 (16–20) 146 (141–150)	 55 (51–57) 36 (35–36) 10 (8–11) 17 (16–19) 145 (134–148)
	Able to walk 10 m without aid/with aid/ unable	3 months	Proportions	34/5/1	38/3/0
		3 months	Adjusted ORs (logistic regression) for: independence in EADL independence in Barthel high motor capacity good manual dexterity walking without aid	OR for rehabilitation at home 1.55 1.18 1.09 1.13 1.13	95% CI: 0.60 to 4.01 0.56 to 2.48 0.41 to 2.84 0.56 to 2.28 0.56 to 2.26

PFS, TBA

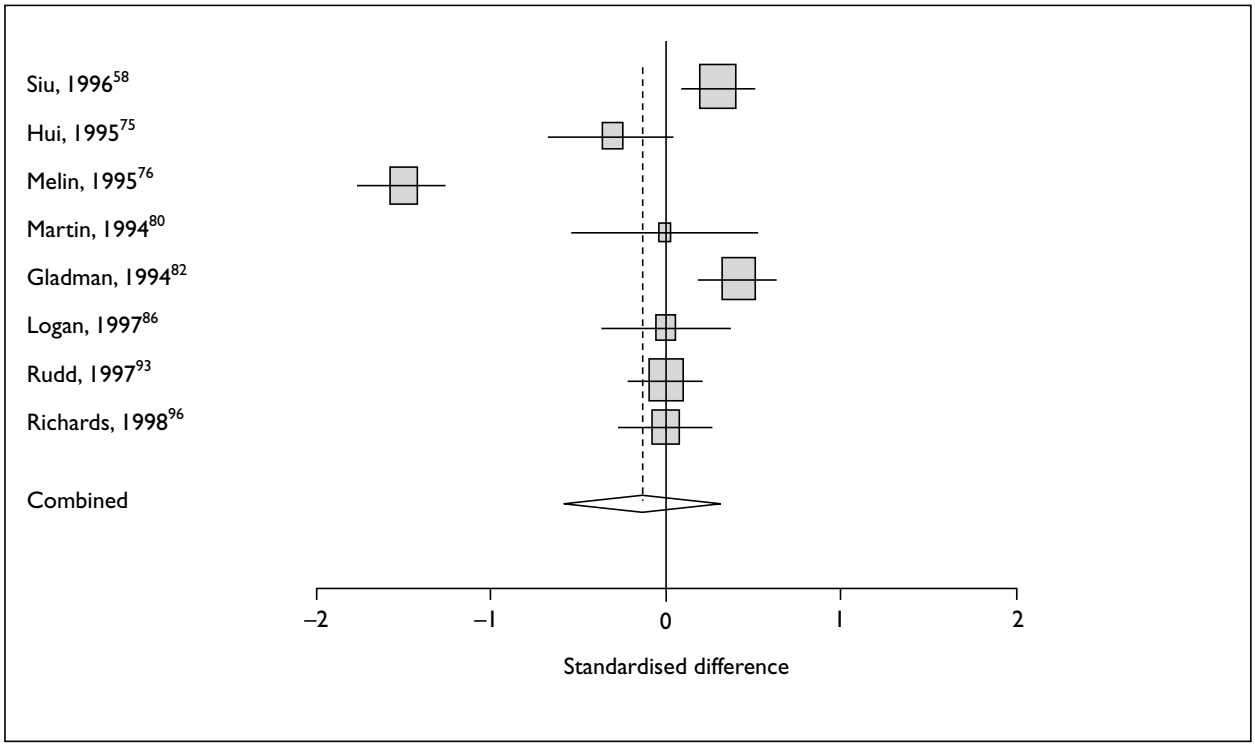

FIGURE 54 *Discharge support arrangements: absolute change in physical function*

TABLE 60 *Mental function (depression, anxiety and cognitive function)*

Study	Measure	How reported	When measured	Subjects	Controls
Beckie, 1989[68]	STAI	Mean (SD) anxiety score	6 weeks	29.78 (7.72)	43.22 (11.52)
Townsend, 1988[69]	10-item MTS	Change in MTS	Baseline, 3 months	+0.3	+0.3
Mor, 1983[71]	10-item MTS Zung depression index	Descriptive Descriptive	Discharge, 1 year Discharge, 1 year	No change No change	No change No change
Siu, 1996[58]	SF-36 at follow-up only (not change in scores)	Estimated effects (differences in adjusted means) for SF-36 scores Role functioning (emotional) Mental health index	At discharge, 60 days postrandomisation	Adjusted means: 85.34 70.84 Difference: 2.90 –3.78	 82.43 74.62 95% CI: –6.50 to 12.31 –9.89 to 2.33
Melin, 1995[76]	MMSE	Mean score (SE) MMSE	Baseline 6 months Difference	22.7 (0.4) 24.1 (0.5) 1.4 (0.4)	22.3 (0.5) 23.9 (0.6) 1.7 (0.5)
Martin, 1994[80]	10-item MTS	Median (IQR) score	6 weeks 12 weeks	8.0 (5–10) 9.0 (7–10)	8.0 (5–10) 9.0 (5–10)
Williams, 1992[84]	Questionnaire	Mean score Mean deterioration in score	Baseline 12 months	3.1 0.6	3.2 0.7
Dunn, 1994[88]	10-item MTS	Mean at discharge Mean at 28 days	Discharge 28 days	8.7 9.0	8.7 8.9
Rudd, 1997[93]	MMSE HADS Anxiety Depression	1 year	Median (range) Normal Borderline Abnormal Normal Borderline Abnormal	27 (8–30) 79 (81%) 12 (12%) 7 (7%) 59 (60%) 19 (19%) 21 (21%)	27 (5–30) 79 (69%) 16 (14%) 20 (17%) 70 (61%) 20 (18%) 24 (21%)
Rawl, 1922[95]	STAI – state STAI – trait	Mean (SD) score	Discharge 30 days 4 months Discharge	29.9 (12.7) 27.5 (8.3) 29.0 (9.9) 30.9 (10.6)	29.8 (10.5) – 44.7 (15.3) 30.1 (8.7)

HADS, Hospital Anxiety and Depression Scale; MTS, Mental Test Score; STAI, State–Trait Anxiety Inventory

TABLE 61 *Morale, health status and social interaction*

Study	Measure	How reported	When measured	Subjects	Controls
Townsend, 1988[69]	PGCMS	Change in morale score	Baseline and 3 months	–0.2	+0.1
Mor, 1983[71]	PGCMS	Descriptive	Discharge and 1 year	No change	No change
Wong, 1990[72]	Subjective psychosocial capability index	Comparison between groups 1 and 3	Baseline and 6 months	Mann–Whitney: $p = 0.67$	See subjects column
	Perceived preparedness for discharge			$p < 0.01$	
	Patient compliance scale, compliant behaviour			$p = 0.38$	
	Exercise compliance			$p < 0.05$	
	Subjective psychosocial capability index	Comparison between groups 2 and 3		Mann–Whitney: $p = 0.67$	
	Perceived preparedness for discharge			$p < 0.01$	
	Patient compliance scale, compliant behaviour			$p = 0.38$	
	Exercise compliance			$p < 0.05$	
Weinberger, 1996[73]	SF-36	Descriptive (all subscales)	Baseline and 6 months	No difference	No difference

continued

TABLE 61 contd *Morale, health status and social interaction*

Study	Measure	How reported	When measured	Subjects	Controls
Siu, 1996[58]	SF-36 at follow-up	SF-36 dimension (sample size):	60 days		
		physical function (293)	Mean (adjusted) Mean difference (95% CI)	40.3 40.13 (–6.08 to 6.33)	40.21
		role functioning, physical (59)	Mean (adjusted) Mean difference (95% CI)	68.83 1.83 (–8.00 to 11.66)	67.00
		pain (291)	Mean (adjusted) Mean difference (95% CI)	68.84 1.10 (–8.26 to 6.07)	69.94
		role functioning, emotional (218)	Mean (adjusted) Mean difference (95% CI)	5.34 2.90 (–6.50 to 12.31)	82.43
		mental health index (53)	Mean (adjusted) Mean difference (95% CI)	70.84 –3.78 (–9.89 to 2.33)	74.62
		energy/fatigue (117)	Mean (adjusted) Mean difference (95% CI)	51.27 –1.10 (–10.23 to 8.03)	52.37
		general health (114)	Mean (adjusted) Mean difference (95% CI)	58.05 1.95 (–6.40 to 10.30)	56.10
		role functioning, emotional (218)	Mean (adjusted) Mean difference (95% CI)	85.34 2.90 (–6.50 to 12.31)	82.43
		mental health index (53)	Mean (adjusted) Mean difference (95% CI)	70.84 –3.78 (–9.89 to 2.33)	74.62
Donald, 1995[74]	Morale score (PGCMS)	Mean	Baseline 4 weeks 12 weeks 26 weeks	12.1 11.9 12.0 12.1	11.7 11.1 11.4 12.4
Melin, 1995[76]	Self-reported: social activities	Mean (SE)	Baseline 6 months Difference	6.3 (0.6) 13.5 (0.7) 6.7 (0.8)	5.7 (0.7) 12.6 (0.9) 7.1 (0.8)
	social contacts	Mean (SE)	Baseline 6 months Difference	5.7 (0.4) 6.9 (0.5) 1.3 (0.5)	6.8 (0.6) 7.8 (0.7) 1.1 (0.7)
Gladman, 1993[82]	Nottingham Health Profile	Median score (IQR):			
		energy	6 months	24 (0–63)	24 (0–61)
		emotions	6 months	10 (0–41)	14 (0–44)
		sleep	6 months	16 (0–50)	13 (0–35)
		isolation	6 months	19 (0–23)	20 (0–42)
		pain	6 months	11 (0–30)	16 (0–23)
		physical mobility	6 months	36 (15–38)	33 (11–15)
Logan, 1997[86]	General Health Questionnaire	Median score (range)	6 months	2 (0–17)	3.5 (0–18)

continued

TABLE 61 contd *Morale, health status and social interaction*

Study	Measure	How reported	When measured	Subjects	Controls
Rodgers, 1997[90]	Dartmouth Coop General Health Scale	Median (range):	3 months		
		physical fitness		5 (3–5)	5 (1–5)
		feelings		2 (1–5)	2 (1–5)
		daily activities		3 (1–5)	3 (1–5)
		social activities		4 (1–5)	3 (1–5)
		pain		3 (1–5)	3 (1–5)
		change in health		2 (1–5)	2 (1–5)
		overall health		3 (2–5)	3 (1–5)
		social support		1 (1–5)	1 (1–4]
		QoL		3 (1–5)	2 (1–5)
Rudd, 1997[93]	Nottingham Health Profile	Median total score (range)	1 year	13 (0–42)	12 (0–36)
Richards, 1998[96]	EQ-5D	Change between mean scores (95% CI)	4 weeks	0.00 (0.09 to 0.10)	
			3 months	–0.04 (–0.13 to 0.06)	
		Thermometer	4 weeks	–1.9 (–7.9 to 4.1)	
			3 months	–4.6 (–11.0 to 2.0)	
	Dartmouth Coop/World Organisation of Family Doctors (WONCA) charts	Differences (95% CI) between mean scores after adjustment for baseline:			
		physical fitness	4 weeks	–0.02 (–0.20 to 0.17)	
		feelings	4 weeks	0.25 (–0.09 to 0.59)	
		daily activities	4 weeks	0.51 (0.13 to 0.89)	
		social activities	4 weeks	0.10 (–0.35 to 0.54)	
		change in health	4 weeks	0.08 (–0.24 to 0.41)	
		overall health	4 weeks	0.14 (–0.12 to 0.40)	
		physical fitness	3 months	–0.05 (–0.28 to 0.19)	
		feelings	3 months	–0.09 (–0.50 to 0.32)	
		daily activities	3 months	–0.04 (–0.47 to 0.38)	
		social activities	3 months	0.07 (–0.38 to 0.52)	
		change in health	3 months	–0.01 (–0.34 to 0.31)	
		overall health	3 months	0.10 (–0.21 to 0.42)	
Phillips, 1993[98]	QoL index	Descriptive	2 weeks	No difference	No difference
Stewart, 1998[99]	Sickness Impact Profile	Median score (IQR)	3 months		
		Overall		14.6 (19.3–19.6)	16.6 (11.1–25.3)
		Physical:		15.0 (9.5–21.4)	14.9 (5.5–25.1)
		ambulation		24.2 (12.3–34.2)	25.1 (10.6–37.4)
		mobility		16.3 (3.8–33.1)	22.4 (0.0–39.1)
		body care and movement		10.3 (4.9–21.6)	9.6 (2.1–16.9)
		Psychosocial:		10.0 (6.1–15.6)	16.6 (8.7–29.1)
		social interaction		10.7 (3.6–18.8)	15.0 (8.4–26.1)
		alertness behaviour		8.8 (0.0–19.8)	9.7 (0.0–35.5)
		emotional behaviour		0.0 (0.0–19.7)	17.6 (0.0–31.3)
		communication		9.7 (0.0–21.5)	16.0 (9.2–30.3)
		Independent categories:			
		sleep and rest		11.7 (0.0–26.1)	22.0 (11.6–33.7)
		eating		5.2 (0.0–11.3)	5.2 (0.0–11.3)
		work		0.0 (0.0–0.0)	0.0 (0.0–0.0)
		home management		32.8 (14.7–46.6)	28.4 (9.3–0.7)
		recreation and pastimes		29.8 (10.2–43.7)	28.4 (10.2–40.0)
	SF-36	Descriptive	1 and 3 months	No difference	No difference

EQ-5D, EuroQoL-5 dimensions; PGCMS, Philadelphia Geriatric Centre Morale Scale; SE, standard error

TABLE 62 *Patent satisfaction*

Study	Measure	When measured	Subjects	Controls	Significance
Siu, 1996[58]	Questions adapted from previous survey	At 30 days post-randomisation	Estimated effects, adjusted means: 69.81	Estimated effects, adjusted mean: 76.00	Differences in adjusted means (95% CI): –6.19 (–11.40 to –0.98), $p = 0.02$
Weinberger, 1996[73]	Patient satisfaction questionnaire	180 days	Mean ± SD: 3.2 ± 0.7	Mean ± SD: 3.2 ± 0.7	Subjects significantly more satisfied, $p < 0.001$
Rudd, 1997[93]	Satisfied with:				χ^2:
	hospital care		78/136	59/126	0.032
	therapy provision		56/136	46/126	0.29
	community support		44/136	39/126	0.44
	general		58/136	43/126	0.14
Phillips, 1993[98]	Satisfaction with care on questionnaire devised by authors	2 weeks	Covariates:	*F*:	*p*:
			age	7.502	0.008
			nurse involvement	11.598	0.001
			both	9.828	0.003
Richards, 1998[96]	Satisfaction with:	4 weeks	%:	%:	Difference (95% CI), *p*:
	quality of service		50.7	44.6	6.1 (–8.6 to 20.8), 0.49
	received needed service		63.0	60.0	3.0 (–11.5 to 17.4), 0.81
	content with care		69.6	56.9	12.7 (–1.6 to 27.0), 0.12
	received all help		83.6	75.4	8.4 (–3.7 to 20.6), 0.15
	discussions with staff		47.4	27.7	19.7 (5.9 to 33.5), 0.024
	involved in decisions		79.4	71.7	7.7 (–5.7 to 21.1), 0.41
	information about illness		76.7	80.0	–3.3 (–15.7 to 9.2), 0.75
	information on treatment		77.0	80.7	–3.2 (–11.2 to 17.8), 0.77
	privacy		84.7	88.1	–3.4 (–13.7 to 6.9), 0.88
	practical support		87.0	93.2	–6.2 (–14.8 to 2.4), 0.73
	emotional support		93.9	96.6	–2.7 (–8.9 to 3.5), 0.92
Nielsen, 1972[116]	Contentment index	12 months	0.5	–0.06	Difference 0.56, $t = 1.93$, $p < 0.1$
	Observer rating		1.25	0.23	Difference 1.02, $t = 2.559$, $p < 0.02$

TABLE 63 *Use of health and social care services*

Study	Services considered and how measured	Use of services by study group	Use of services by controls	Significance, how results calculated
Fretwell, 1990[57]	Calls to professionals:	Mean ± SD:	Mean ± SD:	
	cardiac nurse	0.46 ± 0.80	2.49 ± 1.41	t = 7.61, df = 72, p = 0.000
	family physicians	0.08 ± 0.28	0.76 ± 0.80	t = 4.88, df = 72, p = 0.000
	cardiovascular surgeon	0.03 ± 0.16	0.52 ± 0.87	t = 3.34, df = 72, p = 0.002
Townsend, 1988[69]	Average use 3 months postdischarge:			All ORs:
	visits by district nurse	15.7	19.0	1.21
	visits by home care	6.7	9.9	1.48
	meals supplied by meals on wheels	24.8	22.3	0.90
	No. (%) visited by GP	309 (67)	309 (71)	1.06
	No. (%) visited by SW	127 (27)	121 (28)	1.01
	No. (%) visited by HV	45 (10)	45 (10)	1.06
	No. (%) visited by VW	43 (3)	17 (4)	1.26
Mor, 1983[71]	Average monthly utilisation rates of services (c.v.)			
	shopping (days)	NE 12.135 (3.06) EX 1.488 (5.10)	1.667 (5.16)	0.082
	visiting nurse (visits)	NE 19.946 (2.50) EX 10.561 (3.52)	8.133 (1.83)	0.398
	therapies (visits)	NE 29.216 EX 10.475 (2.33)	8.467 (1.95)	0.069
	personal care (hours)	NE 25.378 (2.91) EX 16.475 (4.17)	22.500 (3.39)	0.92
	transportation (trips)	NE 11.472 (2.89) EX 17.049 (2.55)	9.833 (2.89)	0.84
	home maker (hours)	NE 7.919 (2.13) EX 7.268 (2.63)	11.733 (1.98)	0.73
Donald, 1995[74]	Total hospital and nursing home care	820 days (16% of days alive)	1414 (26% of days alive)	Mann–Whitney, NS
Hansen, 1995[59]	% (*n*/sample) allocated social care at 24 weeks postdischarge:			χ^2, p < 0.05 (row 1)
	home help	98 (73/74)	77 (54/70)	
	home nurse	55 (42/74)	56 (39/70)	
	day care home	34 (25/74)	29 (20/70)	
	meals on wheels	38 (28/74)	33 (23/70)	
Melin, 1995[76]	Use of inpatient care, mean number of days during study period	Level of care (mean ± SD): short term 24 ± 32 long term 16 ± 42 rehabilitation 2 ± 17	Level of care (mean ± SD): short term 25 ± 27 long term 49 ± 62 rehabilitation 3 ± 16	p: short term 0.5 long term < 0.001 rehabilitation 0.88
	Utilisation of inpatient and outpatient care as number of days during 6 months	Level of care (median ± SD): short term 13.5 ± 32 long term 0 ± 42 rehabilitation 0 ± 17	Level of care (median ± SD): short term 16 ± 27 long term 15 ± 62 rehabilitation 0 ± 16	p: NS < 0.001 not stated

continued

TABLE 63 contd *Use of health and social care services*

Study	Services considered and how measured	Use of services by study group	Use of services by controls	Significance, how results calculated
Martin, 1994[80]	At 6 weeks, *n* (%):	*n* = 24:	*n* = 10:	df = –1, $p < 0.05$
	home care	2 (8.0)	8 (80)	
	meals on wheels	16 (64)	7 (70)	
	district nurse	6 (25)	5 (50)	
	day centre	6 (25)	5 (50)	
	At 12 weeks, *n* (%):	*n* = 21:	*n* = 11:	
	home care	18 (86)	9 (81)	
	meals on wheels	15 (71)	7 (63)	
	district nurse	11 (52)	3 (27)	
	day centre	5 (50)	6 (54)	
Fitzgerald, 1994[81]	Utilisation of OPD:			
	total visits kept	0.99 ± 0.83	1.04 ± 0.99	$p = 0.50$
	emergency department visits	0.17 ± 0.22	0.17 ± 0.25	$p = 0.56$
	non-VAMC office visits	0.01 ± 0.06	0.02 ± 0.08	$p = 0.18$ (0.15)
	emergency department visits	0.01 ± 0.08	0.006 ± 0.03	
	total unmet need	0.19 ± 0.73	0.26 ± 0.97	$p = 0.31$
	Total service needs, being provided	2.42 ± 1.74	2.30 ± 1.70	$p = 0.56$
Gladman, 1993[82]	Rehabilitation visits in 6 months	Median 7	Median 16	Not stated
	Total attendances and visits in 6 months	1615	1626	Not stated
Evans, 1993[50]	Proportion in receipt of social services	97%	30%	$p < 0.001$
	Days in a nursing home	25.5 (7.8)	39.9 (11.2)	$p < 0.001$
Williams, 1992[84]	Number of services used	Descriptive	No difference between groups	
Hansen, 1992[85]	Follow-up visits:			
	nurse and GP	108 (66%)	Not stated	Not stated
	nurse	43 (26%)	Not stated	Not stated
	GP	12 (8%)	Not stated	Not stated
Logan, 1997[86]	Comparison of therapy given to the two groups:			
	number of visits (mean)	6	2.5	$p < 0.01$
	minutes of therapy median (mean ± SD, range)	240 (222 ± 136, 60–600)	85 (55 ± 83, 0–400)	$p < 0.01$
	minutes of patient related activity median (mean: range: SD)	66 (65 ± 32, 10–210)	33 (30 ± 31, 0–160)	NS
	pieces of equipment per patient median (range)	3 (0–10)	2 (0–6)	$p < 0.01$

continued

TABLE 63 contd *Use of health and social care services*

Study	Services considered and how measured	Use of services by study group	Use of services by controls	Significance, how results calculated
Dunn, 1994[88]	Use of follow-up services (*n*):			
	requested	73	78	Not different
	requested and received	58	57	
	Unplanned GP visits	51	61	Difference = 8%, t = 1.1, p = 0.27
	Aids and appliances:			
	requested	44	42	Not different
	requested and received	43	42	
	Adaptions:			
	requested	14	22	Not different
	requested and received	12	19	
Rodgers, 1997[90]	Number of hours [visits] over 6 months by:	Total, median (range):	Total, median (range):	
	physiotherapist	488, 4 (1–9)	487, 4 (2–15)	NS
	occupational therapist	546, 8 (4–14)	279, 4 (0–8)	$p < 0.001$
	SALT	201, 1 (0–3)	125, 0 (0–2)	NS
	district nurse	103, 2 (0–3)	134, 0 (0–1)	$p < 0.001$
	SW	114, 2 (0–4)	60, 0 (0–2)	$p < 0.004$
	home care	5015, 0 (0–114)	1580, 0 (0–41)	$p < 0.04$
	[day hospital]	107, 0 (0–26)	378, 0 (0–91)	NS
	[occupational therapist care]	58, 2 (0–8)	61, 1 (0–2)	NS
	[GP care]	128, 2 (0–13)	94, 1 (0–4)	NS
Rudd, 1997[93]	No. (%) having inpatient physiotherapy:	121 (80)	111 (77)	Method p (95% CI for difference between groups):
	mean units (SD)	10.8 (14.3)	17.3 (23.8)	χ^2, 0.52 (–16 to 12)
	median (range)	6 (1–107)	10 (1–1)	Mann–Whitney,
	total inpatient units	1309	1923	0.01 (–4 to 0)
	No. (%) having outpatient physiotherapy:	114 (75)	28 (19)	χ^2, 0.001 (45 to 67)
	mean units (SD)	21 (24)	18 (18)	Mann–Whitney,
	median (range)	11 (1–140)	10 (1–74)	0.998 (–4 to 5)
	total outpatient units	2387	496	Mann–Whitney,
	median total therapy (range)	14 (1–156)	12 (1–1)	0.07 (0 to 6)
	No. (%) having inpatient occupational therapy:	97 (64)	104 (72)	χ^2, 0.14 (–19 to 3)
	mean units (SD)	9 (10)	22 (21)	Mann–Whitney, 0.0001
	median (range)	8 (1–74)	17 (1–105)	(–12 to –5)
	total inpatient units	916	2292	χ^2, 0.001 (61 to 84)
	No. (%) having outpatient occupational therapy:	125 (83)	15 (10)	Mann–Whitney, 0.19 (–18 to 2)
	mean units (SD)	22 (24)	33 (35)	Mann–Whitney, 0.43
	median (range)	12 (2–156)	15 (3–119)	(–2 to 5)
	total outpatient units	2740	498	
	median total therapy (range)	17 (2–156)	18 (1–223)	
	No. (%) having inpatient speech therapy:	42 (35)	35 (31)	χ^2, 0.464 (–8 to 16)
	mean units (SD)	8 (8)	14 (13)	Mann–Whitney, 0.009
	median (range)	5 (1–47)	9 (1–64)	(–7 to 1)
	total inpatient units	319	491	
	No. (%) having outpatient speech therapy:	64 (54)	8 (7)	χ^2, 0001 (35 to 59)
	mean units (SD)	21 (22)	17 (29)	Mann–Whitney, 0.29
	median (range)	13 (1–90)	6 (2–89)	(–3 to 15)
	total outpatient units	1327	139	Mann–Whitney, 0.11
	median total therapy (range)	15 (1–100)	9 (1–89)	(–1 to 9)
	No. (%) using home help	46 (34)	47 (37)	χ^2, 0.45 (–15 to 8)
	No. (%) using meals on wheels	17 (12)	14 (12)	χ^2, 0.79 (–7 to 9)

continued

TABLE 63 contd *Use of health and social care services*

Study	Services considered and how measured	Use of services by study group	Use of services by controls	Significance, how results calculated
Stewart, 1998[99]	Total hospital days	1452	1766	χ^2, p = 0.001
	Emergency service attendances	236	314	χ^2, p = 0.001

c.v., coefficient of variation; df, degrees of freedom; EG, experimental group; HV, health visitor; NE, nurse experimental; OPD, outpatient department; SALT, speech and language therapist; SW, social worker; VW, voluntary worker; VAMC, Veterans Administration Medical Centre

TABLE 64 *Costs to health service providers*

Study	How costs calculated to health service	Costs	Subjects	Controls	Significance
Townsend, 1988[69]	Calculated resource implications	Reduction in number of days spent in hospital x average total cost per inpatient day, less cost of care attendant service	Net saving of £221,000	–	Not stated
Hui, 1995[75]	HK $: acute bed at 2105/day rehabilitation bed at 910/day Day hospital at 677/attendance Outpatient clinics at 313/attendance	See heading to right: 3 months 6 months	Inpatient stay + day hospital attendances + outpatient attendances + readmissions (HK $): Mean ± SD 44,960 ± 17,954 Mean ± SD 58,168 ± 25,898	Inpatient stay + outpatient attendances + readmissions (HK $): Mean ± SD 891 ± 28,835 Mean ± SD 51,809 ± 30,480	 $p = 0.39$ $p = 0.29$
Melin, 1995[76]	Thousands of Swedish crowns (1989 prices) over 6 months	Inpatient care: short term long term Rehabilitation Outpatients care Cost of intervention team Total cost	Total cost/cost per patient: 6622/60 2521/23 298/3 3884/35 449/5 14,260/130	 4478/61 130/70 323/4 1685/23 NA 11,859/162	p: 0.5 < 0.001 0.87 0.001 0.01 0.02
Martin, 1994[80]	Calculated using 1990 costing		150 days	250 days	
Fitzgerald, 1994[81]	33% of the nurse researcher's time and 66% of the case manager's time was spent on intervention after a 2-week observational study	Intervention costs only	$51,625 p.a.	–	–
Rubin, 1992[63]	In-hospital and postdischarge costs	Total inpatient ($) Total outpatient ($) Total home health ($) Total physician and other ($) Total skilled nursing facility and hospice ($) Total charges ($) Median Range	459,666 108,186 99,125 138,244 7508 812,729 5899 34–47, 467	6701 128,570 57,838 156,188 1668 1,014,795 4978 119–67, 946	Wilcoxon, $p = 0.95$
Rodgers, 1997[90]	1995–1996 UK prices over 6 months	Inpatient care Rehabilitation/ additional service Other service Total costs	– – – –	54 1279 748 7480	–

continued

TABLE 64 contd *Costs to health service providers*

Study	How costs calculated to health service	Costs	Subjects	Controls	Significance
Stewart, 1998[99]	Costs of admissions calculated from hospital costing system; costs of intervention calculated from costs of staff time, infrastructure, etc.; community services costs derived from random sample of patients using standard fees for items of care. Calculated over 6 months	Hospital care, cost per patient (95% CI)	$2190 (1740 to 2630)	$2680 (2030 to 3320)	NS
		Cost of intervention, cost per patient	$190		
		Community care, cost per patient (95% CI)	$610 (0 to 690)	$630 (560 to 700)	NS

HK, Hong Kong; p.a., per annum

TABLE 65 *Destinational outcome*

Study	Measure of destination outcome used	When assessed	Results		Significance, method, results
			Subjects ***n*** **(%)**	**Controls** ***n*** **(%)**	
Mor, 1983[71]	Long-term care, institutional rates per day of study	During study period	Group mean (coefficient): NE 0.025 (2.55) EG 0.018 (5.39)	 0.009 (2.55)	$F = 0.504$, $p = 0.58$
Siu, 1996[58]	Admission to long-term care	60 days	7/178 (3.9%)	6/176 (3.4%)	Not stated
Donald, 1995[74]	Total No. No. living at home No. living in institution No. in hospital No. dead	6 months	30 19 2 0 9	30 19 5 0 5	
Hansen, 1995[59]	Admission to nursing home	At 24 weeks	7/96 (7%)	8/97 (8%)	χ^2, NS
Melin, 1995[76]	Living at home	6 months	87/150	46/99	χ^2, $p = 0.03$
Martin, 1994[80]	Outcomes of destination: home acute hospital continuing care residential care deceased	Assessed after study period of 1 year	*n*: 17 3 0 2 7	*n*: 10 0 2 8 5	Not stated
Fitzgerald, 1994[81]	No. of admissions to nursing home per patient per month	1 year	0.006 ± 0.032	0.005 ± 0.031	$p = 0.67$
	No. of days in a nursing home per patient per month		0.64 ± 3.42	0.22 ± 1.27	$p = 0.04$
Gladman, 1993[82]	Number (%): home in hospital residential/ nursing home death	6 months	 134 (82) 3 (2) 9 (6) 16 (10)	 148 (90) 2 (1) 9 (11) 10 (13)	Not stated
Hansen, 1992[85]	Admission to nursing home	12 months	16/199	29/205	χ^2, $p < 0.05$
Dunn, 1994[88]	Number living alone Location of patients	At discharge At 6 months: at home nursing home private residential home Local authority elderly persons home hospital dead	63/102 69 8 1 4 5 15	61/102 61 7 3 3 3 25	
Rodgers, 1997[90]	Discharged to residential or nursing home care	At discharge	3 (7%)	5 (12%)	

continued

TABLE 65 contd *Destinational outcome*

Study	Measure of destination outcome used	When assessed	Results		Significance, method, results
			Subjects *n* (%)	Controls *n* (%)	
Rudd, 1997[93]	No. (%) living:	1 year			χ^2, p = 0.27
	alone		37 (27)	31 (25)	
	with others		84 (62)	70 (56)	
	sheltered		6 (4)	8 (6)	
	institution		8 (6)	15 (12)	
	hospital		0	2 (2)	
	Total		135	126	
Nielsen, 1972[116]	Admission to long-term care	12 months	4	14	χ^2 = 25.49, p > 0.025
	Days in long-term care	12 months	8.34	0.12	Difference = 44.78, t = 2.71, p = 0.01

EG, experimental group; NE, nurse experimental

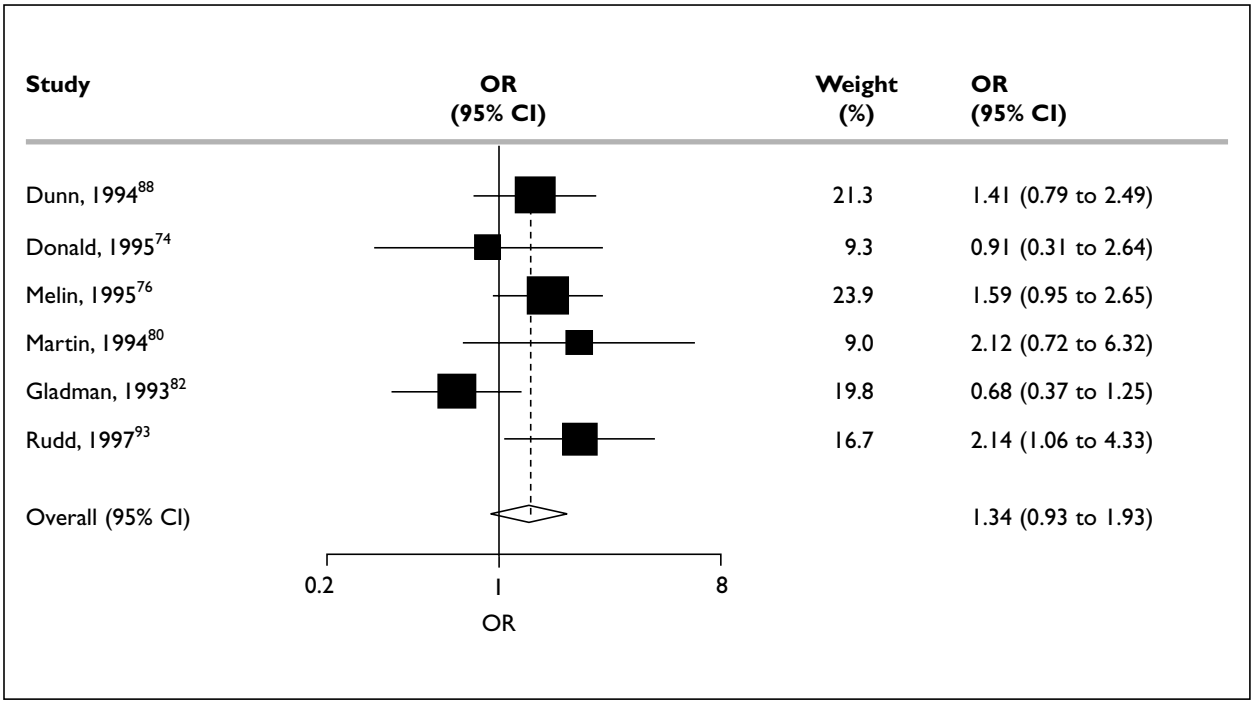

FIGURE 55 *Discharge support: destinational outcome at follow-up*

Chapter 7

Education interventions

Introduction

This chapter addresses the effectiveness of education interventions in improving aspects of the discharge of elderly people from inpatient hospital care. Education interventions are defined as interventions targeted at patients undergoing discharge from hospital that are intended to improve their ability to manage aspects of their care after discharge through the provision of information or more active education. Studies were included in the review if education was described as the principal method used to improve discharge. We included studies concerned with education about medication, although studies that were solely concerned with improving adherence to medication and not other outcomes such as readmission rates were not included. The general inclusion and exclusion criteria (see page 13) were also followed.

A number of reviews of education interventions for a variety of clinical conditions have been undertaken, and the findings suggest that education can improve outcomes. However, the effect of education interventions appears to be limited, particularly if education consists of the provision of information only. The supplementation of information with activities that assist patients in changing their behaviour may have more effect. We have not found a review of education to improve the discharge of elderly patients from hospital.

Brown[139] reviewed trials of education interventions and the outcome of adults with diabetes. Education improved self-care behaviour, compliance with dietary advice and glycosylated haemoglobin levels. In a review of 19 controlled studies, Superio-Cabuslay and co-workers[140] reported that, in patients with osteoarthritis or rheumatoid arthritis, education can reduce pain and disability. However, the effect was small and the available evidence inadequate. In another review, relatively intensive education of adults with coronary heart disease was reported as having some effect on blood pressure control and mortality, but no effect on morbidity or return to work.[146] In contrast, in a review of limited education for patients with asthma, there was no effect on health outcomes.[142] Patient education does not appear to be effective in reducing pain due to mechanical neck disorders.[143] The effects of education and training of the carers of patients with Alzheimer's dementia is unclear.[144] One approach to increasing the impact of education has been the addition of psychosocial support to the education intervention (psychoeducation). In a review of psychoeducation in the care of people with hypertension, this combined intervention improved blood pressure control.[145]

Pharmacists may have a role in patient education. A review of trials of the expanded role of the pharmacist indicated that pharmacists consulting with patients could reduce subsequent use of health services, including hospital admissions.[146] The effect of interventions to increase adherence with medication has been investigated in a recent review.[147] Complex interventions, such as combinations of information, counselling, convenient care, reminders and additional supervision, tended to be more effective than single interventions used alone.

Method

Search strategy

The details of the search are described on page 7.

Objectives of this review

To determine if patient education interventions improve the outcome and cost-effectiveness of the discharge of elderly people from hospital.

Hypotheses

Patient education interventions:

- reduce length of stay and readmission rates
- improve health outcomes
- improve patient and carer satisfaction
- are cost-effective.

Types of participants

This review includes evaluations of education interventions targeted at patients aged 65 years and over experiencing discharge from inpatient hospital care, and/or their carers. Discharge from day hospitals, outpatient settings, nursing homes and other settings not providing acute or high technology care was excluded.

Types of interventions
We included studies that tested the effect of interventions described as principally educational. The interventions may be limited to education, or supplemented by other activities such as home visits or telephone calls after discharge.

Study designs
We included RCTs only. The methods for assessing studies for relevance and quality are described on page 9.

Data extraction
For those studies included in the review, data were extracted independently by two reviewers. The reviewers were blind to the study authors. The procedures followed for data extraction are described on page 10.

Results from this review

Characteristics of included studies
Interventions
Fourteen articles were identified reporting 11 different studies. The interventions investigated in the identified studies fell into two broad categories (*Table 66*). These were:

- education given specifically to improve self-medication after discharge.[107–109,111]
- studies of education supplemented by multiple activities to improve patients' self-care (complex interventions).[57,72,99,104,105,110,112]

Education given specifically to improve self-medication after discharge
The complexity of the intervention evaluated in each study varied. In one study,[58] patients being discharged were counselled by a pharmacist about their medication, the importance of compliance being stressed. In two studies,[107,109] patients received training in medication compliance during their inpatient care, but did not receive additional interventions after discharge. Other studies included a mix of education and other activities. In the study by Lipton and Bird,[111] pharmacists provided education and consulted with both patients and their physicians, and also held consultations with patients for up to 3 months after discharge.

Education supplemented by multiple activities to improve patients' self-care
Data from study by Rich and co-workers[105] are reported in two other papers,[103,106] and data about a subgroup of patients with congestive heart failure in the study by Stewart and co-workers[99] are reported in two other papers.[100,101] In this group of studies, education was used to improve patients' understanding of their illness and its management but, in addition, various forms of postdischarge support were offered, including visits by nurses and telephone calls. For example, in one study,[104] patients received intensive education about their illness (congestive heart failure) before discharge, combined with recommendations to aid compliance with medications, early discharge planning, and visits by a home care nurse after discharge to identify any new problems and reinforce the education already received. The intervention in the study by Rich and co-workers[105] was virtually identical. In another study,[110] particular attention was given to the patient's psychological adjustment to having cardiac surgery, in addition to education about the illness. After discharge, support was provided in weekly telephone calls in the first 4 weeks, and again at 6 and 8 weeks. Patients who had undergone coronary artery bypass graft surgery received four to six telephone calls in the first 6 weeks after discharge. The calls were made by a cardiac rehabilitation nurse specialist, and were intended to provide education and support. During the telephone calls, the patient's knowledge was assessed and information provided to improve knowledge. In the study by Stewart and co-workers,[99] patients received some counselling about their illness and medications before discharge, and 1 week after discharge were visited by a nurse and a pharmacist. Compliance with medication was assessed during the visit, with advice being given about improving compliance, if necessary. The nurse checked the patients' clinical condition and arranged review by the primary care physician if necessary. In another study,[72] patients undergoing total hip replacement received an educational pamphlet and watched a video tape. This education was supplemented by regular home visits by a community nurse. In the study by Cline and co-workers,[112] patients and their families received education from a nurse, supplemented by written materials about their medication.

In most studies involving face-to-face education of patients, education was delivered by a nurse.[99,104,105,110,112] Use of written materials was common,[72,104,105,112] and only one study employed video tape[72] and one a slide presentation.[110]

We did not find evaluations of education delivered before admission in order to reduce length of stay or improve postdischarge rehabilitation for patients experiencing planned admissions. Only one study[110] employed education as one element

TABLE 66 *Range of models of education intervention*

Study	Country	Model of care/compared with	Setting	Condition
Beckie, 1989[68]	Canada	Postdischarge follow-up, supportive/ educative telephone programme	Teaching hospital	Cardiac patients undergoing CABG
Wong, 1990[72]	Canada	Inpatient education with written materials and videotape, then community nurse follow-up at home/usual care	General hospital orthopaedic units	Hip arthroplasty
Pereles, 1996[107]	Canada	Self-medication programme/usual care	Geriatric units for short-term assessment and rehabilitation	All
Williford, 1995[108]	USA	Pharmacist counselling/no counselling	Large veteran tertiary hospital	Patients receiving acute care or rehabilitation
Rich, 1995[108]	USA	Multidisciplinary education about heart failure and treatment, diet, using written materials and personal consultations, review of medications, discharge planning with social services and postdischarge visits and telephone calls/usual care	Medical wards of university hospital	Heart failure
Lowe, 1995[109]	UK	Self-medication education programme for patients/usual care	DGH	Medical inpatients
Gilliss, 1993[110]	USA	Psychoeducation – in-hospital education for patients and partners on emotional reactions to surgery, including slide presentation and personal interview, and telephone coaching after discharge/usual care	Two hospitals with cardiac surgery	Undergoing cardiac surgery (CABG ± valve repair, valve replacement or repair; septal repair)
Rich, 1993[104]	USA	Multifaceted intervention with patient education, involving personal sessions with a nurse and written materials, medication review, early discharge planning and enhanced home follow-up/usual care by attending physician	Teaching hospital	Congestive heart failure
Lipton, 1994[111]	USA	Review by pharmacist of patient records, pharmacist consultation with physician and patient, plus follow-up consultations by telephone at 1 week, 2–4 weeks, and 2 and 3 months after discharge/ usual care	Non-teaching community hospital	Patients admitted with non-psychiatric illness
Stewart, 1998[99]	Australia	Home-based intervention – personal counselling by nurse before discharge on medications and signs of clinical deterioration; home visit at 1 week postdischarge by nurse and pharmacist to check medication use, advise care-giver, improve liaison with community services/usual care	440-bed hospital	All admissions to medical and surgical units
Cline, 1998[112]	Sweden	Education and information for patients with heart failure, delivered personally by nurse, plus written materials/ usual care	University hospital	Congestive cardiac failure

of a complex intervention to improve patients' emotional reactions to their illness and its management (psychoeducation). Psychoeducation has been investigated in other patient groups.[145] In a review of 191 randomised and non-randomised controlled studies of psychoeducation for adult surgical patients, the intervention was found to reduce the length of stay in hospital, pain and psychological distress.[148] We did not identify other studies of educational interventions to improve other aspects of patients' QoL after discharge. Furthermore, we did not identify RCTs of interventions specifically intended to educate carers of elderly people discharged from hospital.

Subjects

Three studies involved patients with congestive heart failure.[104,105,112] Two other studies included patients undergoing cardiac surgery,[68,110] four included a variety of patients with medical conditions admitted to hospital,[99,107,109,111] one included patients undergoing total hip replacement[72] and one included patients undergoing acute care or rehabilitation (*Table 67*).[108] The number of patients in each study group (experimental and control) exceeded 100 in only three studies (*Table 68*).[99,105,111] Five studies were undertaken in the USA, one in Australia, two in Canada, one in Sweden and one in the UK (see *Table 66*).

Age and sex

The lowest mean age of patients included in a study was 56 years (*Table 69*).[108] This study included patients with a wide age range, but since a proportion were over age 65, the study was included in the review. Similarly, in the study by Gilliss and co-workers,[110] the majority of patients were aged over 50, and 14% were aged 70 or over. In the other studies, the mean age of included patients was between 66 and 80 years. In most studies, more than 50% of patients were female. The exceptions were two studies[68,110] that were undertaken in veterans' hospitals (*Table 70*).

Quality of studies

The quality of the studies included was generally limited. In addition to small sample sizes, power calculations were often not reported. Authors failed to report whether they had collected data about outcomes blind to patients' study groups. In addition, the possibility of contamination between study groups was not always eliminated. For example, patients in the same hospital unit may have been able to exchange information or educational materials they had received from hospital staff, and staff who were delivering education to the intervention group may have participated in the care of patients in the control groups.

Interventions were usually well described, although several interventions were often used together and study designs did not permit conclusions to be drawn about the relative importance of particular components. For example, in the study by Rich and co-workers[105] the intervention consisted of education on heart failure, consultation with social care staff, education about diet from a dietician, review of medication by a geriatric cardiologist, and postdischarge support by home care services and telephone contact. In order to identify which of these components have most effect on particular outcomes, more complex designs than simple two-group RCTs are required.

Range of outcomes reported

Only a limited range of outcomes were reported, and no single study included a broad variety of outcomes (*Table 71*). Three studies assessed the impact of interventions on mortality. Five studies reported the number of in-hospital days due to readmissions or number of readmissions, four reported QoL and four reported compliance with medication. Several of the studies of medication compliance assessed patients' knowledge of their medication regimes, but only one other study investigated knowledge of the condition. The impact on carers was generally not investigated, although in one study data about the time devoted to caring were collected.[105] Five studies included some assessment of costs.[99,104,105,111,112] Most studies did not assess patient satisfaction, and no study investigated the impact of education on place of care at final follow-up.

The effects of education interventions

Mortality

No study of education to improve self-medication investigated the effect on mortality (*Table 72*). Only three studies of complex education-based interventions to improve self-care investigated impact on mortality.[99,105,112] In the study by Rich and co-workers,[105] a multidisciplinary programme about heart failure was undertaken. There was no significant difference in mortality rates between treatment and control groups. Likewise, no difference in mortality was reported by Cline and co-workers.[112] The findings of Stewart and co-workers[99] indicated an absolute risk reduction in mortality in the intervention group of 5%. In a subgroup analysis of this study including only patients with heart failure,[100] no difference in mortality was reported. However, this part of the study included a total of only 97 patients and may have been too small to detect a clinically significant difference.

TABLE 67 *Inclusion and exclusion criteria*

Study	Country	Inclusions	Exclusions
Beckie, 1989[68]	Canada	First time planned CABG, uncomplicated, no psychiatric complaints, able to speak English, telephone at home, intend to attend follow-up	Language, cognitive impairment, poor reading ability
Wong, 1990[72]	Canada	Post-hip replacement, English speaking, no severe post operative complications, satisfactory operation and hip mobility, satisfactory ambulation ability	Cognitive impairment, visual/hearing impairment, severe/disabling co-morbidity
Pereles, 1996[107]	Canada	Intended return to community living, patient responsible for administration of drugs on discharge, mini mental state score ≥ 20, medically stable condition, able to give consent	–
Williford, 1995[108]	USA	Patients being discharged home on one or more drugs	Discharge to another healthcare facility (e.g. nursing home), severely hearing impaired or demented
Rich, 1995[105]	USA	Age ≥ 70 years, admitted to medical ward, screened positive for CHF (X-ray or signs and symptoms responding to treatment), presence of risk factors for readmission (past history, ≥ 4 admissions in past 5 years, heart failure due to myocardiol infarction or hypertension)	Residence outside the catchment area, discharge to long-term care facility, dementia or psychiatric illness, unlikely to survive for 3 months, medical discretion
Lowe, 1995[109]	UK	Consecutive admissions, taking one or more drugs, responsible for administering own drugs on discharge	Discharge to nursing home, dependent on another person for administering drugs, terminally ill
Gilliss, 1993[110]	USA	Age 25–75 years, conversant in English, available for telephone follow-up for 6 months, with a primary care-giver	Aneurysms, aortic arch repairs, chronic ventricular arrhythmia, implantable cardiovertor, idiopathic hypertrophic subaortic stenosis
Rich, 1993[104]	USA	Patients aged ≥ 70 years admitted to medical ward, radiographic evidence of CHF or typical symptoms and signs	Death in hospital, low risk of readmission, resident outside hospital catchment area, discharge to nursing home, non-cardiac illness likely to lead to readmission, cognitive impairment, discretion of clinicians. 142/240 alive at discharge were excluded
Lipton, 1994[111]	USA	Age ≥ 65 years, covered by Medicare, residence within 35 miles of the hospital, mentally competent, access to a telephone, prescription of three or more medications on discharge for a chronic condition	Discharge to nursing home or hospice
Stewart, 1998[99]	Australia	Discharged home, taking medication for a chronic condition	Terminal malignancy, home address outside catchment area
Cline, 1998[112]	Sweden	Target condition admissions	Alcohol or drug abuse, psychiatric disease, inability to understand questionnaires, other trials, discretion of treating physician

TABLE 68 *Numbers of participants*

Study	Number of patients assessed	Number of patients eligible for trial	Number of patients randomised	Sample size	
				Intervention	Control
Beckie, 1989[68]	74	74	74	37	37
Wong, 1990[72]	Not stated	Not stated	146	50 (group 1) 48 (group 2)	48
Pereles, 1996[107]	778	107	107	51	56
Williford, 1995[108]	Not stated	Not stated	71	36	35
Rich, 1995[105]	1306	282	282	142	140
Lowe, 1995[109]	Not stated	Not stated	88	45	46
Gilliss, 1993[110]		345	171	75	81
Rich, 1993[104]	261	188	98	63	35
Lipton, 1994[111]	Not stated	Not stated	706	350	356
Stewart, 1998[99]	4100	906	762	381	381
Cline, 1998[112]	Not stated	Not stated	206	80	110
Total	> 6519	> 1902	2711	1358	1325

TABLE 69 *Age of subjects (years)*

Study	Mean age (SD) or median [range, IQR]	
	Subjects	Controls
Beckie, 1989[68]	Age range 50–70 overall	
Wong, 1990[72]	63.3 (group 1) 71.7 (group 2)	64.8
Pereles, 1996[107]	80 (7)	80 (7)
Williford, 1995[108]	59.6 (13.2)	56.2 (13.2)
Rich, 1995[105]	80.1	78.4
Lowe, 1995[109]	77 (range 57–96)	79 (range 59–93)
Gilliss, 1993[110]	59.3 (range 25–75)	59.8 (range 25–75)
Rich, 1993[104]	80 (6.3)	77 (6.1)
Lipton, 1994[111]	74.6	74.4
Stewart, 1998[99]	66.0 (15.7)	65.3 (15.8)
Cline, 1998[112]	75.1 (5.1)	76.0 (5.3)

As all three education studies reported mortality at different time periods, no formal synthesis for this outcome was possible.

Hospital admission/readmission

Data about readmission was expressed either as the number of readmissions in intervention and control groups, or the total number of days in hospital due to readmissions, or both. Some studies also considered the frequency of re-admissions, since some patients may experience several readmissions in the follow-up period.

Of the six studies reporting information about readmission, two followed patients up for 90 days, two for 6 months, one for 12 months and one for 6 weeks after discharge.

No study investigated the impact of educational interventions on length of stay, although one study collected baseline data about length of stay.[111] One study of education to improve self-medication investigated the impact on readmissions,[111] and in a subsidiary analysis of the study by Rich and co-workers[105] patients received additional education about medications and were followed for 90 days after discharge.[103] Patients in the study by Lipton and Bird[111] were followed for 6 months. Neither study demonstrated an effect on readmissions of the interventions to improve self-medication.

Five studies of complex interventions to improve self-care investigated the effect on readmissions.[68,99,104,105,112] In all these studies the mean number of in-hospital days per patient due to readmissions was lower among patients who received the intervention, although in one study[112] the difference did not reach statistical significance. However, in this study, patients were followed up for 12 months, a longer period than in any of the other studies. The time to first readmission in this study was longer in the intervention group ($p < 0.05$).

Five of the trials reported results of readmission rates in a form that allowed the calculation of an

TABLE 70 *Gender of subjects*

Study		Intervention group (%)		Control group (%)	
		Men	Women	Men	Women
Beckie, 1989[68]		86.5	13.5	Overall	
Wong, 1990[72]	Group 1	48	52	39.6	60.4
	Group 2	27	73		
Pereles, 1996[107]		27	73	14	86
Rich, 1995[105]		32	68	59	41
Lowe, 1995[109]		14.3	85.7	15.2	84.8
Gilliss, 1993[110]		81.3	–	79.0	–
Rich, 1993[104]		60	40	43	57
Stewart, 1998[99]		50.7	–	50.1	–
Cline, 1998[112]		55	45	58	42

TABLE 71 *Range of outcomes reported in studies*

Study	Mortality	LoS/re-admissions	Physical function	Mental function	Use of services	Costs to service providers	Costs to patients	QoL	Patient satisfaction	Impact on carers	Discharge destination	Compliance
Beckie, 1989[68]		✔		✔								
Wong, 1990[72]			✔		✔					✔		✔
Pereles, 1996[107]								✔				✔
Williford, 1995[108]												✔
Rich, 1995[105]	✔	✔				✔	✔	✔				
Lowe, 1995[109]									✔			✔
Gilliss, 1993[110]			✔	✔				✔				
Rich, 1993[104]	✔	✔				✔						
Lipton, 1994[111]		✔										✔
Stewart, 1998[99]	✔	✔				✔		✔				
Cline, 1998[112]	✔	✔				✔		✔				

TABLE 72 *Mortality outcomes*

Study	Baseline		Months follow-up	Subjects		Controls	
	Subjects	Controls		*n*	(per 100 per month)	*n*	(per 100 per month)
Beckie, 1989[68]	37	37	1.5	2	3.604	9	16.216
	59	61	6	7	1.98	6	1.64
Rich, 1995[105]	142	140	3	?	3.9/patient	?	6.2/patient
Rich, 1993[104]	63	35	3	33.3%	11.1	45.57%	15.19
Stewart, 1998[99]	381	381	3	154	13.47	197	17.24
	–	–	6	154	6.737	197	8.618
Cline, 1998[112]	96	110	12	22	1.91	43	3.26

RRR, which was analysed using a random-effects meta-analysis model. The overall RRR for education trials was 0.667 (95% CI, 0.573 to 0.778; $p < 0.001$). An RRR of less than one indicates that the intervention is beneficial (i.e. there is a relative reduction in the risk of being admitted). This indicates that the educational interventions of the type described by these five trials had an overall beneficial effect in reducing the likelihood of readmission to hospital. Each of these five trials evaluated an educational intervention with specific groups of patients, either with heart failure[99,103,104,112] or following coronary artery bypass graft surgery. Therefore, it may not be appropriate to generalise these findings to all patient groups. The distribution of RRRs for the education trials is shown in *Figure 56*.

Physical function

Surprisingly, few studies investigated physical function or ADL, even though the patients included were elderly (*Table 73*). Only two studies[72,110] investigated this outcome. In one of these,[110] the intervention included a complex of activities to educate patients and their partners on the emotional reactions to surgery. At 24 weeks after discharge improvement in walking and perceptions of ability to walk were greater in the intervention group. In the other study,[72] patients undergoing total hip replacement received an education programme. Physical function was not improved in the intervention groups.

Mental function

Only three studies investigated the effect of education interventions on mental function[68,72,110] (*Table 74*). One of these[110] used standard scales to measure mood state and self-efficacy for activities such as walking, lifting or climbing. The intervention was complex, comprising a combination of in-hospital education on emotional reactions to surgery for patients and carers followed by telephone coaching after discharge. The effect of the intervention was limited, with only patient's self-efficacy for walking being improved in the intervention group.

In the study by Wong and co-workers,[72] patients completed a questionnaire about their preparedness for discharge, and up to discharge they completed further questionnaires about their psychosocial well-being and compliant behaviour (e.g. performing prescribed exercises). Preparedness for discharge and exercise compliance were higher in the intervention groups.

The last of these three studies[57] was a small study, involving a total of only 74 patients undergoing coronary artery bypass graft surgery. Patients received a supportive education intervention in hospital and extensive telephone support after discharge. A standard measure of anxiety was administered to patients 6 weeks after discharge, and levels of anxiety were significantly lower in the intervention group. Patients in the intervention group also had a higher level of knowledge about coronary artery disease.

Adherence to medication regimens

Four studies investigated the effect of education interventions on adherence to medication advice[106–108,111] (*Table 75*). In addition, a subgroup

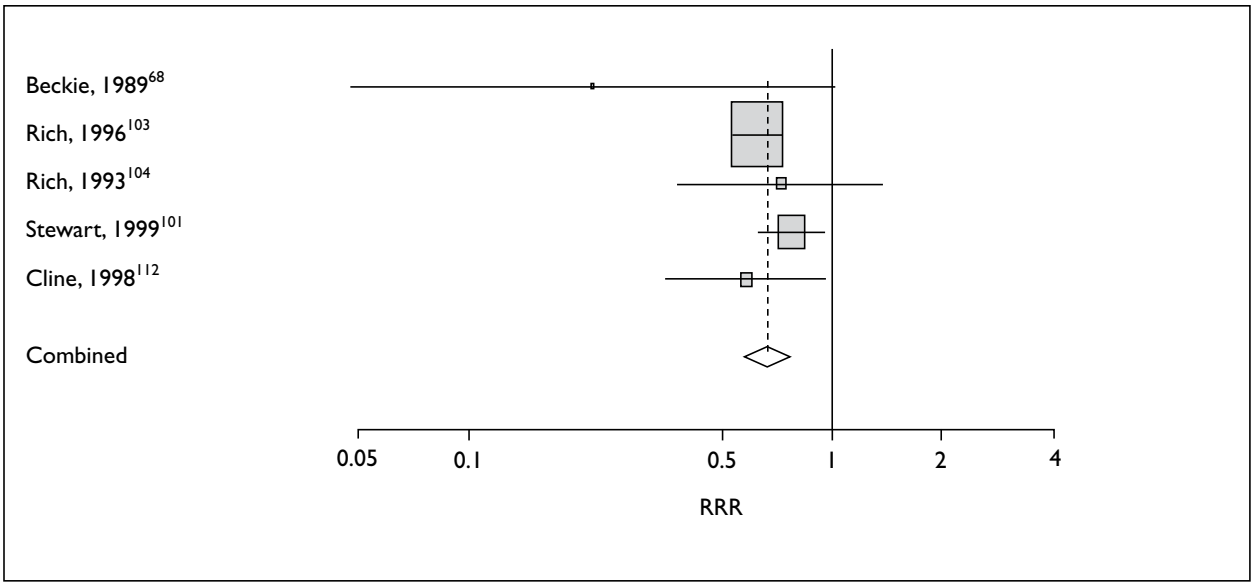

FIGURE 56 *Risk of readmission to hospital*

TABLE 73 *Change in physical function*

Study	Measure	When measured	How reported	Controls	Subjects
Gilliss, 1993[110]	Activity check list		Repeated measures and regression models		
		4 weeks	Walking	8.8	1.03
			Lifting	4.7	5.9
			Climbing	4.3	5.7
			General	12.6	13.5
			Work	3.7	3.8
		24 weeks	Walking	10.8	11.4
			Lifting	9.6	9.4
			Climbing	5.6	5.4
			General	15.8	15.7
			Work	11.0	12.9
				SE	*p*
		Comparison	Walking	0.4	0.012
			Lifting	0.4	0.027
			Climbing	0.2	0.207
			General	0.4	0.103
			Work	1.0	0.195
Wong, 1990[72]			Mann–Whitney, *p* values	*p*:	
	Subjective functional capacity index	6 months	Comparison groups 1 and 3:	0.34	
			muscle strength	0.69	
			mobility	0.70	
	Objective functional capacity index	6 months	walking	0.55	
			stairs	0.46	
	Subjective functional capacity index	6 months	Comparison groups 2 and 3:	0.57	
			muscle strength	0.17	
			mobility	0.87	
	Objective functional capacity index	6 months	walking	0.71	
			stairs	0.40	

of patients in the study by Rich and co-workers[105] received additional education about medication.[103] Different measures were used to assess adherence, including tablet counts, self-reports of compliance and knowledge of medication regimens. Only one study failed to show some improvements in adherence to medication or knowledge about medication regimens.[108] This was a small study involving brief counselling by a pharmacist before discharge. The interventions employed in the other studies were more intensive, and included practical training[107] and follow-up consultations.[111] It therefore appears that more intensive interventions such as these are relatively effective, but brief counselling or education is of little effect.

However, some qualifications should be expressed about this conclusion. The methods used to measure adherence were variable, and the length of follow-up of patients was generally short. The longest period of follow-up was 6 weeks[108] and this study failed to demonstrate a beneficial effect. Thus, the duration of any effects may be short-lived. It should be noted that the two studies of medication education that included readmission as an outcome failed to demonstrate any effect.

Use of health and social care services

Only two of the studies identified collected any information about the use of health services, other than readmissions[99,105] (*Table 76*). Information about the use of social services was not collected in any study. One study[105] investigated the effect of intensive education about heart failure supplemented by dietary assessment, discharge planning and medication review. A total of 282 patients were included in the study, and a subsample of this study completed logs on the care they received. The use of nursing care, dietician, social worker and home care team was expressed in monetary terms, and there was no difference between intervention and control groups of patients. The other study[99] was a study of a mixed education intervention. Patients in the intervention group made less use of the hospital emergency services.

TABLE 74 *Change in mental function*

Study	Measure	When measured	How reported	Controls	Subjects
Gilliss, 1993[110]	Self-efficacy expectations		Repeated measures and regression models		
		Baseline	Walking	4.5	4.9
			Lifting	4.7	4.4
			Climbing	5.9	6.4
			General	6.6	6.9
			Work	4.7	5.4
		24 weeks	Walking	9.1	9.5
			Lifting	9.4	9.1
			Climbing	9.3	9.5
			General	10.0	9.8
			Work	9.2	10.0
				SE:	*p*:
		Comparison	Walking	< 0.2	0.013
			Lifting	< 0.2	0.4
			Climbing	< 0.2	0.091
			General	< 0.1	0.388
			Work	< 0.6	0.392
	Profile of Mood State	4 weeks	Global	27.3	21.8
			Tense	10.5	10.0
			Depression	8.9	8.1
			Anger	6.1	5.6
			Vigour	15.2	16.9
			Fatigue	10.9	8.9
			Confusion	6.0	6.0
		24 weeks	Global	14.0	12.0
			Tense	8.1	8.2
			Depression	7.3	6.7
			Anger	7.4	6.4
			Vigour	20.8	20.4
			Fatigue	6.2	6.7
			Confusion	5.1	5.6
				SE:	*p*:
		Comparison	Global	4.0	0.769
			Tense	0.8	0.696
			Depression	1.0	0.732
			Anger	0.9	0.906
			Vigour	0.8	0.603
			Fatigue	0.8	0.541
			Confusion	0.5	0.403
Wong, 1990[72]	Subjective psychosocial capability index	6 months	Mann–Whitney, *p* values	0.67	
	Perceived preparedness for discharge		Comparison groups 1 and 3	< 0.01	
	Patient compliance scale: compliant behaviour			0.38	
	exercise compliance			< 0.05	
	Subjective psychosocial capability index	6 months	Comparison groups 1 and 2	0.67	
	Perceived preparedness for discharge			< 0.01	
	Patient compliance scale: compliant behaviour			0.38	
	exercise compliance			< 0.05	
Beckie, 1989[68]	State–trait anxiety inventory	6 weeks	Mean (SD) anxiety score	43.22 (11.52)	29.78 (7.72)

TABLE 75 *Adherence to medication*

Study	Measure of mental function used	When measured	Results		Significance
			Subjects	Controls	
Rich, 1996[106]	Compliance rates:				*p*:
	Pills taken correctly for each medication	30 days after discharge	87.9%	81.1%	0.003
	Pills taken correctly of all pills that should have been taken	30 days after discharge	87.5%	80.9%	0.004
	Patients with 80% or better compliance	30 days after discharge	85.0%	69.7%	0.04
Pereles, 1996[107]	No. self-medicating at discharge	At discharge and at 1 month after discharge	39 (76%)	39 (70%)	Logistic regression, NS
	Mean No. medication errors		14	25	Logistic regression, $p = 0.001$
	Patient knowledge of drugs (proportion able to name medication at follow-up)		77%	68%	Repeated measures of variance, NS
Williford, 1995[108]	Medication knowledge and compliance scores assessed in telephone interview	6 weeks after discharge	90.7	75.4	Two-tailed Fisher's exact, NS
	Compliance with medication (tablet count, interview of knowledge)	10 days after discharge			Mann–Whitney:
		Compliance	95%	83%	$p = 0.02$
		Knew purpose of medication	90%	46%	$p = 0.001$
Lipton, 1994[111]	Compliance score; interview to assess compliance, knowledge of drugs, frequency, dose, regularity and missed doses	After discharge:			
		6–8 weeks	94.4	91.4	$p = 035$
		12–14 weeks	96.3	91.2	$p < 0.001$

TABLE 76 *Use of health and social care services*

Study	Services considered and how measured	Use of services by study group	Use of services by controls	Statistical significance, how results calculated
Rich, 1995[105]	Other medical care	$1257	$1211	NS
Stewart, 1998[99]	Hospital emergency services, recorded in hospital computerised records system	236 visits in total	314 visits in total	$p < 0.001$

Costs to health service providers

Four studies included information about costs to health services, all being trials of complex interventions[99,104,105,112] (*Table 77*). Two studies[104,105] were undertaken in the same hospital and involved patients with congestive heart failure. One of these[104] was a small study, undertaken before, and serving as the pilot to, the other study.[105] The costs included in the small study[104] are estimates, based on national average costs. In the larger study[105] data were collected to enable more detailed information about costs to be taken into account. This study reported that, although the intervention (multidisciplinary education and postdischarge support) cost more than routine care during the hospital admission, subsequent costs were reduced since the number of days in hospital due to subsequent readmissions was reduced: the overall cost of care was $460 per person higher in the control group (see *Table 77*). In contrast, Stewart and co-workers[99] found no significant difference in hospital or community care costs between intervention and control patients. In the fourth study,[112] the difference in costs between study groups did not reach statistical significance. Only one study[105] reported costs to patients and carers (*Table 78*).

TABLE 77 *Costs to health service providers*

Study	How costs calculated to health service	Over what period	Results		Significance
			Subjects	Controls	
Cline, 1998[112]	Mean annual health care costs (US$ per patient)	1 year	Intervention $208 Doctors visits $458 Readmissions $1628 Total $2294	Doctors visits $513 Readmissions $3081 Total $3594	Difference: $208 –$55 (NS) –$1453 ($p$ = 0.07) –$1300 ($p$ = 0.07)
Rich, 1995[105]	Costs logs for a subsample of patients	90 days of discharge	Cost of readmission $2178	Cost of readmission $3236	0.03
Stewart, 1998[99]	Costs of admissions calculated from hospital costing system; costs of intervention calculated from costs of staff time, infrastructure, etc.; community services costs derived from random sample of patients using standard fees for items of care		Hospital care $2190/patient (95% CI, 1740 to 2630) Cost of intervention $190/patient Community care $610/patient (95% CI, 0 to 690)	Hospital care $2680/patient (95% CI, 2030 to 3320) Community care $630/patient (95% CI, 560 to 700)	NS
Rich, 1993[104]	Use of median charge for admission for CHF to estimate potential cost saving	Per year	28% admitted $3631/admission $726.2 million/year in USA (200,000 admissions)	48% admitted (250,000 admissions); total $907.8 million	Not given

Patient satisfaction

No study systematically investigated the impact of education interventions on patient or carer satisfaction (*Table 79*). In studies of patient education interventions, patients or carers could be asked about their satisfaction with the intervention, care in general, or their clinical outcome. The study by Lowe and co-workers[109] was an investigation of the impact of an inpatient self-medication programme on compliance with and knowledge about medication 10 days after discharge from hospital. Patients were interviewed at home 10 days after discharge. The interview included questions on patients' opinions of the programme. Patients expressed positive views of the programme, but equivalent questions were not administered to patients in the control group and therefore few conclusions can be drawn. It is particularly important that measurement of patient and carer satisfaction is included in studies of education

TABLE 78 *Costs to patients and informal carers/families*

Study	How costs to informal carers calculated	Over what period	Results	Comments
Rich, 1995[105]	Logs kept by a subsample of patients	90 days	$1164 for treatment group, 828 for controls	No statistical test

TABLE 79 *Patient satisfaction*

Study	Measure of patient satisfaction used	When measured (first and final assessment)	Change between first and final assessment: subjects
Lowe, 1995[109]	Structured interview	10 days after discharge	Patients in the study group preferred to give themselves their medication

interventions, since patients and carers are asked to change their behaviour as a result of the education. This may involve them in extending their activities in self-care or, for carers, in caring for the patient. It is therefore conceivable that satisfaction would decline.

QoL

Only five studies investigated the impact of education on QoL after discharge (*Table 80*). One study assessed the effect of a self-medication programme,[107] and four assessed the effect of complex education interventions.[99,105,110,112] A variety of measures of QoL were used, and therefore meaningful comparison between studies is not possible.

Education about self-medication had no effect on morale.[107] However, only 74 patients completed this study and the sample size was probably inadequate to detect a clinically important difference. Rich and co-workers[105] included a larger number of patients in their study, and used a disease-specific measure of QoL. Patients who received the education intervention reported greater improvements in QoL than those who did not, with significant differences found in favour of the intervention in all subscales of the questionnaire. Gilliss and co-workers[110] also investigated the impact of a general educational intervention. However, the measure of QoL was a single question and no intervention effect was detected. In the study by Stewart and co-workers,[99] random samples of patients in the intervention and control groups were administered the SF-36 by telephone at 1 and 3 months after discharge. There were no significant differences between the intervention and control groups.

Discharge destination

Discharge destination was not reported as an outcome in any of these studies.

Conclusions

Since the number of studies is small and their quality often poor, generalisable conclusions about the role of education interventions in improving the discharge of elderly patients from hospital cannot be drawn. The variety of education interventions investigated was small.

No study of education before planned admission was identified. Several studies investigated self-medication programmes, and others investigated education about a wider range of issues, including diet, the illness and its symptoms, and advice about when to seek further medical help. However, in these studies education was usually one element of a complex of interventions that included postdischarge support.

The variety of outcomes studied was narrow. For example, assessments of impact on functional abilities, cost, and patient and carer satisfaction

TABLE 80 *Impact on QoL*

Study	Measure of QoL used	When measured	Results		Significance
			Subjects	Controls	
Cline, 1998[112]	Nottingham Health Profile	Baseline 1 year	30.1 (21.6) 25.3 (22.2)	26.9 (21.2) 23.4 (22.2)	Not different
	QoL in heart failure questionnaire	Baseline 1 year	4.5 (1.0) 3.5 (1.3)	4.2 (1.1) 3.5 (1.1)	
	Global self-assessment	Baseline 1 year	4.3 (1.5) 3.3 (1.4)	3.7 (1.6) 3.2 (1.6)	
Pereles, 1996[107]	Philadelphia Geriatric Centre Morale Scale	On admission On discharge 40 days follow-up	15 (5) 15 (5) 16 (4)	15 (5) 16 (4) 16 (4) 40	Repeated ANOVA, NS
Rich, 1995[105]	Chronic heart failure questionnaire	Baseline 3 months	72.1 (15.6) 94.3 (21.3) Change 22.1	74.4 (16.3) 85.7 (19.0) Change 11.3	0.0001
Gilliss, 1993[110]	Single-item 10-point scale	4 and 24 weeks	6.8–8.7 (SE = 0.3)	7.6–8.5 (SE = 0.3)	NS
Stewart, 1998[99]	SF-36 (random subsamples)	1 and 3 months after discharge	Data not given	–	NS

were uncommon. The extent to which education improved knowledge was not usually investigated. In addition, the variety of patients included in the studies was limited. Five of the 11 studies involved only patients with cardiovascular disease.

Education to improve adherence to medication regimens appears to have some benefit. However, the studies available do not indicate the duration of the benefit, and the measures of medication adherence did not usually include objective assessments. These studies did not identify other benefits, such as reduced readmission rates, but they generally investigated only a narrow range of outcomes. Further research is needed to establish whether education about medication has a long-term benefit, and whether other outcomes, including mortality, functional ability and use of health services, are affected.

It is unclear whether education interventions combined with other activities (complex educational interventions) reduce mortality after discharge. However, there is some evidence that readmission to hospital is less frequent in patients who receive a complex education intervention, and that in consequence healthcare costs are reduced. However, the duration of the effect of the intervention may be limited.[112]

It was possible to conduct a meta-analysis on five of the educational interventions where readmission data were reported. This analysis did demonstrate a statistically significant beneficial effect on reducing the risk of readmission to hospital. All the five trials contributing to this analysis were based on cardiology patients, with four relating to patients with heart failure and the fifth being derived from patients who had undergone coronary artery bypass graft surgery. These findings appear to demonstrate that, for this specific group of patients, an educational intervention is an effective way of improving the likelihood of a successful discharge home of an older person. It might also be reasonable to hypothesise that this could equally apply other groups of patients, particularly those in hospital with a specific illness or for a specific intervention. However, it is not possible to state whether this is the case from the available evidence of the RCTs we were able to identify, and we would recommend that the generalisability of this finding needs to be tested in further studies with other groups of older inpatients. This result should also be qualified with the observation that in four of the five studies included in the meta-analysis older people were excluded if they were either cognitively impaired or suffering with some form of psychiatric disease. It would, therefore, be desirable for any future studies to consider how to widen the scope of the intervention by finding means of including this most vulnerable group, perhaps by directing such an intervention to those who care for them.

Since elderly people discharged from hospital with chronic illness are likely to remain in regular contact with health and social services, they will continue to receive advice and education as part of routine care. As a result, the differences between groups of patients who are or are not given intensive education intervention around the time of discharge may disappear over time. Therefore, studies that investigate the outcome and cost-effectiveness of education interventions should take into account the duration of intervention effects.

Since the interventions tested in these studies were combinations of activities, it is not possible to determine whether the effect on readmission was due to education, some other activity, or to a combination of activities. None of the four studies of readmission were undertaken in the UK, and it would be inappropriate to assume that findings can be applied to the NHS. Furthermore, in one study complex interventions were found to increase costs on carers,[105] and information about the impact on patient and carer satisfaction is not available. Therefore, a good quality trial undertaken in the UK is required. The impact on QoL, mental function and physical function of education interventions were assessed in only a small number of studies. The findings of the studies differ, and therefore future studies should include assessment of these outcomes.

In summary, therefore, it is not possible on the basis of the available evidence, to recommend that patient education programmes be introduced to improve either medication adherence or reduce readmission rates following discharge of older people from inpatient hospital care. Education interventions may have some beneficial effects, in specific clinical states and settings, but these may be short-lived, and there may be harmful effects such as increased costs for carers and patients.

Chapter 8
Discussion

A range of different interventions have been used in attempts to improve the process of discharging older people from hospital and subjected to RCTs in the UK, the USA and elsewhere.

There was considerable heterogeneity at different levels between the trials selected for analysis in this review. Services were provided by a range of different personnel, including multidisciplinary teams, single-person services and services delivered over the telephone. Studies described a range of service models, which were not easily classified into specific intervention types. Classification of these service models was, therefore, performed with reference to other relevant systematic reviews in the fields of CGA and stroke care, consideration of the primary focus of the 43 studies identified in initial scoping searches and discussion between the reviewers based on the results of these analyses.

The four predominant types of intervention relating to discharge identified during the process of this systematic review are discharge planning protocols, discharge support schemes, discharge-focused CGA and educational interventions. We recognised that this classification of service models was somewhat arbitrary and produced categories which were not mutually exclusive. Therefore, in addition to the analysis of a range of more or less discrete service models, the data were analysed by specific intervention characteristics (i.e. whether the intervention was provided by a team, and the site(s) at which the intervention was delivered). It is this analysis which gives rise to the principal conclusions that readmission rates are significantly influenced by discharge arrangements and that discharge care delivered both in hospital and at home has the largest influence on readmission rates. Therefore, while the difficulties of reviewing and synthesising a heterogeneous group of studies are acknowledged, we are confident that by approaching the data from a number of different viewpoints, the analysis is robust and the conclusions, while limited, are defensible.

The meta-analysis which it was feasible to conduct on a range of outcomes for the studies as a whole did indicate that there is an effect of intervening in discharge, and that this is reflected in an overall beneficial effect on the risk of readmission to hospital but not on mortality, length of index stay or discharge destination. When the characteristics associated with the effect on readmission are considered, it would appear that interventions occurring across the interface between hospital and community care are the most marked, although it appeared to make little difference to the effect size dependent on whether the intervention was delivered by a single person or a team. Thus interventions provided face-to-face with the patient at both the inpatient and postdischarge stages of the discharge process resulted in a more beneficial effect than those confining themselves to intervening on a single site or conducted over the telephone. This finding was lent further support by the evidence of a trend towards a beneficial effect on mortality at 6 months for patients discharged via a multiple-site intervention.

The validity of the conclusions was further strengthened by exploring the possible influences of potentially important parameters on the effects of reduced readmission found in the meta-analysis. This exploration indicated that neither publication bias nor bias associated with the quality of the studies unduly influenced this finding.

Due to the exploration of the effects of individual types of intervention and different modes of intervention delivery by means of subgroup analyses, it is important to be aware of the dangers of multiple comparisons when conducting probability tests. Thus the findings relating to the influence of intervention site on risk of readmission need to be treated cautiously. However, these data in themselves do provide a certain face validity to the conclusions presented. There is a logical gradient evident in the effect sizes of readmission risk depending on where the intervention is delivered. Thus interventions delivered by means of a postdischarge telephone call show the least beneficial effect, followed by interventions at a single site which indicate a more substantial effect, and with those interventions delivered across the hospital–community care interface demonstrating the most benefit to the patient in terms of a reduced risk of readmission.

In the UK a substantial proportion of trusts now employ discharge planning personnel[135] in line

with recommendations endorsed by the BGS, the DOH and the ADSS (see *Table 1*) to the effect that a single named person from within a multidisciplinary team should be responsible for discharge preparation. Not only would the available trials evidence indicate that single professionals, not teams, are undertaking responsibility for discharge planning, but more fundamentally there is no UK research base to indicate that this is appropriate to the UK system of healthcare delivery. Another recommendation made by all three organisations is that patients and carers should be central to the planning of a discharge, but again the studies included in the review do not demonstrate either that patients and carers are included in the process or that outcomes related to their well-being, satisfaction or to the costs they might incur have been considered in a robust manner.

Moreover, as many of the discharge planning studies excluded the least fit and most vulnerable older people, we must question the generalisability of these findings to the substantial numbers of older people passing through acute care hospitals with complex and multiple pathology whose cognitive impairment or inability to speak English would set them apart from the generally fitter older person included in the available trials.

The programmes for discharge-focused CGA included in this review were, like the discharge planning schemes, largely derived from the USA. Despite the UK being the birthplace of the principles of geriatric assessment and having many proponents and practitioners of CGA for older people whilst in acute care, we did not identify any studies that could provide a robust evidence basis for this practice. Both the BGS and the ADSS have recommended that all preparations for discharge should be based on effective multidisciplinary teamwork between the hospital and the community. In the absence of UK trials data to support this, it would appear to have been taken on trust that such an approach is the best one. Formal data synthesis, although possible for a number of important discharge-related outcomes, did not demonstrate any overall beneficial effects in the context of the discharge process. There is an evident need for UK trials to take into account the differences in healthcare delivery between this country and the USA. Finally, in the almost complete absence of any patient- or carer-focused outcomes data in this field, any future work would need to reflect the importance of the users of services when evaluating the effectiveness of an intervention.

The discharge support schemes were a particularly heterogeneous group of studies. Despite this, there was a tendency for these interventions to take place in the patient's own home, which thus marked this type of intervention out particularly from the discharge planning and CGA studies. Also, unlike discharge planning and CGA studies, the discharge support trials were more predominant in the UK and other northern European countries, and would therefore have a more direct relevance to the UK system of healthcare delivery. However, none of the primary discharge outcomes for which a meta-analysis was conducted (mortality, length of stay, readmission to hospital, discharge destination, physical/mental function) indicated any benefit to patients supported by the discharge intervention. Nor, however, was any disadvantage evident, which should provide some reassurance to the high proportion of trusts in the UK that offer some form of discharge support scheme as part of their portfolio of services. The question does remain, however, as to exactly what benefit such schemes confer and whether the dilution resulting from such a heterogeneous group of studies has in fact masked potentially beneficial outcomes derived from those schemes that provide support on both acute and primary care sites, as would be suggested by the overall analysis.

There are relatively few RCTs of educational interventions. Despite this, the impact of educational programmes on any of the primary outcomes of focus in this review represents the single most pronounced effect of any single type of intervention reported here. The reduction in risk of readmission of 33% signifies that interventions which empower patients by paying particular attention to their specific educational needs should be of great interest to this whole field. It must be said that this effect was confined to cardiovascular patients and it is not necessarily a finding that is generalisable to all groups of patients, in view of which we would recommend that further trials are needed to explore whether such programmes could be applied successfully with other patient groups. It would seem that the Department of Health recommendation that advice about diet, medications and where to obtain help should be made available may be underpinned by this finding, at least for this specific group of older people.

Limited cost data were generated from the review, and much of this is not from the UK. This makes it difficult to generalise the health economic results to a UK setting. Thus economic modelling would have to be used to inform decision-making

regarding the cost implications of discharge arrangements. Data from the review could be used to generate economic models to examine and estimate the effects on costs (and possibly the cost-effectiveness) of implementing discharge schemes in a UK setting. The first step would be to obtain estimates of what resources would be needed to provide each of the types of discharge scheme covered in the review. These could be obtained from experts in this field, or from existing protocols for providing the discharge scheme. The same experts could be questioned as to what constitutes existing care. The resource implications of this would then also be estimated, and costed using data obtained from NHS sources.

These estimates of the cost of providing the discharge arrangements reviewed and the appropriate alternatives would then be used with data from the review on the effects of the discharge scheme on resource use. Where possible, aggregated estimates should be used if the necessary statistics can be calculated. These are likely to be available for the length of the initial inpatient stay and readmission rates (and, possibly, length of stay of readmissions). Where these estimates are not available, data from the systematic review can be incorporated in the form of a sensitivity analysis. Data from a study that indicates that a discharge scheme might increase or decrease resource use can be entered in the model to see the effects that this has on the conclusions of this model. Sensitivity analysis would also be used to test the effects of varying other parameters in the model, such as the costs of the discharge schemes.

Despite the relative lack of good RCT evidence to support specific service models to hasten or enhance hospital discharge, there is evidence that such schemes are widely adopted in the UK. In a recent national survey of health authorities and trusts, over half were found to provide 'any staff dedicated to discharge planning or coordinating for older people',[135] and over a third (38%) of trusts indicated that they provided 'any home based service which provides medical and/or nursing care in patients own homes immediately after discharge from hospital (e.g. home from hospital scheme)'. Between one-quarter and a third of these schemes had been established since 1997. This 'evidence free' service development gives the research and development agenda arising from this review particular urgency.

We have shown that much of the RCT evidence for discharge arrangements for older people is derived from the USA. All the discharge planning studies, over two-thirds of the CGA studies, over one-third of the discharge support arrangement studies and almost half of the education interventions report data from USA patient groups, and in the case of both the discharge planning and CGA intervention types there are no UK RCTs. Can the results of the studies conducted in the USA be translated for UK practice? Probably not, for a number of reasons. Aside from the obvious difficulties of extrapolation from a largely commercialised to a largely socialised system, study populations between trials from different countries differed on measured characteristics. For example, in the trials of discharge support arrangements, which were conducted mostly in the USA, populations tended to be in their 50s or 60s,[70,73,81,87,95] and the inclusion of veterans hospitals results in a greater overall proportion of men over women. In the UK, trial populations were more commonly in their 70s or 80s, and predominantly were women.[74,86,88,90,93,96] Therefore, the UK trials have tended to be of discharge arrangements for women in their 70s and 80s, and this hinders comparability with US trials conducted in populations of younger men. Furthermore, translation from US to UK studies may to be hampered by differences in both ethnic mix and the rural/urban distribution of populations. These factors are not always reported.

Most studies of discharge from acute care settings take a linear approach to patient progress and throughput. However, acute hospital units are only one element in a complex system of services, including community health and social services, primary care, rehabilitation, residential care, voluntary organisations, and the informal care provided by family and friends. It is well known that differences in the availability of these non-acute services (e.g. residential care beds) can have a marked and enduring impact on the capacity of acute units to discharge elderly patients.[149] Consequently, the effectiveness of interventions to improve the speed and quality of discharge will depend to a large extent on the broader service context in which they take place. Interventions that are shown to work well in areas with well-resourced and efficient community support services may have little or no impact where these services are inadequate or lacking. Moreover, within a particular area the intervention itself may have an impact on the availability of services to the control patients, either through the 'diffusion' of practice change or by restricting their access to resources. Future evaluations of interventions aimed at discharge need to take these factors into account, both at the descriptive

level (the particular service system in which the intervention and evaluation are located) and at the analytic level (e.g. multicentre studies evaluating interventions in different service configurations, quasi-experimental designs, pooled analysis of separate but related studies). The same considerations apply to evaluations of post-acute/intermediate care and admission avoidance schemes. It may be that the conventional RCT paradigm is not the most efficient mechanism to address the cost-effectiveness of changes within complex service systems.

In healthcare systems around the world there is an increasing awareness that the introduction of (and even the continued use of existing) health technologies must be based on scientific evidence.[150,151] The RCT is sometimes cited as the gold standard to provide the necessary evidence.[150,152,153] However, RCTs are not always possible, either economically, organisationally or ethically.[154] In fact, the National Institutes of Health in the US have estimated that only approximately 20% of currently used health technologies have been evaluated by means of an RCT.[155] Against this background meta-analysis, the quantitative synthesis of effects from a number of 'similar' studies (meta-analysis) has grown in popularity[156] providing the basis for what is currently termed 'evidence-based medicine'.[151] This approach can enhance precision, and answer questions that single trials may be underpowered or not designed to answer. However, meta-analysis is subject to its own range of limitations, which may be present despite methodological rigour. For example, negative trials are often not reported, there is often considerable heterogeneity between trials, and on occasion large RCTs have been shown to disagree with prior meta-analyses.[157,158]

In situations in which RCTs are available, observational or non-randomised evidence is often discounted on the grounds that only RCTs can provide guaranteed unbiased estimates of intervention effects.[152,153] However, although observational studies are prone to biases that are unlikely to arise in RCTs, they do contribute something to the totality of evidence regarding the effect of an intervention. Recently, several authors have demonstrated the relative lack of systematic bias on either the direction or magnitude of effects in well-conducted observational studies when compared with RCTs addressing the same questions.[159–161] Whether both forms of evidence are always to be treated in an equal manner remains an issue, and will often depend on the situation under consideration.

It is thus worth exploring alternative methods for the generalised synthesis of evidence, in which both quantitative and qualitative heterogeneity, in terms of effect size and study design, respectively, may be accommodated together with subjective beliefs about the relative merits of the different sources of evidence with respect to the question in hand. When evidence from RCTs is simply not available, yet decisions regarding whether to implement a policy or use an intervention have to be made, then a formal synthesis of the evidence that is available from observational studies can be valuable whilst awaiting higher quality evidence from RCTs.

The approach adopted in this review allowed for an initial search of the literature with relatively liberal criteria, to obtain an overview of the type of evidence available. The research protocol included a hierarchical view of the nature of the evidence which might be found and included in the review. The proposed analytical approach was dependent on the type of evidence that the literature contained. In practice, during this review a large number of potential studies were identified in the literature, which resulted in an early decision to limit the review to RCTs. The number of trials identified was sufficient to allow a quantitative synthesis overall, and a subgroup analysis in particular intervention types.

Chapter 9
Conclusions

This review supports the concept that arrangements for discharging older people from hospital can have beneficial effects on subsequent readmission rates. The effect on readmission appears to be little affected by whether the intervention is delivered by an individual or a team. Interventions provided across the hospital–community interface, both in hospital and in the patient's home, showed the largest effect sizes. Overall, the evidence from these trials does not suggest that discharge arrangements have effects on mortality, length of hospital stay or discharge destination.

Evidence from RCTs is not available to support the general adoption of discharge planning protocols, geriatric assessment processes or discharge support schemes as means of improving discharge outcomes. Neither is there good evidence from RCTs to justify specific forms of service development to enhance or hasten hospital discharge in the UK.

More research is urgently needed, particularly in the UK. The magnitude of the gap between clinical practice in the UK and the evidence available to support it is highlighted by the findings of this review. High-quality studies (including, where appropriate, RCTs) are required to explore and develop models of discharge intervention that cross the hospital–community interface.

Future studies should ensure at the very least that mortality, index length of stay and readmission rates are recorded. Patient health outcomes, patient and carer satisfaction, and costs should be measured. Ideally, the studies should be conducted to agreed standards, with harmonisation of outcome measurement and objectives to facilitate pooling of data where appropriate.

Further exploration of the interesting finding that educational interventions can reduce readmission rates is justified. Is this effect generalisable from the rather narrowly focused trials in which it was demonstrated?

Health economic analysis should be planned as integral to future studies, which should be large enough and inclusive enough to detect important effects and ensure generalisability.

Further research to explore the important issue of cross-national comparability of studies conducted in different healthcare systems (particularly between Europe and North America) would be worthwhile.

Acknowledgements

This report was commissioned by the NHS R&D HTA Programme, project number 95/09/03.

We would like to thank: those individuals and organisations who have responded generously with their time in response to our requests for further information about their trials; the library staff at the Leicester General Hospital and the Universities of Leicester and Sheffield, who responded cheerfully to our requests for thousands of abstracts and papers; and the secretaries, notably Zena Jones and Elsie Potter, who helped to cut, paste, collate and distribute papers and manage our meetings.

We are grateful to the referees for reading the draft manuscript and for the quality of their constructive comments.

The views expressed in this review are those of the authors, who are also responsible for any errors.

References

References for included trials (Nos. 46–116) comprise primary and subsidiary reports; the latter are indented in this list.

1. Department of Health. Discharge of patients from hospital (HC(89)5). London: Department of Health, 1989.
2. Department of Health. Discharge of patients from hospital (LAC(89)7). London: Department of Health, 1989.
3. Henwood M, Wistow G. Hospital discharge and community care: early days, London: Social Services Inspectorate/NHSME, 1993.
4. Department of Health. Hospital discharge workbook: a manual on hospital discharge practice, London: NHSE/SSI, 1994.
5. Department of Health. Precondition on the 1995 community care special transition grant (EL(94)85). Leeds: NHSE, 1994.
6. ADSS/BGS/RCN. The discharge of elderly persons from hospital for community care, ADSS/BGS/RCN, August 1995.
7. Bowling A, Betts G. From hospital to home: communication on discharge. *Nurs Times* 1984;**30**:31–3.
8. Victor CR, Vettor NJ. Preparing the elderly for discharge from hospital: a neglected aspect of patient care? *Age Ageing* 1988;**17**:155–63.
9. Harding J, Modell M. Elderly peoples experiences of discharge from hospital. *J R Coll Gen Pract* 1989;**39**:17–20.
10. Williams EI, Fitton F. Surveys of carers of elderly patients discharged from hospital. *Br J Gen Pract* 1991;**41**:105–8.
11. Tierney A, Worth A, Jose Closs J, King C, Macmillan M. Older patients experiences of discharge from hospital. *Nurs Times* 1994;**90**(21):36–9.
12. Jones D, Lester C. Hospital care and discharge: patients' and carers' opinions. *Age Ageing* 1994;**23**:91–6.
13. McBride RC. An audit of current discharge planning arrangements and their effectiveness on elderly care wards and community nursing services together with aspects of client satisfaction. *J Nurs Manage* 1995;**3**:19–24.
14. Victor CR, Young E, Hudson M, Wallace P. Whose responsibility is it anyway? Hospital admission and discharge of older people in an inner-London district health authority. *J Adv Nurs* 1993;**18**:1297–304.
15. Bowling A, Betts G. From hospital to home: communication on discharge. *Nurs Times* 1984;**30**:31–3.
16. Victor CR, Vettor NJ. Preparing the elderly for discharge from hospital: a neglected aspect of patient care? *Age Ageing* 1988;**17**:155–63.
17. Harding J, Modell M. Elderly peoples experiences of discharge from hospital. *J R Coll Gen Pract* 1989;**39**:17–20.
18. Jewell SE. Discovery of the discharge process. *J Adv Nurs* 1993;**18**:1288–96.
19. McWilliam CL, Sangster JF. Managing patients discharge to home: the challenges of achieving quality of care. *Int J Quality Health Care* 1994;**6**:147–61.
20. Houghton A, Bowling A, Clarke KD, Hopkins AP, Jones I. Does a dedicated discharge co-ordinator improve the quality of hospital discharge? *Quality Health Care* 1996;**5**:89–96.
21. Closs J, Tierney A. Discharge planning for elderly patients. *Nurs Standard* 1993;**7**:30–3.
22. Too J, Gardner J, Savla N. Failed discharges from the psychogeriatric ward. *Psychiatr Bull* 1995;**19**:478–9.
23. Naylor MD. Comprehensive discharge planning for hospitalized elderly: a pilot study. *Nurs Res* 1990; **39**(3):156–61.
24. Lockery SA, Dunkle RE, Kart CS, Coulton CJ. Factors contributing to the early rehospitalisation of elderly people. *Health Soc Work* 1994;**19**:182–91.
25. Farren EA. Effects of early discharge planning on length of hospital stay. *Nurs Econ* 1991;**9**:25–30,63.
26. Styrborn K. Early discharge planning for elderly patents in acute hospitals. *Scand J Soc Med* 1995;**23**:273–85.
27. Challis D, Davies B. Case management and community care. Aldershot: Gower, 1986.
28. Jones E. Audit in psychiatry. *Psychiatr Bull* 1991;**13**:26–7.

29. Williams EI, Fitton F. Factors affecting early unplanned readmission of elderly patients to hospital. *BMJ* 1988;**297**:784–7.

30. Naylor M, Brooten D, Jones R, LaVizzomourey R, Mezey M, Pauly M. Comprehensive discharge planning for the hospitalized elderly – a randomized clinical trial. *Ann Intern Med* 1994;**120**:999–1006.

31. Challis D, Chessum R, Chesterman J, Luckett R, Traske K. Case management in social and health care. Canterbury: Personal Social Services Research Unit, University of Kent, 1990.

32. Challis D, von Abendorff R, Brown P, Chesterman J. Care management and dementia: an evaluation of the Lewisham intensive case management scheme. Canterbury: Personal Social Sciences Research Unit, University of Kent, 1996.

33. Mamon J, Steinwachs DM, Fahey M, Bone LR, Oktay J, Klein L. Impact of hospital discharge planning on meeting patient needs after returning home. *Health Serv Res* 1992;**27**:155–75.

34. NHS Centre for Reviews and Dissemination. Undertaking systematic reviews of research on effectiveness. CRD Guidelines for those carrying out or commissioning reviews. CRD Report 4, January 1996.

35. Clarke M, Oxman AD, editors. Cochrane reviewers' handbook 4.1.4. Cochrane Library, issue 4. Oxford: Update Software, 2001.

36. Dickerson K, Scherer R, Lefebvre C. Identifying relevant studies for systematic reviews. *BMJ* 1994;**309**(6964):1286–91.

37. Jadad A. Randomised controlled trials. London: BMJ Books, 1998.

38. Cochrane Effective Practice and Organisation of Care Review Group. The data collection checklist. Aberdeen: HSRU, University of Aberdeen, 1998.

39. Sutton AJ, Abrams KR, Jones DR, Sheldon TA, Song F. Systematic reviews of trials and other studies. *Health Technol Assess* 1998;**2**(19).

40. StataCorp. Stata statistical software: release 6.0. College Station, Texas: Stata Corporation, 1999.

41. Sharp S, Sterne J. sbe16: Meta-analysis. *Stata Tech Bull* 1997;**38**:9–14.

42. Bradburn M, Deeks JJ, Altman DG. sbe24: metan – an alternative meta-analysis command. *Stata Tech Bull* 1999;**44**:4–15.

43. Sharp SJ. Meta-analysis regression. *Stata Tech Bull* 1998;**42**:16–22.

44. Stuck AE, Siu AL, Wieland D, Adams J, Rubenstein LZ. Comprehensive geriatric assessment: a meta-analysis of controlled trials. *Lancet* 1993;**342**:1032–6.

45. Langhorne P, Williams BO, Gilchrist W, Howie K. Do stroke units save lives? *Lancet* 1993;**342**:395–8.

46. Kennedy L, Neidlinger S, Scroggins K. Effective comprehensive discharge planning for hospitalized elderly. *Gerontologist* 1987;**27**(5):577–80.

47. Neidlinger SH, Scroggins K, Kennedy LM. Cost evaluation of discharge planning for hospitalized elderly: the efficacy of a clinical nurse specialist. *Nurs Econ* 1987;**5**(5):225–30.

48. Naylor MD. Comprehensive discharge planning for hospitalized elderly: a pilot study. *Nurs Res* 1990;**39**(3):156–61.

49. Naylor M, Brooten D, Jones R, Lavizzo Mourey R, Mezey M, *et al.* Comprehensive discharge planning for the hospitalized elderly. A randomized clinical trial. *Ann Intern Med* 1994;**120**(12):999–1006.

50. Evans RL, Hendricks RD. Evaluating hospital discharge planning: a randomized clinical trial. *Med Care* 1993;**31**(4):358–70.

51. Naylor MD, Brooten D, Campbell R, Jacobsen BS, Mezey MD, Pauly MV, *et al.* Comprehensive discharge planning and home follow-up of hospitalized elders: a randomized clinical trial. *JAMA* 1999;**281**(7):613–20.

52. Saltz CC, McVey LJ, Becker PM, Feussner JR, Cohen HJ. Impact of a geriatric consultation team on discharge placement and repeat hospitalization. *Gerontologist* 1988;**28**(3):344–50.

53. Allen CM, Becker PM, McVey LJ, Saltz C, Feussner JR, Cohen HJ. A randomized, controlled clinical trial of a geriatric consultation team. Compliance with recommendations. *JAMA* 1986;**255**(19):2617–21.

54. McVey LJ, Becker PM, Saltz CC, Feussner JR, Cohen HJ. Effect of a geriatric consultation team on functional status of elderly hospitalized patients. A randomized, controlled clinical trial. *Ann Intern Med* 1989;**110**(1):79–84.

55. Hogan DB, Fox RA, Badley BW, Mann OE. Effect of a geriatric consultation service on management of patients in an acute care hospital. *Can Med Assoc J* 1987;**136**(7):713–17.

56. Harris RD, Henschke PJ, Popplewell PY, Radford AJ, Bond MJ, Turnbull RJ, *et al.* A randomised study of outcomes in a defined group of acutely ill elderly patients managed in a geriatric assessment unit or a general medical unit. *Aust N Z J Med* 1991;**21**(2):230–4.

57. Fretwell MD, Raymond PM, McGarvey ST, Owens N, Traines M, Silliman RA, *et al.* The senior care study. A controlled trial of a consultative/unit-based geriatric assessment program in acute care. *J Am Geriatr Soc* 1990;**38**(10):1073–81.

58. Siu AL, Kravitz RL, Keeler E, Hemmerling K, Kington R, Davis JW, *et al.* Postdischarge geriatric assessment of hospitalized frail elderly patients. *Arch Intern Med* 1996;**156**(1):76–81.

59. Hansen FR, Poulsen H, Sorensen KH. A model of regular geriatric follow-up by home visits to selected patients discharged from a geriatric ward: a randomized controlled trial. *Aging Milano* 1995;**7**(3):202–6.

60. Landefeld CS, Palmer RM, Kresevic DM, Fortinsky RH, Kowal J. A randomized trial of care in a hospital medical unit especially designed to improve the functional outcomes of acutely ill older patients. *N Engl J Med* 1995;**332**(20):1338–44.

61. White SJ, Powers JS, Knight JR, Harrell D, Varnell L, Vaughn C, *et al.* Effectiveness of an inpatient geriatric service in a university hospital. *J Tenn Med Assoc* 1994;**87**(10):425–8.

62. Thomas DR, Brahan R, Haywood BP. Inpatient community-based geriatric assessment reduces subsequent mortality. *J Am Geriatr Soc* 1993;**41**(2):101–4.

63. Rubin CD, Sizemore MT, Loftis PA, Adams Huet B, Anderson RJ. The effect of geriatric evaluation and management on Medicare reimbursement in a large public hospital: a randomized clinical trial. *J Am Geriatr Soc* 1992;**40**(10):989–95.

64. Rubenstein LZ, Josephson KR, Wieland GD, English PA, Sayre JA, Kane RL. Effectiveness of geriatric evaluation unit. A randomized clinical trial. *N Engl J Med* 1984;**311**(26):1664–70.

65. Naughton BJ, Moran MB, Feinglass J, Falconer J, Williams ME. Reducing hospital costs for the geriatric patient admitted from the emergency department: a randomized trial. *J Am Geriatr Soc* 1994;**42**(10):1045–9.

66. Fishman LM, Emro MA. Active use of serial functional assessment improves outcome and shortens acute geriatric hospitalization. *Top Geriatr Rehabil* 1994;**9**(3):16–29.

67. Slaets JPJ, Kauffmann RH, Duivenvoorden HJ, Pelemans W, Schudel WJ. A randomized trial of geriatric liaison intervention in elderly medical inpatients. *Psychosom Med* 1997;**59**(6):585–91.

68. Beckie T. A supportive-educative telephone program: impact on knowledge and anxiety after coronary artery bypass graft surgery. *Heart Lung* 1989;**18**(1):46–55.

69. Townsend J, Piper M, Frank AO, Dyer S, North WR, Meade TW. Reduction in hospital readmission stay of elderly patients by a community based hospital discharge scheme: a randomised controlled trial. *BMJ* 1988;**297**(6647):544–7.

70. Smith DM, Weinberger M, Katz BP, Moore PS. Postdischarge care and readmissions. *Med Care* 1988;**26**(7):699–708.

71. Mor V, Granger CV, Sherwood CC. Discharged rehabilitation patients: impact of follow-up surveillance by a friendly visitor. *Arch Phys Med Rehabil* 1983;**64**(8):346.

72. Wong J, Wong S, Nolde T, Yabsley RH. Effects of an experimental program on post-hospital adjustment of early discharged patients. *Int J Nurs Stud* 1990;**27**(1):7–20.

73. Weinberger M, Oddone EZ, Henderson WG. Does increased access to primary care reduce hospital readmissions? Veterans Affairs Cooperative Study Group on Primary Care and Hospital Readmission. *N Engl J Med* 1996;**334**(22):1441–7.

74. Donald IP, Baldwin RN, Bannerjee M. Gloucester hospital-at-home: a randomized controlled trial. *Age Ageing* 1995;**24**(5):434–9.

75. Hui E, Lum CM, Woo J, Or KH, Kay RL. Outcomes of elderly stroke patients. Day hospital versus conventional medical management. *Stroke* 1995;**26**(9):1616–19.

76. Melin AL, Wieland D, Harker JO, Bygren LO. Health outcomes of post-hospital in-home team care: secondary analysis of a Swedish trial. *J Am Geriatr Soc* 1995;**43**(3):301–7.

77. Melin AL, Bygren LO. Perceived functional health of frail elderly in a primary home care programme and correlation of self-perception with objective measurements. *Scand J Soc Med* 1993;**21**(4):256–63.

78. Melin AL, Hakansson S, Bygren LO. The cost-effectiveness of rehabilitation in the home: a study of Swedish elderly. *Am J Public Health* 1993;**83**(3):356–62.

79. Melin AL, Bygren LO. Efficacy of the rehabilitation of elderly primary health care patients after short-stay hospital treatment. *Med Care* 1992;**30**(11):1004–15.

80. Martin F, Oyewole A, Moloney A. A randomized controlled trial of a high support hospital discharge team for elderly people. *Age Ageing* 1994;**23**(3):228–34.

81. Fitzgerald JF, Smith DM, Martin DK, Freedman JA, Katz BP. A case manager intervention to reduce readmissions. *Arch Intern Med* 1994;**154**(15):1721–9.

82. Gladman JR, Lincoln NB, Barer DH. A randomised controlled trial of domiciliary and hospital-based rehabilitation for stroke patients after discharge from hospital. *J Neurol Neurosurg Psychiatry* 1993;**56**(9):960–6.

83. Gladman JR, Lincoln NB. Follow-up of a controlled trial of domiciliary stroke rehabilitation (DOMINO Study). *Age Ageing* 1994;**23**(1):9–13.

84. Williams EI, Greenwell J, Groom LM. The care of people over 75 years old after discharge from hospital: an evaluation of timetabled visiting by health visitor assistants. *J Public Health Med* 1992;**14**(2):138–44.

85. Hansen FR, Spedtsberg K, Schroll M. Geriatric follow-up by home visits after discharge from hospital: a randomized controlled trial. *Age Ageing* 1992;**21**(6):445–50.

86. Logan PA, Ahern J, Gladman JR, Lincoln NB. A randomized controlled trial of enhanced Social Service occupational therapy for stroke patients. *Clin Rehabil* 1997;**11**(2):107–13.

87. Williams H, Blue B, Langlois PF. Do follow-up home visits by military nurses of chronically ill medical patients reduce readmissions? *Milit Med* 1994;**159**(2):141–4.

88. Dunn RB, Lewis PA, Vetter NJ, Guy PM, Hardman CS, Jones RW. Health visitor intervention to reduce days of unplanned hospital re-admission in patients recently discharged from geriatric wards: The results of a randomised controlled study. *Arch Gerontol Geriatr* 1994;**18**(1):15–23.

89. Dunn RB, Guy PM, Hardman CS, Lewis PA, Vetter NJ. Can a house call by a public health nurse improve the quality of the discharge process for geriatric patients? *Clin Perform Qual Health Care* 1995;**3**:151–5.

90. Rodgers H, Soutter J, Kaiser W, Pearson P, Dobson R, Skilbeck C, *et al.* Early supported hospital discharge following acute stroke: pilot study results. *Clin Rehabil* 1997;**11**(4):280–7.

91. McNamee P, Christensen J, Soutter J, Rodgers H, Craig N, Pearson P, *et al.* Cost analysis of early supported hospital discharge for stroke. *Age Ageing* 1998;**27**(3):345–51.

92. Rogers H. Development of an early supported hospital discharge policy following acute stroke – an evaluation. Final report. University of Newcastle-upon-Tyne, 1997.

93. Rudd AG, Wolfe CDA, Tilling K, Beech R. Randomised controlled trial to evaluate early discharge scheme for patients with stroke. *BMJ* 1997;**315**(7115):1039–44.

94. Beech R, Rudd AG Tilling, K, Wolfe CDA. Economic consequences of early inpatient discharge to community-based rehabilitation for stroke in an inner London teaching hospital. *Stroke* 1999;**30**:729–35.

95. Rawl SM, Easton KL, Kwiatkowski S, Zemen D, Burczyk B. Effectiveness of a nurse-managed follow-up program for rehabilitation patients after discharge. *Rehabil Nurs* 1922;**23**(4):204–9.

96. Richards SH, Coast J, Gunnell DJ, Peters TJ, Pounsford J, Darlow M. Randomised controlled trial comparing effectiveness and acceptability of an early discharge, hospital at home scheme with acute hospital care. *BMJ* 1998;**316**(7147):1796–801.

97. Coast J, Richards SH, Peters TJ, Gunnell DJ, Darlow M, Pounsford J. Hospital at home or acute hospital care? A cost minimisation analysis. *BMJ* 1998;**316**:1802–6.

98. Phillips CY. Postdischarge follow-up care: effect on patient outcomes. *J Nurs Care Qual* 1993;**7**(4):64–72.

99. Stewart S, Pearson S, Luke CG, Horowitz JD. Effects of home-based intervention on unplanned readmissions and out-of-hospital deaths. *J Am Geriatr Soc* 1998;**46**(2):174–80.

100. Stewart S, Pearson S, Horowitz, JD. Effects of a home-based intervention among patients with congestive heart failure discharged from acute hospital care. *Arch Intern Med* 1998;**158**(10): 1067–72.

101. Stewart S, Vandenbroek AJ, Pearson S, Horowitz JD. Prolonged beneficial effects of a home-based intervention on unplanned readmissions and mortality among patients with congestive heart failure. *Arch Intern Med* 1999;**159**(3):257–61.

102. Widen Holmqvist L, Von Koch L, Kostulas V, Holm M, Widsell G, Tegler H, *et al.* A randomized controlled trial of rehabilitation at home after stroke in southwest Stockholm. *Stroke* 1998;**29**(3):591–7.

103. Rich MW, Gray DB, Beckham V, Wittenberg C, Luther P. Effect of a multidisciplinary intervention on medication compliance in elderly patients with congestive heart failure. *Am J Med* 1996;**101**(3):270–6.

104. Rich MW, Vinson JM, Sperry JC, Shah AS, Spinner LR, Chung MK, *et al.* Prevention of readmission in elderly patients with congestive heart failure: results of a prospective, randomized pilot study. *J Gen Intern Med* 1993;**8**(11):585–90.

105. Rich MW, Beckham V, Wittenberg C, Leven CL, Freedland KE, Carney RM. A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure. *N Engl J Med* 1995;**333**(18):1190–5.

106. Rich MW, Beckham V, Wittenberg C, Leven CE, Freedland KE, Carney RM. Repetitive hospital admissions for congestive heart failure in the elderly. *Am J Geriatr Cardiol* 1996;**5**(3):32–6.

107. Pereles L, Romonko L, Murzyn T, Hogan D, Silvius J, Stokes E, *et al.* Evaluation of a self-medication program. *J Am Geriatr Soc* 1996;**44**(2):161–5.

108. Williford SL, Johnson DF. Impact of pharmacist counseling on medication knowledge and compliance. *Milit Med* 1995;**160**(11):561–4.

109. Lowe CJ, Raynor DK, Courtney EA, Purvis J, Teale C. Effects of self medication programme on knowledge of drugs and compliance with treatment in elderly patients. *BMJ* 1995;**310**(6989):1229–31.

110. Gilliss CL, Gortner SR, Hauck WW, Shinn JA, Sparacino PA, Tompkins C. A randomized clinical trial of nursing care for recovery from cardiac surgery. *Heart Lung* 1993;**22**(2):125–33.

111. Lipton HL, Bird JA. The impact of clinical pharmacists' consultations on geriatric patients' compliance and medical care use: a randomized controlled trial. *Gerontologist* 1994;**34**(3):307–15.

112. Cline CMJ, Israelsson BYA, Willenheimer RB, Broms K, Erhardt LR. Cost effective management programme for heart failure reduces hospitalisation. *Heart London* 1998;**80**(5):442–6.

113. Winograd, CH, Gerety MB, Lai NA. A negative trial of inpatient geriatric consultation – lessons learned and recommendations for future research. *Arch Intern Med* 1993;**1**:2017–23.

114. Parfrey PS, Gardner E, Vavasour H, Harnelt JD, McManamon C, McDonald J. The feasibility and efficacy of early discharge planning initiated by the admitting department in two acute care hospitals. *Clin Invest Med* 1999;**17**(2):88–96.

115. McInnes E, Mira M, Atkin N, Kennedy P, Cullen J. Can GP input into discharge planning result in better outcomes for the frail aged: results from a randomised controlled trial. *Fam Pract* 1999;**16**:289–93.

116. Nielsen M, Blenker M, Bloom M. Older persons after hospitalisation. A controlled study of home aid services. *Am J Public Health* 1972;**62**:1094–101.

117. Haddock S. Collaborative discharge planning: nursing and social services. *Clin Nurs Specialist* 1994;**8**(5):248–52.

118. Naylor MD. Comprehensive discharge planning for hospitalised elderly: a pilot study. *Nurs Res* 1990;**39**(3):156–61.

119. Williams EI, Fitton F. Factors affecting early unplanned readmission of elderly patients to hospital. *BMJ* 1988;**297**:784–7.

120. Styrborn K. Early discharge planning for elderly patients in acute hospitals. *Scand J Soc Med* 1995;**23**:273–85.

121. Farren EA. Effects of early discharge planning on length of hospital stay. *Nurs Econ* 1991;**9**:25–20,63.

122. Naylor M, Brooten D, Jones R, La Vizzomourey R, Mezey M, Pauly M. Comprehensive discharge planning for the hospitalized elderly – a randomized clinical trial. *Ann Int Med* 1994;**120**:999–1006.

123. Shepperd S, Parkes J. Discharge planning from hospital to home. Cochrane Database of Systematic Reviews, 2000.

124. Rubenstein LZ, Stuck AE, Siu AL, Wieland D. Impacts of geriatric evaluation and management programs on defined outcomes: overview of the evidence. *J Am Geriartr Soc* 1991;**39**(suppl):8–16.

125. Melin Al, Byrgeb LO. Efficacy of the rehabilitation of elderly primary health care patients after short stay hospital treatment. *Med Care* 1992;**30**:1004–15.

126. Epstein AM, Hall JA, Fretwell M, Feldstein M, DeCiantis ML, Tognetti J, *et al.* Consultative geriatric assessment for ambulatory patients: a randomized trial in a health maintenance organization. *JAMA* 1990;**263**:8–44.

127. Stuck AE, Aronow HU, Steiner A, Alessi CA, Bula CJ, Gold MN, *et al.* A trial of annual in-home comprehensive geriatric assessments for elderly people living in the community. *N Engl J Med* 1995;**333**:1184–9.

128. Warren MW. Care of the chronic aged sick. *Lancet* 1946;841–3.

129. Warren MW. Rehabilitation of the elderly patient. *Ann Phys Med* 1960;**5**:170.

130. Exton-Smith AN, Crockett GS. The chronic sick under new management – experiences starting a geriatric unit. *Lancet* 1949;**i**:1016–18.

131. NHS Executive. Patient partnership: building a collaborative strategy. London: Department of Health, 1996.

132. Nikolaus T, Specht-Lieble N, Bacj M, Oster P, Schlierf G. A randomized trial of comprehensive geriatric assessment and home intervention in the care of hospitalized patients. *Age Ageing* 1999;**28**:543–50.

133. NHS Executive. The patient partnership strategy. London: Department of Health, 1996.

134. Audit Commission. The coming of age: improving care services for older people. London: Audit Commission, 1997.

135. Parker G, Phelps K, Shepperdson B, Bhakta P, Katbamna S, Lovett C. Best place of care for older people after acute and during sub-acute illness: report of a national survey. Leicester: NCCSU, University of Leicester 1999.

136. Shepperd S, Iliffe S. The effectiveness of hospital at home compared with in-patient hospital care: a systematic review. *J Public Health Med* 1998;**20**(3):344–50.

137. Parker SG, Du X, Bardsley MJ, Goodfellow J, Cooper RG, Cleary R, *et al.* Measuring outcomes in care of the elderly. *J R Coll Physicians Lond* 1994;**28**(5):428–33.

138. Fitzpatrick R, Davey C, Buxton MJ, Jones DR. Evaluating patient-based outcome measures for use in clinical trials. *Health Technol Assess* 1998;**2**(14).

139. Brown SA. Studies of educational intervention and outcomes in diabetic adults: a meta-analysis revisited. *Patient Ed Counsel* 1990;**16**(3):189–215.

140. Superio-Cabuslay E, Ward MM, Lorig KR. Patient education interventions in osteoarthritis and rheumatoid arthritis: a meta-analytic comparison with nonsteroidal and anti-inflammatory drug treatment. *Arthritis Care Res* 1996;**9**(4):292–301.

141. Mullen PD, Mains DA, Velez R. A meta-analysis of controlled trials of cardiac patient education. *Patient Ed Counsel* 1992;**19**:143–62.

142. Gibson PG, Coughlan J, Wilson AJ, Hensley MJ, Abramson M, Bauman A, *et al.* Limited (information only) patient education programs for adults with asthma (Cochrane Review). In: The Cochrane Library, Issue 2, 1999. Oxford: Update Software.

143. Gross AR, Aker PD, Goldsmith CH, Peloso P. Patient education for mechanical neck disorder (Cochrane Review). In: The Cochrane Library, Issue 2, 1999. Oxford: Update Software.

144. Thompson C, Thompson G. Support for carers of people with Alzheimer's type dementia (Cochrane Review). In: The Cochrane Library, Issue 2, 1999. Oxford: Update Software.

145. Devine EC, Reifschneider E. A meta-analysis of the effects of psychoeducational care in adults with hypertension. *Nurs Res* 1995;**44**:237–45.

146. Bero LA, Mays NB, Barjesteh K, Bond C. Expanding the roles of outpatient pharmacists: effects on health services utilisation, costs, and patient outcomes (Cochrane Review). In: The Cochrane Library, Issue 2, 1999. Oxford: Update Software.

147. Haynes RB, McKibbon KA, Kanani R, Brouwers MC, Oliver T. Interventions to help patients to follow prescriptions for medications (Cochrane Review). In: The Cochrane Library, Issue 2, 1999. Oxford: Update Software.

148. Devine EC. Effects of psychoeducational care for adult surgical patients: a meta-analysis of 191 studies. *Patient Ed Counsel* 1992;**19**:127–42.

149. El-Darzi E, Vasilikis C, Chaussalet T, Millard PH. A simulation modelling approach to evaluating length of stay, occupancy, emptiness and bed blocking in a hospital geriatric department. *Healthcare Manage Sci* 1998;**1**(2):143–9.

150. NHSME. Assessing the effects of health technologies. London: HMSO, 1992.

151. Rosenberg W, Donald A. Evidence based medicine: an approach to clinical problem solving. *BMJ* 1995;**310**:1122–6.

152. Peto R. Why do we need systematic overviews of randomized trials? *Stat Med* 1987;**6**:233–40.

153. Peto R, Collins R, Gray R. Large scale randomized evidence: large, simple trials and overviews of trials. *J Clin Epidemiol* 1995;**48**:23–40.

154. Smyth JF, Mossman J, Hall R, Hepburn S, Pinkerton R, Richards M, *et al.* Conducting clinical research in the new NHS: the model of cancer. United Kingdom Coordinating Committee on Cancer Research. *BMJ* 1994;**309**:457–61.

155. Dubinsky M, Ferguson JH. Analysis of the national institutes of health medicare coverage assessment. *Int J Technol Assess Health Care* 1990;**6**:480–8.

156. Sacks HS, Berrier J, Reitman D, Ancona-Berk VA, Chalmers TC. Meta analysis of randomized controlled trials. *N Engl J Med* 1987;**316**:450–5.

157. Teo KK, Yusuf S, Collins R, Held PH, Peto R. Effect of intravenous magnesium in suspected myocardial infarction: overview of randomised trials. *BMJ* 1991;**303**:1499–503.

158. Woods KL, Fletcher S, Roffe C, Haider Y. Intravenous magnesium sulphate in suspected acute myocardial infarction: results of the second Leicester Intravenous Magnesium Intervention Trial (LIMIT-2). *Lancet* 1992;**339**:1553–8.

159. Britton, McKee M, Black N, McPherson K, Sanderson C, Bain C. Choosing between randomised and non-randomised studies: a systematic review. *Health Technol Assess* 1998;**2**(13).

160. Concato J, Shah N, Horowitz RI. Randomized controlled trials, observational studies and the hierarchy of research designs. *N Engl J Med* 2000;**342**(25):1887–92.

161. Benson K, Hartz J. A comparison of observational studies and randomized controlled trials. *N Engl J Med* 2000;**342**(25):1878–86.

Appendix 1

Data collection forms

Hospital discharge arrangements for older people
Quality checklist & data extraction form (Version P2)

Publication details

Author(s)
Article title
Source (inc. journal, year, vol, pages)

Contact name/institution/ address

OPEN INTRODUCTION & METHODS ENVELOPE & FILL IN AS MANY OF THE FOLLOWING DETAILS AS POSSIBLE, USING THE BLACK PEN

Relevance

Inclusion:

1. Is the study looking at an intervention designed to modify discharge? YES NO No, but general interest

2. Are the subjects experiencing, or have they experienced, discharge from inpatient hospital care? (Either patients or carers). YES NO

Exclusion:

3. Is the study drug/disease specific? YES NO Yes, but of interest

4. Are any of the patients 65 years of age or over? YES NO

Age range/No. of patients _____

Quality of study

5. Were the inclusion/exclusion criteria clearly stated? YES NO

6. Was the study described as random? Described & appropriate Only stated
Pseudo NO
Details: _____

7. Was there a control group? YES NO

8. Were the control and treatment groups comparable at entry? YES NO Only stated
Not stated On majority of measures
Details: _____

9. Were the groups treated identically other than for the named intervention? YES NO Not stated
Details: _____

10. Was relatively complete follow-up achieved for subjects?	YES NO *Give figs if nec.*	Not stated _____
11. Were dropouts/ withdrawals described/ stated?	YES NO	Only stated
12. Were the statistical methods described?	YES No	Only stated

Based on the information in the Introduction and Methods sections, in your opinion, is the study an RCT?	YES NO Unclear from info. Reason? _____

OPEN RESULTS SECTION NOW IF NECESSARY & FILL IN DETAILS WITH <u>RED</u> PEN

Does looking at the Results section change your decision?	YES NO
New decision: Is study an RCT?	YES NO
If study is NOT an RCT, would you still consider this study for inclusion at a later date?	YES NO Reason? _____
How would you classify the study?	Controlled trial (either with pseudo or no randomisation) Cohort study (prospective) Cohort study (retrospective) Controlled Before and After study Survey Other (*Please specify)* _____

C. Study Details.

1. Location. *(Country/ region if known)*

Australia	_____	Sweden	_____
Denmark	_____	UK	_____
New Zealand	_____	USA	_____
		Other *(Specify)*	_____

2. Setting. *(tick more than 1 box if necessary)*

community	DGH/acute care hospital
veterans medical center/hospital	tertiary care hospital
outpatient clinic _____	research center
geriatric inpatient units	other
community (district) hospital	not stated

- ***2a. If hospital, was it a teaching hospital ?*** yes no
- ***2b. If stated:*** urban rural

3. Year(s) and duration of the study.

stated *(please describe)*

_____

_____

_____

not stated

4. Was consent of the participants obtained ?

yes no not stated/unclear

5. Were arrangements made for consent to be obtained from a 3rd party if the participants was unable to provide it. ?

yes no not stated/unclear

D. Recruitment procedure.

1. Who recruited participants ? _____

2. How were participants recruited ?_____

Target Population:

3. Was the intervention targetted towards people with a specific condition ?

no yes _____ *(state which)*

4. Inclusion Criteria.

all admissions to ward target condition admissions

discharge destination expected length of stay _____ *(state)*

age group _____ *(state)* physical health _____ *(state)*

geographical location availability of carer support

anticipated need for rehab. anticipated need for services

self-caring/medicating absence of complications

pragmatic considerations _____ *(describe)*

other _____

5. Exclusion Criteria.

non-English speakers not contactable by telephone

cognitive impairment ITU admissions

CCU admissions receiving chemotherapy

living in a nursing home visual/hearing impairment

life-threatening illness likelihood of discharge to LTC/other hospital

no carer short lengths of stay *(state duration)* _____

distance of residence from hospital _____ *(state)*

other _____

E. Quality of Study.

1. Concealment of allocation .

yes no not stated/unclear

2. Did the paper include power calculations?

yes no

If yes, 2a. did the study achieve the numbers required.?

yes no

3. Was there a clear statement of inclusion/exclusion criteria?

yes no

4. Was there a baseline assessment before intervention?

yes no

5. Were groups comparable at baseline? (results in F4. - grid-)

yes no only stated

not stated on most measures

6. Protection against contamination

yes no not stated/unclear

7. Were reliable primary outcomes used?

yes no some unclear

8. Blinded assessment of primary outcomes?

yes no not stated/unclear

9. Description of drop-outs

yes no not stated/unclear

10. 80%+ final follow-up of total sample randomised?

yes no not stated/unclear

Description of attrition during study	
Study Group	**1. Control Group**

F. Participant characteristics.

1. When were baseline measurements taken?

_____

2. Who conducted baseline measurements?

_____

3. Was baseline measurement conducted blind to intervention status ?

yes no not stated

4. Baseline demographic characteristics

	Study Group	**Control Group**	**Statistical comparison of groups? (which tests)**	**Equivalence at baseline(eg. statistical significance)**
Original sample size				
Number(%)				
female:				
male:				
Age ***(state units: eg. mean/SD/ median/range % over stated age)***				
Ethnicity: number (%)				
white				
black				
Asian				
other				
Living status: number (%)				
alone				
with partner				
with family				
with unrelated carer				
with outside assistance				
other				
Education mean no. years				

5. Other Baseline Measures.

Measure	**Name/ description of measure**	**Results**		**Comparable group ? (p-value)**	**Validated measure?** *yes/no by author/ other*	**Used as outcome measure?** *yes/no*
(tick as many as appropriate)		**Study group**	**Controls**			
Diagnosis						
Medical/psychiatric conditions or status						
Functional status/dependency/ self-care (ADL)						
Health status						
Continence						
Recent use of health services						
Recent use of social services						
Mental Status						
Depression						
Morale/mood state						
Alcoholism screen						
Instrumental Activities of Daily Living						
Social interactions/support						
Social dependency						
Patient satisfaction						
Quality of life/wellbeing						
Patient knowledge						
Patient compliance						
Preparedness for discharge						
Length of stay						
Medications on discharge						
Other(s)						

G. Outcome Measurement.

1. When were follow-up measurements taken? _____

2. Who conducted follow-up measurements ? _____

3. Was follow-up measurement conducted blind to intervention status ?

yes no not stated

4. Outcome Measures.

Measure	**Used as outcome measure?**	**Name/ description of measure**	**Validated ?** *yes/no by author/ other*	**Measured for both groups ?**	**Statistical test used for comparison of groups**
			NB. do not fill in these 2 columns if already completed in baseline measurement table		
Mortality					
Index length of stay					
Readmission to hospital					
No. days in hospital					
Discharge destination					
Destination at final follow-up					
Days in institutions					
(Changes in) physical function					
(Changes in) mental function					
Use of services					
Quality of life					
Participant/patient satisfaction					
Carer satisfaction					
Costs of intervention					
Compliance					
Knowledge					
Other: 1					
Other: 2					

H. Results.

1. Outcome Measures: Mortality, length of stay and readmissions.

Outcome Measure	Results		Statistical significance
Mortality	**Death rate: n (%) of original sample**		
	study group	**control group**	
Length of index stay	**days: number/mean number**		
	study group	**control group**	
Readmission to hospital *(state time period)*	**study group**	**control group**	
number participants			
number days			

2. Outcome Measures: discharge destination, destination at final follow-up, admission to long-term care and days in long-term care.

Outcome Measure	Results		Statistical Significance
Discharge destination	**Place of discharge**		
	Study group	**control group**	
Destination at final follow-up	**Where living at follow-up**		
	Study group	**control group**	
Admission to LTC	**Number (%) admitted to long-term care during follow-up period**		
	Study group	**control group**	
Days in LTC	**Number/mean number days in long-term care during follow-up period**		
	Study group	**control group**	

3. Outcome Measures: Changes in Physical and mental functioning.

Outcome Measure	Results		Statistical significance
Change in physical function	**change between baseline and follow-up**		
	study group	**control group**	
Change in mental function	**change between baseline and follow-up**		
	study group	**control group**	

4. Outcome Measures: quality of life, patient satisfaction, impact on carers.

Outcome Measure	Results		Statistical Significance
Impact on quality of life	**change between baseline and follow-up assessments**		
	study group	**control group**	
Patient satisfaction	**change between baseline and follow-up assessments**		
	study group	**control group**	
Impact on informal carers/family	**change between baseline and follow-up assessments**		
	study group	**control group**	

5. Outcome Measures: use of services, costs of services

Outcome Measure	Description of calculations	Results		Statistical significance
Use of services	**How service use calculated (Over what period)**	**study group**	**control group**	
Costs to health/social service providers	**How costs calculated to health service (Over what period)**	**study group**	**control group**	

6. Outcome Measures: Compliance and knowledge.

Outcome measure	Results		Statistical Significance
Compliance	**Study Group**	**Control Group**	
Knowledge	**Study Group**	**Control Group**	

7. Outcome Measures: Others.

Outcome measure	**Results**		**Statistical Significance**
_____ ***(please state)***	**Study Group**	**Control Group**	
_____ ***(please state)***	**Study Group**	**Control Group**	

8. **Other descriptive results.**

_____

_____

_____

_____

_____

_____

_____

No. 3
Rituximab as third-line treatment for refractory or recurrent Stage III or IV follicular non-Hodgkin's lymphoma: a systematic review and economic evaluation.

By Wake B, Hyde C, Bryan S, Barton P, Song F, Fry-Smith A, *et al.*

No. 4
A systematic review of discharge arrangements for older people.

By Parker SG, Peet SM, McPherson A, Cannaby AM, Baker R, Wilson A, *et al.*

Health Technology Assessment Programme

Prioritisation Strategy Group

Members

Chair
Professor Kent Woods
Director,
NHS HTA Programme, &
Professor of Therapeutics
University of Leicester

Professor Bruce Campbell
Consultant General Surgeon
Royal Devon & Exeter Hospital

Professor Shah Ebrahim
Professor of Epidemiology
of Ageing
University of Bristol

Dr John Reynolds
Clinical Director
Acute General Medicine SDU
Oxford Radcliffe Hospital

Dr Ron Zimmern
Director, Public Health
Genetics Unit
Strangeways Research
Laboratories, Cambridge

HTA Commissioning Board

Members

Programme Director
Professor Kent Woods
Director, NHS HTA
Programme, &
Professor of Therapeutics
University of Leicester

Chair
Professor Shah Ebrahim
Professor of Epidemiology
of Ageing
University of Bristol

Deputy Chair
Professor Jon Nicholl
Director, Medical Care
Research Unit
University of Sheffield

Professor Douglas Altman
Director, ICRF Medical
Statistics Group
University of Oxford

Professor John Bond
Director, Centre for Health
Services Research
University of Newcastle-
upon-Tyne

Ms Christine Clark
Freelance Medical Writer
Bury, Lancs

Professor Martin Eccles
Professor of
Clinical Effectiveness
University of Newcastle-
upon-Tyne

Dr Andrew Farmer
General Practitioner &
NHS R&D
Clinical Scientist
Institute of Health Sciences
University of Oxford

Professor Adrian Grant
Director, Health Services
Research Unit
University of Aberdeen

Dr Alastair Gray
Director, Health Economics
Research Centre
Institute of Health Sciences
University of Oxford

Professor Mark Haggard
Director, MRC Institute
of Hearing Research
University of Nottingham

Professor Jenny Hewison
Senior Lecturer
School of Psychology
University of Leeds

Professor Alison Kitson
Director, Royal College of
Nursing Institute, London

Dr Donna Lamping
Head, Health Services
Research Unit
London School of Hygiene
& Tropical Medicine

Professor David Neal
Professor of Surgery
University of Newcastle-
upon-Tyne

Professor Gillian Parker
Nuffield Professor of
Community Care
University of Leicester

Dr Tim Peters
Reader in Medical Statistics
University of Bristol

Professor Martin Severs
Professor in Elderly
Health Care
University of Portsmouth

Dr Sarah Stewart-Brown
Director, Health Services
Research Unit
University of Oxford

Professor Ala Szczepura
Director, Centre for Health
Services Studies
University of Warwick

Dr Gillian Vivian
Consultant in Nuclear
Medicine & Radiology
Royal Cornwall Hospitals Trust
Truro

Professor Graham Watt
Department of
General Practice
University of Glasgow

Dr Jeremy Wyatt
Senior Fellow
Health Knowledge
Management Centre
University College London

continued

continued

Diagnostic Technologies & Screening Panel

Members

Chair
Dr Ron Zimmern
Director, Public Health Genetics Unit
Strangeways Research Laboratories
Cambridge

Dr Philip J Ayres
Consultant in Epidemiology & Public Health
The Leeds Teaching Hospitals NHS Trust

Mrs Stella Burnside
Chief Executive, Altnagelvin Hospitals Health & Social Services Trust
Londonderry
Northern Ireland

Dr Paul O Collinson
Consultant Chemical Pathologist & Senior Lecturer
St George's Hospital, London

Dr Barry Cookson
Director, Laboratory of Hospital Infection
Public Health Laboratory Service, London

Professor Howard Cuckle
Professor of Reproductive Epidemiology
University of Leeds

Dr Carol Dezateux
Senior Lecturer in Paediatric Epidemiology
Institute of Child Health
London

Professor Adrian K Dixon
Professor of Radiology
Addenbrooke's Hospital
Cambridge

Mr Steve Ebdon-Jackson
Head, Diagnostic Imaging & Radiation Protection Team
Department of Health, London

Dr Tom Fahey
Senior Lecturer in General Practice
University of Bristol

Dr Andrew Farmer
General Practitioner & NHS Clinical Scientist
Institute of Health Sciences
University of Oxford

Mrs Gillian Fletcher
Antenatal Teacher & Tutor
National Childbirth Trust
Reigate

Professor Jane Franklyn
Professor of Medicine
University of Birmingham

Dr JA Muir Gray
Joint Director, National Screening Committee
NHS Executive, Oxford

Dr Peter Howlett
Executive Director – Development
Portsmouth Hospitals NHS Trust

Professor Alistair McGuire
Professor of Health Economics
City University, London

Mrs Kathlyn Slack
Professional Support
Diagnostic Imaging & Radiation Protection Team
Department of Health
London

Mr Tony Tester
Chief Officer, South Bedfordshire Community Health Council
Luton

Pharmaceuticals Panel

Members

Chair
Dr John Reynolds
Clinical Director – Acute General Medicine SDU
Oxford Radcliffe Hospital

Dr Felicity J Gabbay
Managing Director, Transcrip Ltd
Milford-on-Sea, Hants

Mr Peter Golightly
Director, Trent Drug Information Services
Leicester Royal Infirmary

Dr Alastair Gray
Director, Health Economics Research Centre
Institute of Health Sciences
University of Oxford

Mrs Jeannette Howe
Senior Principal Pharmacist
Department of Health, London

Dr Andrew Mortimore
Consultant in Public Health Medicine
Southampton & South West Hants Health Authority

Mr Nigel Offen
Head of Clinical Quality
NHS Executive – Eastern
Milton Keynes

Professor Robert Peveler
Professor of Liaison Psychiatry
Royal South Hants Hospital
Southampton

Mrs Marianne Rigge
Director, College of Health
London

Dr Frances Rotblat
Manager, Biotechnology Group
Medicines Control Agency
London

Mr Bill Sang
Chief Executive
Salford Royal Hospitals NHS Trust

Dr Eamonn Sheridan
Consultant in Clinical Genetics
St James's University Hospital
Leeds

Mrs Katrina Simister
New Products Manager
National Prescribing Centre
Liverpool

Dr Ross Taylor
Senior Lecturer
Department of General Practice & Primary Care
University of Aberdeen

Dr Richard Tiner
Medical Director
Association of the British Pharmaceutical Industry
London

Professor Jenifer Wilson-Barnett
Head, Florence Nightingale Division of Nursing & Midwifery
King's College, London

Mr David J Wright
Chief Executive
International Glaucoma Association, London

Therapeutic Procedures Panel

Members

Chair
Professor Bruce Campbell
Consultant General Surgeon
Royal Devon & Exeter Hospital

Professor John Bond
Professor of
Health Services Research
University of Newcastle-upon-Tyne

Ms Judith Brodie
Head of Cancer
Support Service
Cancer BACUP, London

Ms Tracy Bury
Head of Research
& Development
Chartered Society of
Physiotherapy, London

Mr Michael Clancy
Consultant in A&E Medicine
Southampton General Hospital

Professor Collette Clifford
Professor of Nursing
University of Birmingham

Dr Katherine Darton
Information Unit
MIND – The Mental Health
Charity, London

Mr John Dunning
Consultant Cardiothoracic
Surgeon
Papworth Hospital NHS Trust
Cambridge

Mr Jonothan Earnshaw
Consultant Vascular Surgeon
Gloucestershire Royal Hospital

Professor David Field
Professor of Neonatal Medicine
The Leicester Royal Infirmary
NHS Trust

Professor FD Richard Hobbs
Professor of Primary Care
& General Practice
University of Birmingham

Mr Richard Johanson
Consultant & Senior Lecturer
North Staffordshire Infirmary
NHS Trust, Stoke-on-Trent

Dr Duncan Keeley
General Practitioner
Thame, Oxon

Dr Phillip Leech
Principal Medical Officer
Department of Health, London

Professor James Lindesay
Professor of Psychiatry for
the Elderly
University of Leicester

Professor Rajan Madhok
Director of Health Policy
& Public Health
East Riding & Hull
Health Authority

Dr Mike McGovern
Branch Head
Department of Health
London

Dr John C Pounsford
Consultant Physician
Frenchay Healthcare Trust
Bristol

Dr Mark Sculpher
Senior Research Fellow in
Health Economics
University of York

Dr Ken Stein
Consultant in Public
Health Medicine
North & East Devon
Health Authority, Exeter

Expert Advisory Network

Members

Professor John Brazier
Director of Health Economics
University of Sheffield

Mr Shaun Brogan
Chief Executive, Ridgeway
Primary Care Group
Aylesbury, Bucks

Mr John A Cairns
Director, Health Economics
Research Unit
University of Aberdeen

Dr Nicky Cullum
Reader in Health Studies
University of York

Professor Pam Enderby
Chair of Community
Rehabilitation
University of Sheffield

Mr Leonard R Fenwick
Chief Executive
Freeman Hospital
Newcastle-upon-Tyne

Ms Grace Gibbs
Deputy Chief Executive
West Middlesex
University Hospital

Dr Neville Goodman
Consultant Anaesthetist
Southmead Hospital, Bristol

Professor Robert E Hawkins
CRC Professor & Director of
Medical Oncology
Christie Hospital NHS Trust
Manchester

Professor Allen Hutchinson
Director of Public Health &
Deputy Dean, ScHARR
University of Sheffield

Professor David Mant
Professor of General Practice
Institute of Health Sciences
University of Oxford

Professor Alexander Markham
Director
Molecular Medicine Unit
St James's University Hospital
Leeds

Dr Chris McCall
General Practitioner
Corfe Mullen, Dorset

Dr Peter Moore
Freelance Science Writer
Ashtead, Surrey

Dr Sue Moss
Associate Director, Cancer
Screening Evaluation Unit
Institute of Cancer Research
Sutton, Surrey

Mrs Julietta Patnick
National Coordinator
NHS Cancer Screening
Programmes, Sheffield

Professor Jennie Popay
Professor of Sociology &
Community Health
University of Salford

Professor Chris Price
Professor of
Clinical Biochemistry
St Bartholomew's & The
Royal London School of
Medicine & Dentistry

Mr Simon Robbins
Chief Executive
Camden & Islington
Health Authority, London

Dr William Rosenberg
Senior Lecturer &
Consultant in Medicine
University of Southampton

Dr Sarah Stewart-Brown
Director, Health Services
Research Unit
University of Oxford

Dr Gillian Vivian
Consultant in Nuclear
Medicine & Radiology
Royal Cornwall Hospitals Trust
Truro

Mrs Joan Webster
Former Chair
Southern Derbyshire
Community Health Council
Nottingham

Feedback

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

The Correspondence Page on the HTA website (http://www.ncchta.org) 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.

Copies of this report can be obtained from:

The National Coordinating Centre for Health Technology Assessment,
Mailpoint 728, Boldrewood,
University of Southampton,
Southampton, SO16 7PX, UK.
Fax: +44 (0) 23 8059 5639 Email: hta@soton.ac.uk
http://www.ncchta.org

ISSN 1366-5278