# Hospital Readmissions in Frail Older People

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Abstract

**Background**: The majority of hospital in-patients are older people, and many of these are at increased risk of readmission, which can be an adverse outcome for the patient. Currently there is poor understanding as to how best to reduce the risk of readmission.

**Methods**: We searched Medline, EMBASE and the Cochrane library for high quality review articles about readmissions. Each review was quality assessed by two reviewers. Grouped data and evidence from original papers in cited with 95% confidence intervals when possible.

**Results:** Nine review studies of sufficient quality were included. Two addressed risk factors for readmission, which included: age, poor functional status prior to admission, length of stay during the index admission, depression, cognitive impairment, malnutrition, social support and social networks/support. The seven other reviews addressed interventions to reduce readmission, which included: discharge planning; post-discharge support, post-discharge case management, and nutritional supplementation.

**Conclusions :** It is possible to identify older people at risk of readmission using well-established risk factors; discharge planning, post-discharge support and nutritional interventions appear to be effective in reducing readmission. Combined interventions appear to be more effective than isolated interventions.

## Introduction

Older people (defined as people over 65) are the major users of health and social care systems across the Western word. The majority of hospital in-patients are older people, and many of these are at increased risk of readmission; in England, 14% of patients aged over 75 were readmitted within 30 days of discharge during 2008[1], at an estimated cost the NHS £2.6 billion each year[2]. Readmission is considered as an adverse outcome, although some readmissions will be clinically indicated and therefore represent good practice. In many systems, readmission rates above a certain threshold attract financial penalties[3, 4]. The recognition that older people are at particular risk of readmission has led to targeted research and the development of initiatives to improve their outcomes. Whilst readmissions occur in all ages and all settings, the purpose of this article was to focus on readmissions in the general medical care of frail older people.

We undertook a critical analysis of recent reviews; also known as an umbrella review or review of reviews, to formulate an up to date summary of knowledge on readmission in older people, including risk factors for readmission and evidence based interventions that can reduce readmission rates.

## Methods

This paper aims to present evidence from high quality review papers, enabling further insight into best management for reducing readmissions in older people. Medline, EMBASE and Cochrane on-line databases were searched. Target groups were older people (65+) with medical conditions, but not those on disease specific pathways (table 1) in order to maximise generalisability.

In addition to formal database searches, papers were obtained from bibliographies of selected articles. These were only included if they conformed to the pre-specified selection criteria.

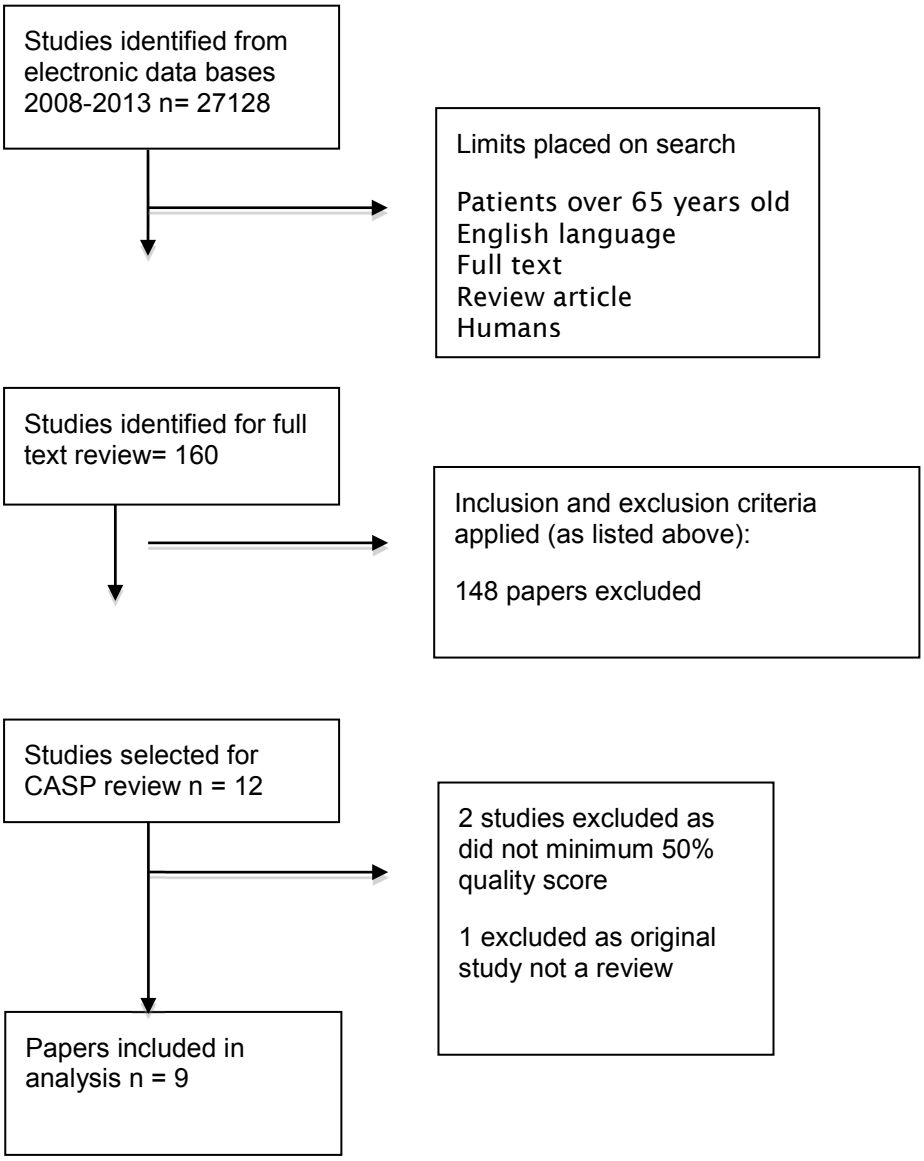
Final papers for inclusion in the review were selected by consensus between two reviewers (SC, EC). Full text articles were then graded by the reviewers using the CASP tool for systematic reviews. The CASP tool for systematic reviews consists of 10 questions, of which seven or eight (depending on whether or not there was a meta-analysis) can be scored 0/1/2, giving a maximum score per paper of 14-16 marks. We assigned a percentage rating to each paper to allow for differences in the scoring system, and papers scoring above 50% that met the selection criteria were included in the scoping exercise.

### Exclusions

Reviews focussing predominantly upon psychiatric and surgical settings were excluded, to enable generalisable themes common to frail older patients to be studied. A time limit of papers from November 2008 – 2013 was placed in order to obtain recent evidence and to minimise duplications in original evidence cited. Papers which did not score 50% or more on the CASP tool were rejected.

| Table 1 Details of search methods | |
|---|---|
| **Databases searched from Nov 2008 – Nov 2013** | Ovid Medline<br>EMBASE<br>Cochrane library |
| **Search terms used** | Aged, aged 80 and over, health services for the aged<br>Geriatric<br>Elderly<br>Older people, aging<br>Readmissions$, patient readmission<br>Rehospitalisation, rehospitalization |
| **Limits placed on search** | Patients over 65 years old<br>English language<br>Full text<br>Review article<br>Humans |
| **Inclusion criteria placed on search** | Participants aged 65+<br>Reported readmissions as an outcome at any time up to one year<br>Could include a range of common conditions or geriatric syndromes:<br>• COPD<br>• Heart failure<br>• CKD<br>• Pneumonia<br>• Falls<br>• Delirium<br>• Stroke |
| **Exclusion criteria placed on search**<br>(In order to focus on general medical care) | Surgical conditions including hip fracture<br>Intensive care or critical care<br>Psychiatric disorders other than dementia or delirium (i.e. patients in a mental health inpatient setting were excluded from this review) |

Figure 1 paper selection



## Results

In total 160 full texts were reviewed from which 12 papers were selected for CASP review to assess quality. Figure 1 details the paper selection for the 12 papers from the initial search of EMBASE, Ovid and Cochrane.

Overall good quality review papers that fulfilled our inclusion criteria were sparse. Papers that scored less than 50% using the CASP criteria were excluded, leaving nine papers with three exclusions. The results of CASP review are summarised in table 2.

The nine papers selected were published between 2009-2013; the median CASP score was 13. Five reviews included formal meta-analysis, for which sample sizes ranged from just over 2000 participants through to nearly 900,000 participants.

The reviews covered two main themes – risk factors for readmission and interventions to reduce readmission.

| Table 1 Summary of reviews on readmissions | | | | | |
|---|---|---|---|---|---|
| Paper | Author and date published | Description of study | Type of review | Main findings for readmissions | CASP score |
| Paper | Author | Description of intervention | Type of review | Results | CASP score |
| Risk factors for hospital readmission in elderly patients: a systematic review | Garcia-Perez, L, 2011[5] | Systematic review of 12 prospective cohort studies (13,183 patients) in people aged 75 years or more to identify risk factors for readmission | Systematic review | Need for increased vigilance of older people with previous hospital admission, long length of stay, comorbidities and functional status | 12/14, 86% |
| Evidence based risk factors for adverse health outcomes in older patients after discharge home and assessment tools | Preyde M, 2011[6] | Systematic review of 43 research articles to ascertain risk factors for adverse outcomes for older people discharged from acute care facilities. Also to evaluate post-discharge risk assessment tools | Narrative literature review | Paucity of published research<br><br>Most commonly mentioned risk factors were depression, poor cognition, number of comorbidities, length of stay, prior hospital admission, functional status, patient age, multiple medications and lack of social support<br><br>Older people at risk of adverse outcome post-discharge may benefit from comprehensive discharge planning | 7/14, 50% |
| Discharge planning from hospital to home<br><br>(Cochrane review) | Shepperd S, 2013[7] | Meta-analysis of 24 RCTs (8098 patients) – 16 of these RCT exclusively recruited older people in mixed medical & surgical settings<br><br>Explores effectiveness of discharge planning vs non specialised 'usual care' | Meta - analysis | Significant reduction in readmission rate (RR 0.82, 95% CI 0.73 to 0.92)<br><br>In addition significant impact on length of stay<br><br>No impact on mortality<br><br>Little evidence on cost | 14/16, 88% |
| A systematic review of comprehensive geriatric | Conroy S, 2011[8] | Systematic review of 5 Randomised controlled trials (2287 patients) | Systemic review | No clear evidence of benefit of CGA to prevent readmissions from short hospital stays | 14/16, 88% |

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| assessment to improve outcomes for frail older people being rapidly discharged from acute hospital: 'interface geriatrics' | | comparing usual care to CGA in emergency departments or acute medical units | | RR 0.95 (95% CI 0.83 to 1.08). Also no significant benefit in terms of mortality. | |
| Interventions to reduce hospital readmission in the elderly: in-hospital or home care. A systematic review | Linertova R, 2010[9] | Systematic review of 32 clinical trials (25 RCTs, 7 CCTs) evaluating interventions to reduce hospital readmission in people >75 years and role of home follow up | Narrative literature review | Most of the interventions evaluated had no effect on readmissions.<br><br>Those which included post-discharge home care components seemed more likely to reduce readmissions | 13/14, 93% |
| Interventions to reduce 30-day rehospitalisation: a systematic review | Hansen L, 2011[3] | 43 articles (patients 882,182)<br><br>Aims to describe interventions which reduce hospitalisation at 30 days post discharge<br><br>Age group not specified | 9/16 RCTs had sample size <100; other controlled studies; incomplete reporting common | No single or bundled intervention implemented was consistently associated with reduced risk for 30-day rehospitalisation | 12/14, 86% |
| Comprehensive geriatric assessment for older adults admitted to hospital. Cochrane review | Ellis G, 2011[10] | Meta-analysis of 22 trials (10,315 patients)<br><br>Aim to evaluate the effectiveness of CGA in hospital for older adults admitted as an emergency | Meta-analysis | Readmission rates no different (3822 patients, RR 1.03 [0.89-1.18] but patients in receipt of CGA were more likely to be alive and in their own homes at up to six months | 15/16, 94% |
| A systematic review and meta-analysis of the impact of oral nutritional supplements on hospital readmissions. | Stratton R, 2013[11] | A meta-analysis of six RCT (total $N = 852$)<br><br>Aim to explore effect of nutritional supplements on readmission. Inclusion criteria >18. 5/6 studies included older people (>65 years) | Meta-analysis | Fewer readmission in those receiving nutritional supplements Odds Ratio (OR) 0.59, 95% CI 0.43–0.80, $P = 0.001$ | 15/16, 94% |
| Systematic review and | Cawood AL, | This systematic review involved 36 | Meta-analysis and | Reduced readmissions to hospital in ONS group | 14/16, |

| | | | | | |
|---|---|---|---|---|---|
| meta-analysis of effects of high protein oral nutritional supplements | 2012[12] | randomised controlled trials (n=3790)<br><br>Explored high protein ONS (>20% energy from protein) V normal diet or placebo | systematic review | (OR 0.59 (95% CI 0.41-0.84), p=0.004 | 88% |

## Risk factors for readmission

Identifying risk factors for readmission is helpful for the development and implementation of targeted interventions to reduce hospital readmissions.

Advanced age is a risk factor for readmission, both independently and through associations such as comorbidities, falls, polypharmacy and poor nutrition[6].

Functional Status, defined as poor premorbid functional dependence for basic activities of daily living (ADL) is a major risk factor for readmission[5, 6].

Length of stay was a significant risk factor in three studies; longer stays were associated with increased risk of readmissions immediately post discharge[5]. However the majority of trials (9 of 19) showed no significant relationship between length of stay and readmission[6].The number of previous admissions significantly increases risk of readmission, especially when categorised as emergency or unplanned[5].

Depression is prevalent in older people and is as a risk factor for readmission[5]. Potential mechanisms linking depression and readmissions include associations with poor adherence to medication and reduced adherence to rehabilitation programmes. Depression is a modifiable determinant of readmission, yet it is often absent in many discharge assessment tools[6].

Similarly cognitive impairment, including delirium and dementia, was identified as a risk factor for readmission in 4 of 5 papers included within the review articles, with cognitive impairment thought to reduce adherence to medical regimes and increase carer distress[5, 6].

Malnutrition is a risk factor for readmission that is common in older people across all health and social care settings including hospitals, care homes, and sheltered housing. Malnutrition has a significant impact on increasing recovery time and increases the risk of readmission[6].

Low socioeconomic status, including receipt of social assistance and poor living conditions were found to be associated with readmissions[5].

Family caregivers are believed to help increase the recovery from acute illness, and may protect against readmission[6].

Risk stratification tools such as the ISAR (Identification of Seniors At Risk) and TRST (Triage Risk Screening Tool) that attempt to synthesise risk factors for readmission into a scoring tool have recently been reviewed elsewhere and are not further discussed in this review[4, 13, 14].

In summary, the evidence based risk factors for readmission include age (probably as a marker of complexity), poor functional status prior to admission, length of stay during the index admission, depression, cognitive impairment, malnutrition, social support and social networks/support.

## Interventions to reduce readmission

Our search yielded seven high quality review papers that explored interventions to reduce readmissions in people aged over 65. The interventions were broad ranging and for ease of interpretation we have categorised interventions into five headings:

1. Discharge planning
2. Post-discharge support
3. Bridging interventions
4. Comprehensive Geriatric Assessment (CGA)
5. Nutritional interventions

## 1. **Discharge planning**

Discharge planning is the 'the process of identifying and preparing for the patient's anticipated health care needs on discharge from an inpatient facility'[7]. For older people this is often complex involving detailed assessment from multiple disciplines. Discharge plans are broadly used to enable a smooth, safe transition from hospital to home. They can be stand-alone or embedded in systematic packages such as Comprehensive Geriatric Assessment[7].

The Cochrane review on 'Discharge planning from hospital to home', found that for older medical patients there is a significant reduction in readmission rates within three months (RR 0.82, 95% CI 0.73 to 0.92; 12 trials) when comparing discharge planning with usual care. Important additional benefits of discharge planning included increased patient satisfaction[7]. Early discharge planning can allow medical staff, the patient and family time to implement strategies to modify risk factors such as home hazard modifications[6].

Discharge planning was explored in brief in the Hansen paper, which discusses discharge planning as a stand-alone intervention compared to usual care; a significant benefit was demonstrated on readmissions at 30 days [readmission rates intervention 24% vs. 35% control group (p<0001)[3].

In summary, evidence suggests that structured and tailored discharge planning is associated with reduced readmission rates, by ensuring complex needs are addressed.

### 2. Post-discharge support

These interventions aim to improve support in the community and included telephone calls, home visits, outpatient follow up and enhanced communication with a post-acute care provider. In many papers these interventions are combined or bundled, and often follow specialist geriatric input, however, in this section, we will consider these interventions in isolation.

The Linertova reviewed health visitor interventions from four studies, with a range of timings involved. One study (Martin *et al*) showed an effect on readmissions: 14% vs. 38% (p<0.01) where a health visitor attended at 24 hours, however, this study was small (n= 54) compared to the total study population (n=3029). Dunn *et al* examined home visits by health visitors on day 3 post-discharge, with focus on symptom monitoring, medication adherence and ambulatory care, and found a clinically important reduction although this did not reach statistical significance (OR 0.5 (95% CI 0.3 – 1.1)[3].

Pharmacist visits were explored by two papers; Nazareth *et al* found no significant effect on readmissions, whereas Holland *et al* found increased readmissions in their RCT of 850

patients who received standard care or home follow up with a pharmacist (risk ratio for readmissions at six months 1.3 (1.1-1.6)).

District nurse review at 24 hours followed by GP review at two weeks was explored by Hansen *et al*, but showed significant effect on readmissions.

Phone calls and home visits were explored in a review paper by Hansen which explored readmissions at 30 days. Where explored in isolation in three papers, phone follow up was not effective, although Dudas and colleagues randomly assigned 221 patients after discharge to usual care or a telephone call at 48 hours and showed reduced readmissions at 30 days 15% vs. 24% respectively ($p<0.07$). By way of contrast, Braun *et al* randomly assigned 400 patients to usual care or a phone call at week one post discharge resulting in readmissions at 30 days 7.7% vs. 7.2%.

In summary, many studies use a combination of interventions with few reported in isolation, hence it is difficult to disentangle the effect of one particular intervention. Phone calls in isolation appear to be unsuccessful as stand-alone interventions, but appear to work well when combined with additional interventions such as home visits.

**3. Bridging interventions**

These interventions bridge the transition from hospital to home preventing a sudden drop-off in care when patients are discharged. Such bridging interventions may include geriatric assessment with home follow up, phone calls or an intermediate care home programme. Patient Centred Discharge Instructions (PCDI) often contain a mix of the above interventions, however they have the same care providers or 'transition coaches' who are felt to enable longitudinal relationships spanning hospital and community. There is also a focus on the patient being empowered to develop greater autonomy for their ongoing health needs.

Bridging interventions explored in the Linertova review included a total of 11 papers with a variety of different interventions. Five of the 11 showed a statistically significant improvement in readmissions and another paper had a partial effect, detailed below.

The first paper by Al Rashed tested pharmaceutical counselling, medication discharge summaries and home visits with a pharmacist and found reduced readmission in the intervention group (n=83, readmissions 3 vs. 15 patients ($p<0.05$)). Another paper by Caplan involved CGA, multidisciplinary care and follow up at 1 month; n=739, readmissions 16% vs. 22%, $p<0.05$. Coleman included a transition coach with in-hospital and home visits, and phone follow-up; n = 750, 30 day readmissions 8% vs. 12%, $p<0.05$. The paper by Thomas explored inpatient linking through to community based geriatric assessment; n=132, readmissions 30% vs. 60%, $p<0.05$. The final intervention by Naylor was comprehensive discharge planning and home follow up; n=263, readmissions at six months 49 vs. 107 patients, $p<0.001$.

Koehler reviewed in-hospital visits by care coordinators and pharmacists with post discharge phone call; there was a significant reduction in readmissions at one month (10% vs. 38%, $p<0.05$) but this was not sustained at two months.

Hansen reviewed 12 trials with Patient Centred Discharge Instructions (PCDI). Seven of 12 had showed reductions in readmissions, although no papers reviewing PCDI in isolation found an effect on readmission.

The evidence suggests that written materials or phone follow ups are only effective where there is the support of a care worker. For example, Coleman 2004 found that a transition coach who supported patients in going home and identified ongoing needs reduced readmissions (n= 1393, adjusted odds ratio 0.5 (95% CI 0.3-1.0). In Jack *et al,* a nurse discharge advocate worked with patients during their hospital stay to arrange follow-up appointments, confirm medication reconciliation, and conduct patient education with an individualised instruction booklet that was sent to their primary care provider; readmission fell (n=738, Incidence Rate Ratio, 0.7 (95% CI0.5-0.9).

Van Walreven conducted a cohort study which explored the impact of follow up by the same hospital doctor when in the community. In this paper, results are grouped as death or readmission in 30 days. Of patients studied, 7.7% died or were readmitted, the adjusted relative risk of death or readmission decreased by 5% (95% CI 4%-5%).

In summary, when compared to post discharge interventions in isolation, bridging interventions, which include many components or bundled interventions, appear to have more success in reducing readmissions. It appears that there is an additive effect of multiple interventions or that organisational or cultural change is developed adding quality to the delivery of care.

**4. Comprehensive Geriatric Assessment**

Comprehensive Geriatric Assessment (CGA) is defined as a 'multidimensional diagnostic process focussed on determining a frail older person's medical, psychological and functional capability in order to develop a coordinated and integrated plan for treatment and follow up'. Mindful of risk factors for readmission, GCA provides a structured tool for identifying and addressing modifiable risks allowing intervention to avoid adversity following discharge[9].

A systematic review by Linertova *et al* of 17 in hospital trials compared usual care to geriatric assessment and comprehensive discharge planning. In 3 of 17 studies the intervention produced significant differences to the control group (19.4% vs. 35.7%, $p < 0.05$; 10% vs. 38.1%, $p < 0.05$; 30% vs. 60%, $p < 0.05$). In one study a negative effect was observed (56% V 50.4% $p < 0.05$)[9].

Amongst the studies reporting positive effects on readmissions, comprehensive geriatric assessment followed by home care or by a hospital based multidisciplinary outreach team demonstrated a lower rate of readmissions during the first 30 days and an increased period at home prior to the first emergency readmission. However, these trials had relatively small numbers of patients (total n=323), compared to other trials demonstrating no significant effect (n=7595)[9].

For short stay patients, a model known as interface geriatrics is an emerging concept that seeks to identify frail older people within the first 72 hours of their hospital stay. This reflects a growing culture of 'quicker and slicker' discharges where appropriate patients are quickly sent home or transferred to community settings for ongoing care. Such discharges are usually from emergency departments (ED) or acute medical units (AMU's)[15]. A systematic review compared CGA to usual care in patients discharged from either emergency department (ED) or acute medical units (AMU) within 72 hours from arrival at hospital. From the five trials (2,474 patients), there was no significant difference in readmission rates between intervention and control groups at final follow up; risk ratio 0.95 (95% CI 0.83-1.08)(10). 30 day readmission was reported in three trials, with no overall difference in readmissions between the two groups; risk ratio 1.0 (95% CI 0.8-1.3)[8].

In a similar meta-analysis by Ellis there was no significant difference between groups for readmission to hospital; odds ratio 1.03, 0.89 – 1.18 ($p = 0.72$); 9 trials, 3822 participants[10].

In summary the evidence for CGA improving readmission rates is limited and uncertain, with most recent studies suggesting CGA is of little benefit for reducing readmissions in both acute and ward based discharge.

**5. Nutritional Interventions**

Oral nutritional supplements (ONS) are frequently prescribed for older people who are at risk of malnutrition secondary to inadequate dietary intake, or who are frankly malnourished. Optimising nutrition promotes a number of biological processes which aid healing and recovery from illness[12].

Stratton and colleagues conducted a review and meta-analysis of ONS in patient of any nutritional status. ONS included more than one macronutrient (fat, carbohydrate or protein). In five RCTs reporting readmissions (n=826 patients), significant reductions in readmission in the ONS group were observed; OR 0.5 (95% CI 0.4-0.8)[11].

A systematic review by Cawood *et al* compared high protein ONS (protein >20% total energy) to usual dietary intake in all patient with any nutritional status and reported significant reductions in readmissions; OR 0.6 (95% CI 0.4-0.8)[12].

In conclusion, the targeted use of oral nutrition supplementation can reduce readmission rates.

## Discussion

We identified nine reviews describing a range of interventions applicable to the general cohort of older patients. In terms of risk factors, poor functional status prior to admission, length of stay during the index admission, depression, cognitive impairment, malnutrition, social support and social networks/support were all important. These can loosely be described as frailty related risk factors[16, 17]. The bulk of the interventions to reduce readmissions identified tended to be multifactorial, and included individually tailored discharge planning; post-discharge support – phone calls with face-to-face contacts from a relevant health professionals; bridging interventions involving some form of post-discharge case management or 'coaching'; and nutritional supplementation. Interestingly, the evidence Comprehensive Geriatric Assessment (CGA) being able to reduce readmissions was conflicting; this is somewhat surprising given that CGA is defined as: 'a multidimensional, interdisciplinary diagnostic process to determine the medical, psychological, and functional capabilities of a frail older person in order to develop a coordinated and integrated plan for treatment and long-term follow-up'[18]. This rather encapsulates the previously cited interventions in one care bundle, and so it would be expected to be effective. However, most of the CGA trials examined its role during the in-patient episode of care, with only one review addressing care across the interface[8]; this review examined short term readmissions, but the studies were somewhat dated (latest publication 2004) and perhaps do not reflect more up to date approaches of integrating care across the interface. More recent interventions addressing care across the interface following urgent care episodes describe much more integrated acute-community pathways, which are different from those trials described up until 2004[15, 19, 20]. Whilst these more recent interventions show promise, they have as yet to be subject to rigorous systematic review.

The methods used in this review means that we did not include reviews or individual studies that might be illuminating, that did not meet a minimum threshold of quality. In addition, the inclusion and exclusion criteria will have meant that some disease specific interventions or papers with no age specification, which could be useful may be overlooked in this review. Nevertheless we believe that the findings are scientifically robust and applicable to the care of frail older people in general medical settings.

Many of the papers reviewed highlighted the difficulties of reducing readmissions, with particular emphasis on heterogeneity of current interventions. The interventions available are diverse, and have been inconsistently examined in isolation and/or as a group or bundle of interventions. However some key messages do appear to emerge: unifactorial interventions or interventions administered in isolation of the totality of the patient's care do not appear to be effective. This is also reflected in related studies, for example the UK evaluation of 'community matrons' (case-managers tasked with reducing admission (and thereby readmissions)), which failed to find an effect[21]. More recent evaluations of 'virtual awards' that in part addressed readmissions and attempted to reduce them, have been similarly disappointing[22].

Although much is known about the reasons for readmissions in older people, as highlighted by the risk factors summarised in this paper, less is known about the requirements for an effective intervention. Whilst bundles and bridging interventions appear promising, the

optimum combination of interventions and time that they need to be implemented as well as the optimum duration in order to be clinically effective remain unanswered. Undoubtedly any effective intervention will need to be implemented using robust infrastructure – communication, coordination and continuity of information. In addition, there is a paucity of work on cost-effectiveness, and future works need to address this issue.

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