

## Health Service Executive

### Lot 2: Literature review of patient flow for the Irish health system to support the work of Integrated Clinical Care Programmes

A draft report for the Health Service Executive of Ireland

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## Executive summary

### Introduction

This review aims to inform the work streams of an Integrated Care Programme for Patient Flow. The literature review focuses on patient outcomes and economic effectiveness of interventions to improve patient flow across two or more different institutional areas. We split the literature review into a systematic review (section 1), and a non-systematic, narrative review of the grey literature (section 2).

### Systematic review (section 1)

#### Methods

The systematic literature and guideline search was performed of databases, grey literature, citations and reference lists for studies published in English from 2000 to 2015. Illustrative case studies were selected to provide insight into some of the approaches which have been assessed. In addition, an overview is provided of literature on integrated care by thought leader organisations such as the King's Fund.

#### Results

Eleven systematic reviews were identified that looked at patient flow within integrated healthcare settings. Few systematic reviews were identified that specifically looked at patient flow, so studies using proxies for, or constituent measures of, patient flow were included in the review such as waiting times, length of hospital stay and readmission rate. Reviews on economic effectiveness of patient flow models were lacking, as was information on best practice in the education, training and rollout to staff.

#### *Effective interventions for patient flow*

The systematic reviews found six interventions that improved patient flow through reducing length of stay and/or readmission rate in analyses of randomised controlled trials (RCTs):

- Post-discharge home visiting programs
  - Patient outcomes: Reduced mortality for people admitted with heart failure<sup>1</sup>. Insufficient evidence following stroke or myocardial infarction (MI)<sup>2</sup>.
- Structured telephone support
  - Patient outcomes: Reduced mortality for people admitted with heart failure<sup>1</sup>.
- Multidisciplinary and specialty outpatient clinics
  - Patient outcomes: Reduced mortality for people admitted with heart failure<sup>1</sup>.
- Individualised discharge planning
  - Patient outcomes: No impact on mortality but increased patient satisfaction for people admitted to hospital for a range of medical and psychiatric conditions<sup>3</sup>.
- Early supported discharge
  - Patient outcomes: Improved daily activity scores and patient satisfaction following stroke<sup>4</sup>. No adverse effect on mortality or QoL after stroke<sup>2</sup>.
  - Cost effectiveness: Reduced hospital costs<sup>2, 4</sup>.
- Integrated disease management<sup>5</sup>
  - Patient outcomes: Improved disease-specific QoL and exercise capacity.

## ***Interventions lacking evidence for improved patient flow***

Several systematic reviews found inconclusive or insufficient high-quality evidence of the effectiveness of the following interventions in improving patient flow across healthcare settings. Patient outcomes were either not reported or there was no change in mortality. These interventions were:

- Musculoskeletal (MSK) intermediate care services<sup>6, 7</sup>
- Home-based specialist nursing<sup>8</sup>
- Open access to investigations or clinic appointments<sup>9</sup>
- GP presence in Accident and Emergency (A&E) <sup>10</sup>
- Telemonitoring<sup>1</sup>
- Educational interventions<sup>1, 2</sup>
- Hospital initiated case management<sup>11</sup>
- Community initiated case management<sup>11</sup>

## ***Other findings***

A list of common metrics recommended by the systematic reviews to measure patient flow in integrated healthcare systems was compiled and is included in the main body of the report. There is also an overview of where there are gaps in the evidence.

No systematic reviews were identified that looked at barriers, facilitators and enablers for integrated care programmes to improve patient flow. Three qualitative studies<sup>12-14</sup> described organisational barriers to improving patient flow in A&E and from acute medical care to the community setting, and general barriers to discharge from post-acute care. Barriers included:

- Staff resistance and organisational culture
- Poor communication within teams and across integrated care systems
- Awaiting funding for home modifications and equipment
- Assessment for and location of alternative care settings such as supported accommodation

Two of these primary studies looked at organisational facilitators to improve patient flow, which included<sup>12, 14</sup>:

- Strategic selection of planning team members
- Executive support and availability of resources
- Staff driven improvement strategies
- Staff education
- Post-implementation adjustments
- Improved communication and documentation

## **Narrative review (section 2)**

### **Methods**

Literature was identified through searches in Scopus, Google, Google Scholar and similar search engines; we also searched the websites of specific organisations, such as The King's Fund, the WHO, the Health Foundation and the Commonwealth Fund. Supplemental search techniques were also used to track citations and harvest references from relevant studies. A final total of 27 documents were identified and used.

## Results

The grey literature was broad and diverse, and the language used to describe interventions varied between organisations. However, there were six interventions, or related families of interventions, that were repeatedly described:

- Discharge planning
- Case management
- Self-management
- Telemedicine
- Hospital at Home
- Admissions planning

We discussed how each of these interventions were described by key thought leaders, and gave examples of the evidence produced to support their position. In addition to the thematic descriptions we describe in more detail three case studies cited by one or more of the organisations: 1. The *Esther* case study (Sweden); 2. The *Mrs Smith* case study (England); 3. The *Canterbury Health System* case study (New Zealand).

## Conclusions

The results of the systematic review of evidence and the review of the grey literature revealed similar interventions and the same frustration with the evidence-base; inevitable with such a series of heterogeneous and complex interventions.

The body of review level evidence on interventions to improve patient flow in integrated care systems was limited. There is evidence of benefits of interventions to improve patient flow from hospital to the community for people with heart failure, stroke and MI in terms of reducing length of stay and readmission rate. The evidence shows accompanying improvements in patient outcomes such as quality of life and mortality but there is limited evidence on economic effects.

There was inconclusive evidence on the effectiveness of several interventions aimed at improving patient flow from the community to secondary care. This is due to a lack of high quality RCTs with clearly defined control groups or blinding of the assessors. Many of the studies identified by the reviews were observational, and had methodological limitations.

There is considerable overlap in the elements of care that make up the identified interventions. For example, most of the interventions incorporated an element of patient education and increased contact with a healthcare professional.

However, while the evidence is by its nature limited, there are nevertheless emerging signals, from both the academic and grey literature, that can help direct the design of integrated healthcare systems to improve patient flow.

## Recommendations

The following recommendations have been compiled according to the findings from the review and thought leadership literature.

## **Recommendation 1: Start small and integrate from the bottom up**

Most successful case studies of patient flow interventions have started with a clear focus on integrating care at the micro-service level. Projects should be shaped and led by people who work with and clearly understand the demographic they serve. Senior leaders should focus on facilitation and removing barriers to implementation.

## **Recommendation 2: Focus on specific populations**

The research clearly shows that some interventions work for one population, but not another - a classic example is case management. Therefore a focus on, and understanding of, the population you serve is critical. As with recommendation 1, senior leaders should focus on enabling health care teams to develop a relationship over time with a 'registered' population or local community, and so be able to target individuals effectively who would most benefit from co-ordinated approaches to the management of their care.

## **Recommendation 3: Implement individualised discharge plans**

The evidence suggests that individualised discharge plans reduce hospital length of stay and reduce the risk of readmission; it also improves patient satisfaction. Evidence is less certain with regard to health outcomes and economic impact, but case studies suggest that when well implemented it can improve efficiency, keep people out of hospital, and so, save money.

## **Recommendation 4: Implement early supported discharge**

Early supported discharge was found to reduce both length of stay and improve outcomes for stroke patients. Taking into account both direct and indirect healthcare costs, early supported discharge was found to offer value for money. Support teams for early discharge are likely to include nursing, allied health and social care professionals, and could be based either in hospital or community settings.

## **Recommendation 5: Implement post-discharge support**

People should be followed up by post-discharge home visits and/or structured telephone support. Home visiting programs by doctors, nurses, pharmacists or allied health professionals have been found to reduce the risk of readmission and mortality for heart disease and, though the evidence is less strong, stroke patients.

## **Recommendation 6: Implement multidisciplinary and specialty outpatient clinics**

Specialty outpatient clinics that bring together multidisciplinary expertise have been shown to reduce length of stay, readmission and mortality for people with heart failure. Clinics typically brought together cardiologists, nurses, dieticians and pharmacists but individual case studies suggest that similar models may work with other population groups.

## **Recommendation 7: Consider implementing case management for specific populations**

There is mixed evidence for case management, both in terms of health outcomes and economic effectiveness. However, it forms a central part of most case studies of effective integration, and gains are often seen for patient satisfaction. Case studies suggest that the most effective arrangement is to have individual, named case managers who are part of a multidisciplinary team with clearly defined roles.

## **Recommendation 8: Train, engage and support staff**

Integrated care is often most effectively driven at the micro-service level, and so engagement and support of staff during any attempt to improve patient flow through integrated care is critical. Skills training enables staff to carry out any changing demands and responsibilities with improved confidence and capability, and is likely to reduce resistance to changes. Also, supporting staff-driven approaches is likely to improve and accelerate implementation, especially during the formation of multidisciplinary teams. With multidisciplinary teams, it is vital that all members are clearly aware of their role and the expectations that come with it, and share overarching goals.

## **Recommendation 9: Evaluate**

Because of the generally weak evidence base for much of integrated care, and the complexity and local nature of its interventions, it is crucial that evaluation schemes are run alongside any implementation. A range of metrics should be utilised that measure not only patient flow but also patient and economic outcomes. Useful patient flow outcome measures include (re)admission rate, length of hospital stay, number of accident and emergency visits, and delayed discharge.

## Abbreviations List

A&E	Accident and Emergency
CI	Confidence Interval
COPD	Chronic Obstructive Pulmonary Disease
ECG	Electrocardiogram
ENT	Ear, Nose and Throat
GP	General Practitioner
IDM	Integrated disease management
ITS	Interrupted time series
LUTS	Lower urinary tract syndrome
MDT	Multi-disciplinary team
MI	Myocardial Infarction
MSK	Musculoskeletal
MSK CATS	Musculoskeletal Clinical Assessment Treatment Service
NR	Not reported
OECD	Organisation for Economic Co-operation and Development
QoL	Quality of life
RCT	Randomised controlled trial
RN	Registered nurse

## Introduction

Ireland faces the same major challenges presented to healthcare systems worldwide, namely ageing populations and the increasing disease burden from chronic conditions. There is a need to respond to and meet these challenges, which is demanding for healthcare systems originally set up to respond to acute, episodic care. This challenge has been further compounded by the global economic crisis, which has placed further strain on budgets.

In 2012 the Irish government set out its vision for reforming the health service in 2012 to 2015. This ambitious strategy included a conceptual shift from responsive care to a focus on health and wellbeing (such as preventive services), service reform including moving to integrated care, structural reform such as the introduction of Universal Health Insurance and financial reforms to incentivise efficient and effective care. The Clinical Strategy and Programmes Division (CSPD), established by the Health Service Executive (HSE), is developing five national integrated care programmes in older people, children, women's health, chronic disease prevention and management and patient flow. Integrated care systems are those that ensure the management and delivery of health services (including prevention, diagnosis, care and support) is delivered according to the needs of individual patients, across all levels of the healthcare system. At the heart of integrated health care is coordinated care: the process of managing all of a patient's needs across providers and settings. The provision of healthcare to users of the system should appear seamless, regardless of which part of the healthcare system they are accessing. Integrated systems are often set up in response to real or perceived fragmentation in the delivery of care by separate health and social services.

This is an important year for the HSE as it sees the implementation of the Governance and Organisation Structure for the National Clinical Programmes to enable them to act as the design authority for integrated models of care for the health service and the establishment of its Integrated Programmes of Care and Associated Pathways. To support the development of its integrated care programmes, the HSE has commissioned three literature reviews covering integrated care in these settings, focusing on patient outcomes and economic effectiveness. Patient flow is defined as the movement of patients in and out of hospitals and other health care settings. Improving patient flow can help to reduce overcrowding, prevent poor handovers, and avoid delays, with the potential for clinical and economic benefits. Strategies to improve patient flow can include orchestrating the arrival and discharge of patients undergoing elective procedures and transferring the oversight of patients waiting to be admitted from emergency departments to other hospital units.

The 2014 Community Healthcare Organisations Report and Recommendations of the Integrated Service Area Review Group highlighted that there is not a single approach to integrated care that fits all circumstances, and that it is important to recognise local challenges in any approach. For example case management is a labour-intensive activity that is not always targeted effectively, and therefore it can be difficult to realise cost-savings. Our goal in this review therefore is to help the HSE to target those specific integrated care interventions that have been shown to improve patient flow or patient outcomes, or improve cost-effectiveness.

This literature review provides an identification, critical assessment and evaluation of relevant clinical and economic literature related to systems to improve patient flow within integrated care. Integrated healthcare systems are pragmatically defined as the provision of multidisciplinary interventions at different stages of the care process in 2 or more different institutional areas.

We have divided the literature review into three sections. Section 1 is a systematic review using transparent search, sift and appraisal techniques, while Section 2 is a non-systematic, narrative review of the grey literature. Section 3 contains our conclusions and recommendations.

Section 1 aims to describe findings from systematic reviews relating to:

- The characteristics and features of patient flow models that incorporate elements of integrated care
- Integration of patient flow models within integrated care systems
- Use of metrics/measurement in patient flow systems
- Effect of patient flow models in delivering (un)successful patient outcomes
- Economic effectiveness/viability of patient flow models
- Best practice in the education, training and rollout to staff in patient flow models

To provide insight into the patient flow interventions being assessed, a selection of studies were selected from the systematic reviews to be described in additional detail as illustrative case studies.

The systematic review does not cover:

- Interventions or systems not explicitly described as integrated care or synonyms such as co-ordinated care
- Interventions or systems not explicitly aimed at improving patient flow
- Interventions focussed solely at increasing patient flow efficiency within a single level of the health system (as opposed to between 2 or more levels of the health system, i.e. primary, secondary, tertiary, and social care)
- Process outcomes other than patient flow
- Non-systematic reviews
- Reviews focusing on non-OECD/developing countries

Further details of the scope are provided in Appendix A.

Section 2 is a non-systematic, narrative review of the grey literature published by thought leaders - by which we mean think tanks, not-for-profit research organisations, charitable trusts, non-governmental organisations, key healthcare providers and charities. The narrative review covers the same subject scope as the systematic review.

Section 3 contains our concluding remarks and recommendations for the HSE. Recommendations were drafted after consideration of the weight and reliability of the evidence from both the systematic and grey literature reviews.

**Section 1 - systematic review**

## Methods

Searches were carried out across a range of bibliographic databases including Medline, Embase, Scopus, the Cochrane Library, the Economic Evaluation Database, Joanna Briggs Institute and the Campbell Collaboration to identify systematic reviews published from 2000 onwards in English. To ensure the search would capture qualitative as well as quantitative reviews, we adapted the Scottish Intercollegiate Network's systematic review search filter to include a broader range of review types, such as realist and integrative reviews.

Search strategies combining keywords, synonyms and index headings for the search concepts were developed to maximise the relevance of the search results. Patient flow concepts and synonyms were gathered from a variety of sources, including a recent systematic review on patient flow<sup>15</sup> and other grey literature reports gathered during the scoping phase of the project. For the first search on patient outcomes and economic effectiveness, terms relating to patient flow were combined with relevant terms such as "improve\*", "optim\*", "reduc\*" and "excess\*" to retrieve articles that discussed the impact of patient flow interventions. These were then combined with the modified systematic review filter.

During the sifting phase of the first search, it was apparent that few systematic reviews discussed barriers and facilitators of success in patient flow interventions. Therefore the search approach for barriers, facilitators and enablers was adapted to remove the systematic review filter so that it would capture any study type including primary studies. This search included the patient flow and impact terms, combined with terms relating to barriers and facilitators which were based on two large systematic reviews focusing on these concepts.<sup>16, 17</sup> Full search strategies are included in Appendix B.

After deduplication of search results, 1501 records remained. After a first sift at title and abstract level to remove clearly non-relevant records, 78 records remained. A more detailed second sift at title and abstract level identified 18 potentially relevant papers, for which the full text was obtained. After assessment of the full texts, 11 systematic reviews were identified as relevant and included in the review. Additionally six studies were identified through the systematic reviews that were retrieved to inform the barriers and facilitators or to form the basis of the case studies. Further details and a flow diagram of the search process can be found in Appendix B.

The quality of the evidence identified was rated according to the AMSTAR 11 item checklist, a measurement tool that assesses the methodological quality of systematic reviews. Items assessed include an a priori design, appropriate pooling of results, and likelihood of publication bias. The AMSTAR rating for each study is provided in Table 6 in Appendix C.

For the synthesis of the evidence, the results of the systematic reviews have been grouped according to their conclusions about the effects of the interventions assessed on patient flow. They have been split into those that have been shown to be effective and those with inconsistent or insufficient evidence of effectiveness. Case studies from the systematic reviews are summarised in boxes. These case studies provide illustrative examples of interventions to improve patient flow. They have not been chosen in a systematic way, but have been chosen for being of the highest quality and relevance to the Irish healthcare system. All of them are randomised controlled trials.

## Results

A total of 11 systematic reviews were identified that looked at interventions to improve patient flow across healthcare settings. Four of these included meta-analyses. Details of each systematic review can be found in Table 7 in Appendix D.

Most studies investigated how to improve patient flow for people with heart failure, stroke, musculoskeletal conditions and services for older people. A few studies also looked at people presenting to Accident and Emergency (A&E), child health and people with Chronic Obstructive Airways Disease (COPD). Where patient flow was not specifically addressed (i.e. the number of people moving from one part of the system to another), the following proxies for improving patient flow were used:

- reduced unplanned admissions
- appropriate referral
- reduced waiting times for referral
- reduced length of hospital stay
- reduced readmission

Based on results for these metrics, the interventions are listed below in terms of whether they were shown to be effective in improving patient flow or whether there was insufficient or inconclusive evidence about effects on patient flow. For each effective intervention, patient outcomes are summarised. Economic impact or cost effectiveness of interventions was not assessed in most of the systematic reviews. When it was assessed, the studies were often too heterogeneous to combine so the reviews reported general information on increased or decreased costs rather than precise estimates. This may be due to the complexities of direct and indirect costs relating to the interventions, and the lack of clarity of what was being compared. Where available, the economic findings are also summarised for each intervention.

The systematic reviews all scored highly on the AMSTAR quality assessment for the rigorousness of their methodology. Six of them scored full marks, 3 scored 10 out of 11, while 2 scored 6 and 8 out of 11. However, the quality of the primary studies in these reviews was largely poor, as many were observational. As systematic reviews are reliant on the quality of the primary literature they include, this limits confidence in the results.

With regards to the relevance of the body of evidence to the Irish healthcare system, the systematic reviews included a few small Irish studies. The rest of the studies were from various OECD countries. Many were from the US which has a very different healthcare system to Ireland, in terms of how healthcare is paid for and provided, and the level of integration between services. The latter may explain the preponderance of patient flow interventions carried out in this setting. Case studies to illustrate the successfulness of interventions have been chosen from the UK, Northern Ireland, and Canada as their systems are likely to be more similar to the Irish system. One US study has also been included as a similar approach could be taken in Ireland despite the differences in healthcare systems.

## Effective interventions for patient flow

The systematic reviews identified concluded that there was evidence of improved patient flow for six interventions:

- Structured telephone support
- Multidisciplinary and specialty outpatient clinics
- Individualised discharge planning
- Early supported discharge
- Post-discharge home visits
- Integrated disease management

All aimed to improve the transition from hospital to home, and they are summarised in Table 1. Each intervention is then described further in the text along with the evidence on their effectiveness

**Table 1: Summary of interventions identified by systematic reviews as having evidence of effectiveness for patient flow**

Intervention	Systematic review	Type of studies	Countries	Clinical area	Patient flow outcomes	Patient Outcomes	Cost effectiveness
Structured telephone support	Feltner et al. 2014 <sup>1</sup>	13 RCTs	Germany, Spain, US, Canada, Brazil	Heart failure	Reduced heart failure related readmission.	Reduced mortality.	Not reported (NR)
Multidisciplinary and specialty outpatient clinics	Feltner et al. 2014 <sup>1</sup>	7 RCTs	Ireland, US, Sweden, Canada, Taiwan	Heart failure	Reduced all-cause readmission.	Reduced mortality.	NR
	Furlan et al. 2011 <sup>2</sup>	RCTs and observational	UK, US, Brazil	Heart attack (MI)	Reduced length of stay and readmissions.	Reduced mortality.	NR
Individualised discharge planning	Shepperd et al. 2013 <sup>3</sup>	24 RCTs	Ireland, Scotland, UK, US, Canada, Netherlands, Denmark, France, Taipei, Australia	Mixed	Reduced length of stay and readmissions.	No impact on mortality. Increased patient satisfaction.	Little evidence available.
Early supported discharge	Fearon et al. 2012 <sup>4</sup>	14 RCTs	Ireland, UK, Norway, Sweden, Denmark, Canada, Australia, Thailand	Stroke	Reduced length of stay	Improved daily activity scores and patient satisfaction. Reduced death or institutionalisation, and death or dependency.	Service costs were mostly reduced.
	Furlan et al. 2011 <sup>2</sup>	RCTs and observational	UK, Norway, Sweden, Denmark, Germany, US, Canada, New Zealand	Stroke and MI	Reduced length of hospital stay after stroke.	No impact on mortality, functional recovery, or quality of life.	Cost neutral or trending towards savings.
Post-discharge home visits	Feltner et al. 2014 <sup>1</sup>	15 RCTs	UK, US, Australia, The Netherlands,	Heart failure	Home visits reduced all-cause and heart failure related readmission.	Reduced mortality.	NR

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Intervention	Systematic review	Type of studies	Countries	Clinical area	Patient flow outcomes	Patient Outcomes	Cost effectiveness
			Spain, Hong Kong				
	Furlan et al. 2011 <sup>2</sup>	RCTs and observational	UK, US, The Netherlands, Denmark, Italy, Canada, Mexico	Stroke and MI	Home visits after hospital discharge by physicians or physiotherapists may reduce readmissions for stroke patients.	Insufficient evidence to draw conclusions.	NR
<b>Integrated disease management</b>	Kruis et al. 2013 <sup>5</sup>	26 RCTs	UK, Sweden, Spain, Denmark, Netherlands, US, Canada, Australia, New Zealand, Brazil, Japan	COPD	Fewer and shorter hospitalisations.	Improvements in 6 minute walking test. Improved quality of life (QoL).	NR

## Structured telephone support

One systematic review and meta-analysis of 13 RCTs, Feltner et al. 2014<sup>1</sup>, was identified that assessed structured telephone support. This was defined as a series of scheduled telephone calls with a specific goal, structured questioning or the use of decision-support software. The aim of this type of intervention was to monitor, educate and improve self-care after discharge to improve patient flow by reducing readmission. They found that it reduced heart failure readmission within 3 to 6 months and improved mortality for people admitted with moderate to severe heart failure. The structured telephone support was usually delivered by nurses and pharmacists but there was insufficient evidence to conclude whether results differed according to the type of healthcare professional providing this care. It was not found to reduce all-cause readmissions. Cost effectiveness was not reported.

## Multidisciplinary and specialty outpatient clinics

Two systematic reviews were identified that assessed the effect of cardiology multidisciplinary and specialty outpatient clinics on patient flow in terms of length of stay or readmission. According to the systematic review by Feltner et al. 2014<sup>1</sup>, multidisciplinary heart failure clinic interventions reduced all-cause readmission between 3 to 6 months and mortality for adults admitted to hospital with moderate to severe heart failure. The multidisciplinary clinics provided contact with cardiologists, nurses, dieticians and pharmacists. Furlan et al. 2011<sup>2</sup> found specialty follow-up after myocardial infarction (MI) was associated with reduced length of stay, fewer readmissions and reduced mortality. Cost effectiveness was not reported.

### Case study 1: RCT of a multidisciplinary heart failure clinic versus standard care follow-up

Canadian study by Ducharme et al. 2005<sup>18</sup> identified from Feltner et al. 2014<sup>1</sup>

A multidisciplinary heart failure clinic improved patient flow by reducing the number of hospital readmissions by 41% and hospital days by 44% at 6 months. Patient outcomes included improved physical and emotional quality of life. There were no differences in the number of A&E visits or mortality.

See Appendix E for further details.

## Individualised discharge planning

One systematic review and meta-analysis of 24 RCTs, Shepperd et al. 2013<sup>3</sup>, looked at the effect of individualised discharge planning on patient flow in terms of length of admission, discharge rates back to a person's home and readmission. In this analysis, an individualised discharge plan could include any other elements of care across all settings.

It found that structured individualised discharge planning reduced hospital length of stay for people with a medical diagnosis (mean difference length of stay -0.91, 95% confidence interval [CI] -1.55 to -0.27). It also reduced risk of readmissions by 18% for people with a medical diagnosis (risk ratio 0.82, 95% CI 0.73 to 0.92). Two trials in the review found that individualised discharge planning improves patient satisfaction for people with a medical condition. One trial found increased satisfaction at 1 and 6 months post discharge in terms of continuity of care. In the second trial,

patients reported increased satisfaction with hospital care, hospital discharge and recovery at home. Two trials found increased patient satisfaction when evaluating the use of a pharmacy discharge letter as part of the discharge process.

The impact on health outcomes was uncertain. There was no difference in mortality or rates of discharge from hospital to home for elderly people with a medical condition, people following surgery or people with a mix of medical and surgical conditions. There was little available evidence on overall healthcare costs.

## **Case study 2: RCT of a community liaison pharmacy service to improve consistency of pharmaceutical care between primary and secondary care settings.**

Northern Ireland study by Bolas et al. 2004<sup>19</sup> identified from Shepperd et al. 2013<sup>3</sup>

A hospital-based community liaison pharmacy service optimised medicines management prior to discharge in admitted patients over 55 years and provided support for on-going medicines management. The service ensured seamless pharmaceutical care by co-ordinating liaison between primary and secondary care providers. The service reduced readmission rates by 2.4% and reduced medicines wastage. Patients also demonstrated greater understanding of their drug regimen. As a result of this pilot study, the Integrated Medicines Management was implemented across Northern Ireland's healthcare trusts. The service has been internationally recognised as a successful programme and replicated in the Republic of Ireland, other parts of the UK, Sweden and the Netherlands.

See Appendix E for further details.

## **Early supported discharge**

Early supported discharge was evaluated in two systematic reviews of RCTs, one with a meta-analysis. This was defined as discharge planning with the patient and carer, including recovery planning.

Fearon et al. 2012<sup>4</sup> found 14 RCTs which looked at early supported discharge for stroke patients. Support was provided by teams comprising nursing, allied health and social care professionals, either in hospital or community bases. They were able to perform a meta-analysis of the studies. From this they found that early supported discharge significantly reduced length of stay by approximately 7 days. Patient outcomes included statistically significant improvements in rates of “death or institutionalisation” after up to a year (OR 0.78, 95% CI 0.61 to 1.00, p=0.05). This would mean an extra 4 people living at home out of 100 treated, compared to usual care. It also improved “death or dependency” at the end of follow-up (OR 0.80, 95% CI 0.67 to 0.97, p=0.02) which would mean 5 people regaining independence for every 100 treated. There were statistically significant improvements in patients’ abilities in activities of daily living. People were more likely to report satisfaction with services if there was early supported discharge (OR 1.60, 95% CI 1.08 to 2.38, p=0.02).

There were no statistically significant improvements in carers’ subjective health status, mood or satisfaction with services. The greatest benefits were seen from co-ordinated early supported discharge teams working with stroke patients with mild to moderate disability.

Direct and indirect service costs for early supported discharge were between 4% to 30% less than control costs in four studies. One study which just looked at direct costs found early supported discharge was 15% more expensive.

Furlan et al. 2011<sup>2</sup> included RCTs and observational studies. Overall, early supported discharge after stroke was associated with reduced total hospital length of stay without adverse effects on functional recovery. There was no difference between this and standard care in terms of mortality, disability and quality of life. In one study, early supported discharge was described as a multidisciplinary hospital led stroke service providing support, supervision and coordination with community-led services.

### **Post-discharge home visits**

Two systematic reviews of RCTs, one including a meta-analysis, considered the effect of post-discharge home visits on patient flow in terms of readmission to hospital. Feltner et al. 2014<sup>1</sup> found home visiting programs by doctors, nurses, pharmacists or allied health professionals reduced all-cause readmission and heart failure readmission between 3 to 6 months and improved mortality for adults admitted to hospital with moderate to severe heart failure. Economic effectiveness was not reported. Furlan et al. 2011<sup>2</sup> concluded that home visits by physicians or physiotherapists may reduce readmission rates for stroke patients. There was insufficient evidence of nursing home visits. Cost effectiveness was not reported in either study.

### **Integrated disease management**

One systematic review of 26 RCTs, Kruijs et al. 2013<sup>5</sup>, assessed integrated disease management (IDM) for COPD. IDM was not consistently defined across studies. The researchers included any RCT that compared usual care with at least two of the following interventions given by at least two healthcare providers in any care setting for 3 or more months:

- Education/self-management
- Exercise
- Psychological input
- Smoking cessation
- Optimal medication
- Dietary intervention
- Case management
- MDT involvement
- Financial intervention

With regards to patient flow, IDM reduced the number of people with one or more hospital admissions over the next 3 to 12 months. IDM also reduced the length of any hospital stay by 4 days on average. It led to clinically relevant improvement in 6-minute walking distance after 12 months and quality of life. However, due to the heterogeneity of the interventions assessed by the studies, the review concluded that there was insufficient evidence to confirm or refute the long-term effectiveness of IDM. Economic effectiveness was not reported.

## Case study 3: RCT of a simple disease management program for COPD across healthcare settings.

US study by Rice et al. 2010<sup>20</sup> identified from Kruis et al. 2013<sup>5</sup>

A single group education session with an individualised action plan for self-management of exacerbations of COPD and monthly follow-up calls from a case manager reduced hospitalisations and visits to A&E by around 27% compared to usual care.

See Appendix E for further details.

## Interventions lacking conclusive evidence for improved patient flow

The systematic reviews identified determined that there was inconclusive evidence of the effectiveness of nine interventions assessing patient flow from the community to hospital or vice versa:

- Musculoskeletal intermediate care services
- Integrated disease management
- Home-based specialist nursing
- Open access to investigations or clinic appointments
- GP presence in Accident and Emergency
- Telemonitoring
- Educational interventions
- Hospital initiated case management
- Community initiated case management

These interventions are summarised in Table 2 and described in the main text. While some of the interventions showed evidence of possible improvements in some studies, as evidenced by the summary below, the reviews concluded that the evidence on these interventions was inconclusive. The reasons for this in the individual reviews varied, but factors influencing this conclusion were, for example, that the studies identified had inconsistent findings, the volume of studies and participants was low, there was a lack of RCT evidence or the studies had methodological weaknesses which reduced the reliability of their results.

**Table 2: Summary of interventions identified by systematic reviews as having inconclusive evidence about effect on patient flow**

Intervention	Author of systematic review	Type of studies	Countries	Clinical area	Patient flow effects	Patient Outcomes	Cost effectiveness
<b>Musculoskeletal (MSK) intermediate care services</b>	Hussenbux et al. 2015 <sup>6</sup>	1 RCT 22 observational	NR - includes UK, Canada	MSK	Most people managed within intermediate care. Services led to more appropriate referral and reduced waiting times.	Less diagnostic accuracy but high patient satisfaction.	NR
	Joseph et al. 2014 <sup>7</sup>	2 RCTs 1 non RCT 31 observational	NR - includes UK, Canada	MSK	Earlier diagnosis, treatment and reduced waiting lists.	Improved pain and quality of life. High levels of patient satisfaction.	Reduced hospital costs.
<b>Home-based specialist nursing</b>	Parab et al. 2013 <sup>8</sup>	7 RCTs	UK, US, Canada, Australia	Child health	Reduced hospital stay for children. No effect on readmissions.	Reduction in parental anxiety and improvements in child behaviours.	Increased cost to provider of specialist home-based paediatric nursing. Inconsistent data about costs to family.
<b>Open access to investigations or clinic appointments</b>	Ballini et al 2015 <sup>9</sup>	3 RCTs 5 observational	UK, USA, Australia	Mixed	Waiting time reduced in some studies but results inconclusive.	NR	NR
<b>GP presence in Accident and Emergency</b>	Khangura et al. 2012 <sup>10</sup>	3 observational	Ireland, UK	A&E	Insufficient evidence to conclude whether GPs in A&E reduce overcrowding, waiting times or improve patient flow.	NR	Inconsistent data about cost savings.
<b>Telemonitoring</b>	Feltner et al. 2014 <sup>1</sup>	8 RCTs	UK, Belgium, US, Canada	Heart failure	No impact on all-cause or heart failure related	No change on mortality.	NR

Intervention	Author of systematic review	Type of studies	Countries	Clinical area	Patient flow effects	Patient Outcomes	Cost effectiveness
					readmission.		
Educational interventions	Feltner et al. 2014 <sup>1</sup>	4 RCTs	Italy, Sweden, US	Heart failure	No impact on all-cause or heart failure related readmission.	No change on mortality.	NR
	Furlan et al. 2011 <sup>2</sup>	RCTs and observational	UK, Australia, Iran	Stroke and MI	Education after stroke or MI may reduce visits to A&E.	Insufficient evidence.	NR
Hospital initiated case management	Huntley et al. 2013 <sup>11</sup>	6 RCTs	US, Germany, Denmark, Canada, Australia, Sweden	Older people	Some studies found it reduced unplanned admissions, others did not.	NR	One study reported cost which was reduced due to less admissions from A&E.
Community initiated case management	Huntley et al. 2013 <sup>11</sup>	5 RCTs	US, Germany, Denmark, Canada, Australia, Sweden	Older people	No reduction in unplanned admissions. May reduce length of stay.	NR	Reported favourable cost-outcomes for case management.

## **MSK intermediate care services**

Two systematic reviews, Hussenbux et al. 2015<sup>6</sup> and Joseph et al. 2014<sup>7</sup>, were identified which looked at community services set up to manage the interface between primary and secondary care for musculoskeletal (MSK) conditions. These services were led by allied health professionals including physiotherapists and occupational therapists or GPs with a special interest in MSK medicine. The services included triage, treatment and referral to secondary care. Joseph et al. 2014<sup>7</sup> focused on identifying the optimum features of an MSK triage system.

Both reviews found that most people could be managed entirely within these services<sup>6</sup>. The services reduced inappropriate referrals to orthopaedics<sup>6</sup> and shortened waiting times.

The reviews reported high patient satisfaction with the services, with an improvement in symptoms, pain and quality of life. However, some studies showed that diagnostic accuracy was lower, and this was more likely for people with rheumatological conditions<sup>7</sup>.

Cost effectiveness studies were evaluated by Joseph et al.<sup>7</sup> who found that according to two studies, MSK triage services lowered hospital costs.

While both reviews suggested benefits, they acknowledged that the evidence was not strong. Due to most studies being of an observational nature and there being a lack of prospective randomised trials, both studies concluded that the effectiveness of MSK intermediate care remains unclear.

### **Case study 4: PhysioDirect' telephone assessment and advice services**

UK study by Salisbury et al. 2013<sup>21</sup> identified from Hussenbux et al. 2015<sup>6</sup>

This RCT assessed a physiotherapy based service that provided assessment and advice to patients over the telephone for musculoskeletal (MSK) conditions. The service, called PhysioDirect, also provided an opportunity for senior physiotherapists to rapidly triage patients and identify those that urgently needed face-to-face treatment, and discharge those that were unlikely to benefit from physiotherapy. Patients being treated through PhysioDirect had to wait for an average of just 7 days for treatment, as compared to 34 days wait in usual care. In fact nearly half the patients on PhysioDirect were managed entirely by telephone. The service was broadly acceptable to patients, though some perceived it as a "first step" in accessing treatment rather than a replacement of face-to-face consultation. Clinical outcomes were the same as usual care with no adverse effects reported. PhysioDirect is now a permanent feature in the UK physiotherapy landscape and can be found across many parts of the country.

See Appendix E for further details.

## **Home-based specialist nursing**

One systematic review of seven RCTs, Parab et al. 2013<sup>8</sup>, evaluated specialist home-based nursing services for children with acute and chronic illnesses. They reported that two RCTs found a significant reduction in length of hospital stay, but no difference in hospital readmission rates. There were no significant differences in health outcomes but three RCTs found a reduction in parental anxiety and

improvements in child behaviour. One RCT reported no impact on parental burden of care or functional status of children.

The authors concluded that there was insufficient data to determine the effectiveness of the intervention. There was inconsistent data on cost effectiveness.

### **Open access to investigations or clinic appointments**

One systematic review, Ballini et al. 2015<sup>9</sup>, was identified that evaluated the effect on patient flow of open access to investigations or clinic appointments. The review identified one RCT which concluded that open access to investigative services reduced the waiting time by 30% for people with lower urinary tract syndrome (LUTS) but not for people with haematuria. Another study found that same-day scheduling for paediatric health clinic appointments reduced waiting times (direct reduction of 25.2 days). However four other studies did not find any improvement with open access:

- an interrupted time series (ITS) study showed no effect of a direct booking system on the proportion of participants receiving a colposcopy appointment within the recommended time
- one RCT and one ITS study showed no effect of distant consultancy on waiting times, such as instant photography for dermatological conditions and telemedicine for ear, nose and throat (ENT) conditions
- one ITS study showed no effect of a pooled waiting list on the number of participants waiting for uncomplicated spinal surgery

### **GP presence in Accident and Emergency**

Khangura et al. 2012<sup>10</sup> performed a systematic review which assessed the impact of GPs providing non-urgent care in Accident and Emergency departments on patient flow. Only three studies were identified, all of which were observational and of low quality. The authors concluded that there was insufficient evidence to determine whether GPs in A&E reduce overcrowding, waiting times or improve patient flow. There was inconsistent data about any cost implications.

### **Telemonitoring**

One systematic review and meta-analysis of eight RCTs, Feltner et al. 2014<sup>1</sup>, was identified that assessed telemonitoring for improving patient flow. Telemonitoring is described as measuring physiological data such as blood pressure, electrocardiogram (ECG) and pulse oximetry at home and sending the results via digital, broadband or wireless to a monitoring centre with or without remote visits. There was insufficient evidence about the effects of telemonitoring on all-cause readmission, and moderate evidence of no benefits for heart failure specific readmission or mortality for people with moderate to severe heart failure. Cost effectiveness was not reported.

### **Educational interventions**

Two systematic reviews of RCTs with one meta-analysis evaluated primarily educational programs for improving patient flow. Feltner et al. 2014<sup>1</sup> found insufficient evidence of the effects of primarily educational interventions on all-cause readmission, and low strength evidence of no effect on heart failure readmission or mortality for people admitted with moderate to severe heart failure. Furlan et al. 2011<sup>2</sup> did not find sufficient evidence that education interventions started during hospitalisation and continued at the community level were beneficial following stroke or MI. Cost effectiveness was not reported.

## Hospital initiated case management

One systematic review of six RCTs was identified that assessed hospital initiated case management, Huntley et al. 2013<sup>11</sup>. It found case management initiated in hospital or on discharge reduced length of stay for older people in three RCTs. It also reduced readmissions in two out of six RCTs. In a meta-analysis of three of the RCTs, case management did not significantly reduce unplanned admissions. Case management was defined as a collaborative process of assessment, planning, facilitation, care coordination, evaluation, and advocacy for options and services to meet an individual's and family's comprehensive health needs through communication and available resources to promote quality cost-effective outcomes.

## Community initiated case management

A systematic review by Huntley et al. 2013<sup>11</sup> identified five RCTs of case management of older people initiated in the community. None of them found it reduced unplanned admissions. One of these trials of GP-led case management found a reduction in admissions to the emergency department as well as admissions to nursing homes and non-acute hospitals. One hundred people were randomised to have usual care and 99 were allocated to community initiated case management. This consisted of the GP making an initial assessment which was communicated to the geriatric unit. The GP then made home visits every 2 months, the results of which were discussed at weekly multidisciplinary meetings. The total number of admissions over 1 year was 36 for the intervention compared to 51 (hazard ratio 0.74, 95% CI 0.56 to 0.97). This study in the US estimated \$1800 per capita savings per year based on 1998 prices.

## Metrics used to measure patient flow

The systematic reviews identified the following metrics which they considered would have been important for measuring patient flow and patient outcomes. Many of the primary studies did not explicitly use these metrics.

### Metrics used to assess patient flow:

- Readmission rate
  - Within 30 days
  - Between 3 months and 6 months after admission
- Number of accident and emergency visits
- Number of GP visits
- Length of hospital admission
- Delayed discharge
- Place of discharge e.g. home or rehabilitation facility or long-term care

### Metrics used to measure patient outcomes:

- Mortality rate
- Clinical outcome
- Functional status
- Physical health determinants
- Mental health determinants
- Quality of life
- Patient satisfaction

- Self-care burden
- Adverse events
- Morbidity
- Caregiver burden

More detailed metrics were compiled by New et al. 2013<sup>13</sup>, in a qualitative Australian study. They recommended the following key performance indicators for measuring access to and from post-acute settings which were compiled from a survey sent to all rehabilitation physicians, older adult care physicians, and senior hospital management in Australia:

- Average waiting time for an acute hospital referral to be assessed for post-acute admission
- Average time for acceptance of an acute hospital referral by post-acute service
- Average time from the patient being ready for transfer to admission
- Percentage of the whole length of stay in acute care spent waiting for post-acute admission
- Percentage of patients in post-acute care with a discharge barrier
- Percentage of the whole length of stay in post-acute care spent with a discharge barrier.

## Costs and cost effectiveness

One systematic review by Joseph et al. 2014<sup>7</sup> found evidence that MSK intermediate care services reduced hospital costs but this was not found in another systematic review by Hussenbux et al. 2015<sup>6</sup>. Parab et al. 2013<sup>8</sup> found increased hospital costs in providing home-based paediatric nursing. Huntley et al. 2013<sup>11</sup> found that hospital initiated case management of older people reduced hospital costs by fewer admissions to hospital through A&E. Community initiated case management was also reported to have favourable cost outcomes though it was not shown to improve patient flow. Two systematic reviews, Fearon et al. 2012<sup>4</sup> and Furlan et al. 2011<sup>2</sup> found reduced costs from early supported discharge or trends in that direction.

No economic evaluation was available for the other interventions apart from GP presence in A&E for which cost data was inconsistent<sup>10</sup>.

## Barriers, facilitators and enablers

No systematic reviews were identified which looked at barriers, facilitators and enablers for integrated care programmes to improve patient flow. A search for primary literature revealed three observational studies which identified barriers (New et al. 2013<sup>13</sup>, Van Dyke et al. 2011<sup>14</sup> and Okoniewska et al. 2015<sup>12</sup>), two of which described enablers and facilitators (Van Dyke et al. 2011<sup>14</sup> and Okoniewska et al. 2015<sup>12</sup>) to patient flow.

New et al. 2013<sup>13</sup> performed a multiphase qualitative study in Australia to define and measure barriers to discharge from post-acute medical care. Barriers were identified from senior medical, nursing and allied health professionals from two major hospitals in Victoria over a 4 month period. These barriers were then prospectively monitored to see if they captured all barriers encountered in a 3 month period from a general inpatient rehabilitation ward and then validated from over 600 consecutive admissions. A list of the barriers is provided in Table 3.

Van Dyke et al. 2011<sup>14</sup> conducted a study across six US hospital emergency departments. Each hospital was asked to implement at least one new process for improving patient flow. The researchers then identified organisational barriers and enablers to this process through qualitative research using interviews of 54 individuals across the hospitals, including nurses, doctors, senior hospital leaders and information technology personnel. The barriers that were identified in at least two hospitals are listed in Table 3 and the enablers in Table 4.

Okoniewska et al. 2015<sup>12</sup> performed a qualitative study to identify barriers and enablers to effective discharge planning from an acute medical care unit to the community setting in Canada. They asked nurses, allied health providers and doctors the open-ended question “What are the communication barriers between different health care providers that limit an effective discharge of patients from Unit 36?”. The barriers that were identified are listed in Table 3 and the enablers in Table 4.

**Table 3: Barriers to patient flow identified in 3 primary studies**

Setting	Country	Barrier	Description
Organisational barriers to improving patient flow in A&E <sup>14</sup>	US	Staff resistance	This is one of the most common challenges which may occur if the changes appear to increase workload or disrupt workflow. It is also more likely if staff down or upstream of the intervention have not been involved in planning the change.
		Organisational culture	Ingrained habits and beliefs can be challenging to change.
		Lack of staff resources	If new strategies require extra staff and there is no available budget then this can have a big impact on both the intervention and usual care.
		Past failures at quality improvement	This can lead to staff cynicism and expectations that the new intervention will later be scrapped.
		Lack of data to monitor progress	This hampers the ability to adapt the intervention or show if it is effective.
Organisational barriers to improving patient flow from an acute medical care unit to the community setting <sup>12</sup>	Canada	Poor communication	Delays in communication of complex patient information from hospital doctor to GP due to the process of dictating discharge letters and sending them via mail. Lack of or poor communication of discharge plan to allied health professional teams. Poor communication of the need for patient education such as from a diabetes specialist nurse or anticoagulant advice.
		Lack of role clarity	Lack of designation of responsibility for the discharge plan, medication and follow-up appointment bookings.
		Lack of resources	Limited rehabilitation beds and nursing home placements.
Barriers to discharge from post-acute care <sup>13</sup>	Australia	Family negotiations	Delays in planning and decision-making around whether the family will be able to provide care or whether other care facilities or a combination of the two will be required.
		Weight-bearing issues	People who have had a lower limb fracture and are unable to weight-bear, but ongoing inpatient rehabilitation is no longer appropriate due to lack of improvement in mobility and transfers. No alternative care setting available for maintenance therapy until weight-bearing improves.
		Occupational therapy home assessment	Inpatient rehabilitation no longer required but home visit not yet conducted and deemed necessary to confirm safety aspects.

Setting	Country	Barrier	Description
		Mental capacity	Neuropsychological assessment required to ensure the person has mental capacity to decide on discharge options.
		Specialist review	Awaiting medical or surgical review prior to discharge.
		Ambulatory rehabilitation	Delay in assessment for or availability of ambulatory rehabilitation outside of the post-acute setting.
		Home modifications	Delays in funding and completing essential home modifications for patient safety.
		Equipment	Delays in funding and availability of specific equipment.
		Carer funding, recruiting and training	Delays in funding, recruiting and training so that care can be provided to ensure safe discharge.
		Accommodation	No available suitable accommodation.
		Guardian/power of attorney appointment	Guardian/power of attorney required to make decisions on discharge arrangements but no-one identified or appointed. This would also include any subsequent delays in decision-making by the appointee.
		Long-term and supported care or services and equipment	Awaiting assessment or approval for these services. Also includes confirming that there is no alternative discharge option, if this is part of the necessary process.
		Alternative care setting	Waiting for alternative care including: nursing home, hostel and supported residential care.

**Table 4: Facilitators and enablers to patient flow identified in 2 primary studies**

Setting	Country	Facilitator	Description
Organisational facilitators to improving patient flow through A&E <sup>14</sup>	US	Participation in a learning network across hospitals provided by a national program dedicated to developing strategies to improve patient flow	The national program provided the hospitals with a structure in which to work out how to implement changes to improve patient flow. This included the requirement to consider all intermediate steps in the process, staff roles and resource needed to successfully implement the intervention. The external participation of the national program gave the new process appropriate attention, support and importance. Collaboration with other hospitals was important for peer support.
		Strategic selection of planning team members	Collaboration between different departments and individual stakeholders for input into the design of the intervention can save time in the long run.
		Executive support and availability of resources	Strong commitment by senior leaders may improve access to resources.
		Staff driven improvement strategies	Staff-driven approaches may reduce staff resistance to change, especially if there is multidisciplinary input.
		Aligned reporting structure	A common supervisor for the intervention may make coordination smoother if the intervention involves multiple departments and organisations.
		Simple process changes	Smaller scale process changes may be easier to implement and meet with less resistance.
		Flexible/robust IT system	IT systems that do not interfere with the workflow may be preferred.
		Reinforcement of the strategy by leaders	This may improve staff resistance and culture change as it conveys the message that the strategy will become standard practice.
		Staff education	Enables staff to carry out the changes with improved confidence and capability, which may improve staff resistance.
		Post-implementation adjustments	This shows that staff can be responsive to any concerns and lead to further improvements.
Organisational facilitators improving patient flow from an acute medical care	Canada	Improved communication and documentation	The following elements of care were proposed: <ul style="list-style-type: none"> <li>Ensuring patients are provided with educational materials.</li> <li>Patients should go home with a copy of the discharge summary including documented follow-up of any further investigation dates and outpatient appointments.</li> </ul>

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Setting	Country	Facilitator	Description
unit to the community setting <sup>12</sup>			<ul style="list-style-type: none"><li>● Use of electronic transfer of care summaries to the GP which include follow-up instructions.</li><li>● Protocols to ensure timely transfer of care.</li><li>● Inclusion of multidisciplinary team members in rapid discharge rounds.</li></ul>
		Leadership	New role of team care coordinator for discharge process could liaise with the team, reducing miscommunication.

## Strengths and limitations of the reviews

A strength of the body of evidence looking at patient flow in integrated care systems was the high methodological quality of the systematic reviews. Nine of the reviews scored full marks on the AMSTAR quality assessment tool, while the other two scored well at 8 out of 11. However, the reviews cited major limitations in the quality of the primary studies.

Several primary studies were too small to be able to demonstrate a statistical benefit. Due to the heterogeneity of interventions and studies assessing them, only four of the systematic reviews were able to pool the results of the primary studies in meta-analyses. Most studies included in the reviews were single-site based which increases the potential the results may not be more widely generalisable.

Many studies included complex interventions with multiple components which made it difficult to determine effects of individual elements on outcomes. There was also no standard definition for some of the interventions, such as integrated disease management. This intervention in particular could have had substantial overlap with other interventions such as early discharge planning. Additionally, most reviews reported that the comparator of “standard care” in their included studies was often poorly defined or there was heterogeneity in the care received by controls. This heterogeneity is likely to make it difficult to detect effects, and also to be able to definitively identify what works.

Other reviews such as Parab et al. 2013<sup>8</sup> reported wide heterogeneity in populations across the paediatric studies included in the systematic review. This was due to differences in the type of illnesses included and the varied care requirements. Some of these studies were of small sample size, which increases the risk of bias, particularly in subjective outcomes. Only one study blinded participants and personnel.

Though the results for MSK intermediate care clinics looked promising in the Hussenbux et al. 2015<sup>6</sup> systematic review, the authors reported that there was insufficient evidence to prove their effectiveness on patient flow. This was due to the included studies being mainly observational and of low quality. Only 11% of the studies had a clear evaluation strategy and there is a lack of prospective randomised trials. Cost was also not assessed in the included studies.

Further methodological issues identified were the need to standardise measurement of readmissions or A&E visits, including whether they should be based on patient report, chart review or some combination of measures.

Finally, the wide and varied definitions of “integrated care systems” and interpretation of “patient flow” further hampers attempts to measure the effects of each intervention.

## Gaps in the evidence

No information was found in the reviews on the following areas:

- Best practice in the education, training and rollout to staff in patient flow models
- Accurate economic effectiveness of most interventions
- Social care interventions
- Cost implications for intermediate services in terms of providing the service and the costs for people who do not benefit from the service and then require secondary care<sup>6</sup>.
- Evidence of transitional care interventions to reduce readmissions within 30 days of discharge<sup>1</sup>.
- Any harms of transitional care interventions such as potentially higher caregiver burden<sup>1</sup>.
- RCTs of adequate sample size to examine home care programs for children with acute and chronic illnesses<sup>8</sup>.
- Longitudinal follow-up to assess effectiveness of interventions.

**Section 2 - narrative review of the grey literature**

## Methods

In addition to the academically published, systematic review literature covered in section 1, integrated care is a favourite topic of healthcare organisations that can best be described as *thought leaders*, by which we mean think tanks, not-for-profit research organisations, charitable trusts, non-governmental organisations, key healthcare providers and charities. A great deal of literature has been produced by thought leader organisations on integrated care; though rather less on patient flow within integrated care systems.

Here we provide a thematic review and selection of case studies published in the grey literature by such organisations. We portray the most frequently described interventions, with a focus on those that report patient and economic outcomes. Three case studies are then presented, each of which illustrates one or more of the interventions.

Most literature on integrated care by thought leader organisations discuss general issues such as integration at different levels of the system, how to finance integrated care and what integrated care looks like in different settings.<sup>22</sup> We have not reproduced that general literature here - instead we remain focussed on patient flow. There is also some literature that examines patient flow within individual levels or organisations of the healthcare system, without taking a focus on integrated care systems; this literature tends to focus on emergency departments and hospital efficiency, and covers issues such as lean/six sigma and matching capacity to demand. As in the systematic review above, this non-integrated care literature is outside the scope of this review of the grey literature.

Literature was identified through searches in Scopus, Google, Google Scholar and similar search engines; we also searched the websites of specific organisations, such as The King's Fund, the WHO, the Health Foundation and the Commonwealth Fund. Supplemental search techniques were also used to track citations and harvest references from relevant studies. The same subject scope was used as for the systematic review above. Potential documents were assessed for inclusion during the identification process. A final total of 27 documents were identified and used.

## Interventions

The grey literature is broad and diverse, and the language used to describe interventions vary between organisations, but there are six interventions, or related families of interventions, that are repeatedly described. They are, broadly ranked in order of weight of literature:

1. Discharge planning
2. Case management
3. Self-management
4. Telemedicine
5. Hospital at Home
6. Admissions planning

### Discharge planning

Structured discharge planning, the process of ensuring there is an individualised plan in place to support the return of the patient to their normal place of residence, is widely regarded as central to good patient flow.

The King's Fund recommend that healthcare providers should deliver structured discharge planning, quoting RCT evidence that describe how individualised discharge plans for hospital inpatients are more effective than routine discharge care that is not tailored to the individual.<sup>23</sup> The Fund report that hospital re-admissions are reduced by about 15% for patients allocated to structured individualised discharge planning.<sup>24</sup> While supportive of structured discharge planning, the Fund notes that there is little evidence that unsupported *early* discharge from acute care to a hospital at home system is effective.

The Health Foundation has also recommended the use of structured discharge planning.<sup>15</sup> While the Foundation agree that there is little evidence on cost impacts and safety, they emphasise the increase in patient satisfaction. They quote an example of a hospital in rural Australia that implemented an integrated discharge planning service for older people. The service led to quicker risk screening and more effective referrals to community health services.<sup>25</sup>

The Commonwealth Fund, in their newsletter, discuss how something as simple as ensuring all hospital discharges are done in the morning can prevent readmission.<sup>26</sup> In an interview with the senior director of case management at New York University Langone Medical Center, they say that leaving the hospital early in the day gives: "patients time to get home, get their prescriptions filled, and have a visiting nurse come in". As a result, overall length of stay has dropped at the Center, as have readmission rates - an indication that patients are not being discharged too early.

The West Middlesex University Hospital in West London has seen similar improvements in discharge and readmission rates. Similar to Langone Medical Center, the Hospital introduced ward based multi-disciplinary improvement teams that were set up specifically to focus on increasing the number of patients who were discharged before midday and at weekends. The teams were formed in response to delays identified through process mapping. The improvement teams did just that - they produced a significant reduction in length of stay for emergency medical patients, from 14 days down to 5.8 days over 7 months.<sup>27</sup>

## Case management

How case management is implemented varies from place to place, but there are nearly always three main components. The first is *case finding*, the process of identifying people at risk of unplanned hospital admission. The second is *assessment* of the needs of the at risk individual, which may include the writing of an individualised care plan. The third is *care co-ordination*, where a case manager or team works to navigate the individual through the health system.

Case management is often at the centre of thought leader literature on integrated care. The King's Fund in particular has extensively discussed its implementation - they support assertive case management for specific populations, for example people with mental health illnesses, though they acknowledge that there is mixed evidence for its effectiveness in the general population.<sup>23</sup> The Fund quote a meta-analysis of assertive case management of mental health patients by multidisciplinary teams. The analysis found that the multidisciplinary teams reduced hospital admissions, compared to clinical case management.<sup>28</sup>

The Health Foundation similarly discuss case management as a way in which patient flow could be improved. They report an example of a project at the Royal Free Hospital in London that used a proactive case management model for discharging patients with dementia. A specialist dementia occupational therapist acted as a single point of contact for patients, carers and staff, and led the

patient through both admission and discharge processes. Although led by the occupational therapist, a multidisciplinary team was involved that included: the lead dementia nurse, the director of therapies, a senior information analyst, a carer and member of Carers UK, a discharge co-ordinator, the clinical dementia lead and a project manager. Carers were very satisfied with the service, the average length of stay was reduced by about two days and the predicted cost savings were nearly £50,000 after the first nine months.<sup>29</sup>

Taking a slightly different angle The Nuffield Trust discuss the use of virtual wards, which in effect is a combination of case management and hospital at home: individuals at high risk of future hospital admission are identified and then cared for via a virtual ward. Virtual Wards work just like a hospital ward, using the same staffing, systems and daily routines. The key difference is that rather than being in hospital, the patient being cared for remains in their own homes. The idea being to prevent the person from needing to be admitted into hospital. They concluded that although there was no reduction in emergency hospital admissions or mortality for patients who received this type of care, there was a reduction in elective hospital admissions and in outpatient attendances.<sup>30</sup>

## Self Management

Self-management aims to help a patient develop an understanding of how their condition affects their lives and how to cope with their symptoms. Overall, people report that it helps them live better lives, and puts them in control of their condition.<sup>31</sup>

Self-management, reports The King's Fund, seems to be effective in reducing unplanned admissions for patients with chronic obstructive pulmonary disease (COPD) and asthma. Self-management education for patients with COPD reduces the risk of at least one hospital admission by about a third compared with usual care,<sup>32</sup> while asthma education provided at accident and emergency departments aimed at children and carers can result in lowering the risk of hospital admission by about a fifth.<sup>33</sup>

The Health Foundation similarly suggest that self-management support interventions can work. Their review of the evidence suggests that such interventions can be split into those that focus on building knowledge and technical skills, such as insulin management, versus those that aim to build people's confidence in being able to care for themselves.<sup>34</sup>

However, it is acknowledged in the thought leadership literature that not all studies of self-management demonstrate reduced hospital use, and there is some debate over which 'active ingredient' in self-management is the most effective. Information provision alone is unlikely to be sufficient to motivate behaviour change and improve outcomes,<sup>34</sup> while The King's Fund report a study that suggests that a personalised self-management action plan is a "key ingredient".<sup>35</sup> Personalised self-management action plans could include not only the provision of information to the patient but also coaching, both online and over the telephone, medicines management support and access to their own records.<sup>36</sup>

## Telemedicine

Telemedicine includes both telecare and telehealth. Telecare uses equipment to support the patient in their own home, such as regular contact by telephone. Telehealth tends to complement usual care, for example, by providing equipment for monitoring vital signs such as heart rate and sending the data to a clinician to interpret.<sup>23</sup>

The King's Fund recommend telemonitoring for patients with heart failure, and report that the most effective telecare interventions may be automated vital signs monitoring for people with heart disease, where it may reduce admissions and lower overall costs. The evidence is less strong for people with other long term conditions, such as COPD or diabetes. The Fund reports that overall the evidence for telemedicine remains equivocal.<sup>23</sup>

The uptake of new technologies such as telemedicine may be slower than anticipated because health care professionals lack confidence that it is a safe or efficient way to provide health care.<sup>37</sup> The use of telemedicine remains controversial, and a recently reported trial of telemedicine in the NHS did not find it cost effective for people with Heart Failure, COPD or diabetes.<sup>38</sup>

## Hospital at home

The King's Fund recommend that commissioners should consider implementing hospital at home. They argue that while such a system produces similar health outcomes to inpatient care, it can provide it at a similar or lower cost. They quote a 2009 hospital at home example in the UK.<sup>39</sup> The population group was elderly patients who had suffered from a medical event such as stroke or COPD, but who were clinically stable and did not require diagnostic or specialist input. While there were slightly more admissions in the hospital at home group, they had greater levels of satisfaction, and their care at home was less expensive.<sup>23</sup>

Hospital at Home, as well as case management and wider integrated care, is also part of the 2020 Vision of the Scottish Government.<sup>40</sup>

## Admissions planning

The Commonwealth Fund suggest that improved patient flow can be realised during the admissions process. They give an example of St Louis Children's Hospital, which in 2010 established a call centre to serve as a single point of entry for referring physicians seeking to admit a patient or confer with a specialist. Pediatric nurses with critical care experience staffed the centre 24 hours a day, seven days a week. The centre could arrange for the referring physician to consult with a specialist, schedule an appointment, or accelerate the admission process by assigning responsibility for the case to a hospital physician. The registration and bed finding process could also be begun in parallel by hospital nursing staff, saving time and increasing patient flow.<sup>26</sup>

## Grey literature case studies

The three case studies below implement one or more of the interventions described above, and are referred to by one or more thought leader organisation. Their inclusion here offers an opportunity to describe in a little more detail how the interventions can fit together to support patient flow in an integrated healthcare system.

### Case Study - Esther (Sweden)

Esther is not a real person. Rather, she is a user-experience persona - a grey-haired, ailing but competent, 88 year old Swedish woman living alone. She has a number of chronic conditions and occasionally requires acute care. This persona has been used to discuss how her care can be provided as a joined-up service, rather than as a series of discrete episodes, and the Esther project has driven

impressive improvements in how patients flow through a complex network of providers and care settings in Höglandet, Sweden.<sup>41 42</sup>

The Esther project involved GPs, nurses, social workers and secondary care clinicians, who worked together with the goal of improving patient flow through the care system. The team looked at ways they could co-ordinate care, align capacity with demand, and improve communication among providers. Examples of changes made included:

- a redesigned intake and transfer process
- team-based telephone consultation
- integrated documentation and communication processes
- education of patients in self-management skills

Central to many of these changes was the creation of a multidisciplinary case management team for Esther; or rather, her real-life counterparts. The collaborative team included the GP, appropriate clinical specialists, and hospital and community-based nurses. Although it appeared at first to the teams that demand was for inpatient admissions, it was really for better access to specialty care. The redesigned process and existence of this collaborative team meant that when a patient presented to the GP with acute care needs, the GP could contact a specialist direct, without having to send the patient to hospital. Instead, the specialist could have a telephone consultation with the GP or with Esther direct. If it was decided to admit the patient to hospital, then through the multidisciplinary team the patient could be admitted directly to the relevant ward, without having to endure a visit to the emergency room, which would be costly in both human and financial terms.

In addition to the setting up of the multidisciplinary case management teams, patient education was also recognised as a critical element in keeping patients out of the hospital. Nurses were trained to educate heart patients, for example, about how to take vital measurements at home and tweak their medication accordingly.

Reported outcomes of the Ester project were fewer hospital admissions, reduced lengths of stay and shorter waiting lists for specialists, such as neurologists and gastroenterologists.<sup>43</sup> All 250 providers in the local healthcare network received training in the project's goals and processes, and the investment paid off. About a fifth of acute care beds could be closed, and that capacity moved to where the need was bigger.

### **Case Study - Mrs Smith (England)**

As with Esther, the “Mrs Smith” project is built around the creation of a persona. Mrs Smith is a resident of Torbay, a region in South West England, and is conceived of as a typical older lady who needs a range of services. The project was originally formed in the belief that bringing health and social care services together would better meet the needs of the individuals who required care and support.<sup>44 45</sup>

In Torbay, as well as discussing the integrating of care services, the health and social care budgets were pooled together. This financial arrangement encouraged the establishment of integrated health and social care teams and the development of a wide range of intermediate care services. The changes and innovations included:

- The formation of multidisciplinary teams to provide care to elderly people judged to be in particular need. The teams worked closely with general practices, with the aim to help as many “Mrs Smith’s” to live independently in the community as possible.
- The project prioritised continuity of care at home, with intermediate care provision and hospital discharge processes tied in to support it.
- The appointment of health and social care co-ordinators was an important innovation. Their responsibility was to ensure team members were working together to improve care.

Reported outcomes include a reduction in the number of occupied beds, emergency bed day use, instances of delayed transfer of care, and an increase in the use of home-care services. The “Mrs Smith” approach is of national and international interest, and studied by those keen to incorporate its learnings. Although many UK organisations now deliver some level of integrated care, the approach is still held up as an early example of excellence, and of genuine innovation. Torbay NHS Trust also has an on-going collaboration with Kaiser Permanente in the USA.

### **Case Study - Canterbury Health System (New Zealand)**

The main hospital in Christchurch, the largest city of the Canterbury region in New Zealand, regularly entered ‘gridlock’ - with patients backing up in its emergency department and facing long waits as the hospital ran out of beds. This sort of gridlock rarely happens now. Canterbury has low rates of acute medical admissions, a short average length of stay and low readmission rates. These figures point to a system that is keeping patients who do not need to be in hospital out of it, is treating them swiftly once there, and discharging them safely to good community support.<sup>46</sup>

To move from gridlock to efficiency, Canterbury health system put in place a number of innovations and changes. These include *HealthPathways* (an online ‘care map’, that all members of a health care team - whether primary, community or secondary - can access), an Acute Demand Management System, a Community Rehabilitation Enablement and Support Team, a Falls Management system, Medication management, a range of hospital changes, 24 hour general practice, an Electronic Request Management System, Electronic Shared Care Record View, and finance arrangements.

One of the above interventions of relevance to patient flow in an integrated health care system was the creation of the Community Rehabilitation Enablement and Support Team (CREST). The team was charged with 1) reducing length of stay once in hospital, 2) reducing the chances of readmission, and 3) supporting independent living. CREST case managers looked to ‘pull’ patients out of hospital, and arrange follow-up support at home or in the community. Recovery goals were agreed with patients. The CREST model focused on rehabilitation; the support the teams offered was not just medical or nursing, but included assisting patients in being able to shop again, reconnect with friends and rebuild social networks.

Another of the Canterbury patient flow interventions was the Acute Demand Management System. The system served two functions. First, it offered support for general practice so they could provide patients with a level of care that meant they didn’t need to go to hospital. Second, it allowed hospitals to discharge patients from accident and emergency or other admission wards, without the need for a hospital stay. For example, two hospital nurses were charged with ‘pulling’ patients out of the emergency department to prevent an admission - identifying those whose care could be safely and efficiently delivered at home.

Creating a new system takes time - Canterbury has been working to create 'one system, one budget' for at least six years and the journey is far from complete. A small number of leaders were at the heart of Canterbury's transformation, but this leadership rapidly became collective, shared and distributed.

## Section 3 - conclusions and recommendations

## Conclusions

The results of the systematic review of evidence and the review of the grey literature revealed similar interventions and the same frustration with the evidence-base; inevitable with such a series of heterogeneous and complex interventions.

The body of evidence from the systematic review for interventions to improve patient flow in integrated care systems was limited. There is evidence of effectiveness of some interventions to improve patient flow from hospital to the community for people with heart failure, stroke and MI in terms of reducing length of stay and readmission rate. The evidence shows accompanied improvements in patient outcomes such as quality of life and mortality but evidence of economic effectiveness is lacking.

There was inconclusive and inconsistent evidence to determine the effectiveness of several interventions aimed at improving patient flow from the community to secondary care. This is due to a lack of high quality RCTs with clearly defined control groups or blinding of the assessors. Many of the studies are observational with methodological limitations.

Further difficulties in determining the effectiveness is the considerable overlap in the elements of care that make up each proposed intervention. For example, most of the interventions incorporated an element of patient education and increased contact with a healthcare professional. Finally, the studies included in the systematic reviews came from a range of international countries with different populations and healthcare systems, which may limit their applicability to the Irish healthcare system.

However, while the evidence is by its nature limited, there are nevertheless emerging signals, from both the academic and grey literature, that can help direct the design of integrated healthcare systems to improve patient flow.

## Recommendations

These recommendations for improving patient flow in integrated care emerge from the systematic review of the academic literature, and the narrative review of the grey literature published by thought leader organisations. While it is clear that integrated care does not travel well - every combination of location, population and healthcare system is unique, so needs unique solutions - we consider the following are supported by the best evidence available.

### **Recommendation 1: Start small and integrate from the bottom up**

There is no single organisational model that best supports integrated care. The starting point should be a clinical or service model designed to improve care for people, not an organisational model with a pre-determined design. Organisational integration does not necessarily lead to patients receiving integrated care, and most successful case studies of patient flow interventions have started with a clear focus on integrating care at the micro-service level. Projects should be shaped and led by people who work with and clearly understand the demographic they serve. Senior leaders should focus on facilitation and removing barriers to implementation.

### **Recommendation 2: Focus on specific populations**

The research clearly shows that some interventions work for one population, but not another - a classic example is case management. Therefore a focus on, and understanding of, the population you serve is critical. As with recommendation 1, senior leaders should focus on enabling health care teams to develop a relationship over time with a 'registered' population or local community, and so be able to target individuals effectively who would most benefit from co-ordinated approaches to the management of their care.

### **Recommendation 3: Implement individualised discharge plans**

The first of a package of three recommendations around discharge from hospital. The evidence suggests that individualised discharge plans reduce hospital length of stay and reduces the risk of readmission; it also improves patient satisfaction. Evidence is less certain with regard to health outcomes and economic impact, but case studies suggest that when well implemented it can improve efficiency, keep people out of hospital and so save money.

### **Recommendation 4: Implement early supported discharge**

In addition to discharge plans, early supported discharge was found to reduce both length of stay and improve outcomes for stroke patients. Taking into account both direct and indirect healthcare costs, early supported discharge was found to offer value for money. Support teams for early discharge are likely to include nursing, allied health and social care professionals, and could be based either in hospital or community settings.

### **Recommendation 5: Implement post-discharge support**

The third and final recommendation around discharge from hospital is that patients should be followed up by post-discharge home visits and/or structured telephone support. Home visiting programs by doctors, nurses, pharmacists or allied health professionals have been found to reduce the risk of readmission and mortality for heart disease and, though the evidence is less strong, stroke patients.

### **Recommendation 6: Implement multidisciplinary and specialty outpatient clinics**

Specialty outpatient clinics that bring together multidisciplinary expertise have been shown to reduce length of stay, readmission and mortality for people with heart failure; potentially very significant reductions too. Clinics typically brought together cardiologists, nurses, dieticians and pharmacists. Individual case studies suggest that similar models may work with other population groups, though as stated in recommendations 1 and 2, it is important to start small and know the population you serve.

### **Recommendation 7: Consider implementing case management for specific populations**

There is mixed evidence for case management, both in terms of health outcomes and economic effectiveness. However, it forms a central part of most case studies of effective integration, and gains are often seen for patient satisfaction. Case studies suggest that the most effective arrangement is to have individual, named case managers who are part of a multidisciplinary team with clearly defined roles.

### **Recommendation 8: Train, engage and support staff**

Integrated care is often most effectively driven at the micro-service level, and so engagement and support of staff during any attempt to improve patient flow through integrated care is critical. Skills training enables staff to carry out any changing demands and responsibilities with improved confidence and capability, and is likely to reduce resistance to changes. Also, supporting staff-driven approaches is likely to improve and accelerate implementation, especially during the formation of multidisciplinary teams. With multidisciplinary teams, it is vital that all members are clearly aware of their role and the expectations that come with it, and share overarching goals.

### **Recommendation 9: Evaluate**

Because of the generally weak evidence base for much of integrated care, and the complexity and local nature of its interventions, it is crucial that evaluation schemes are run alongside any implementation. A range of metrics should be utilised that measure not only patient flow but also patient and economic outcomes. Useful patient flow outcome measures include (re)admission rate, length of hospital stay, number of accident and emergency visits, and delayed discharge. More detailed metrics, such as those suggested by New et al (see above) may be necessary depending on the intervention being evaluated.

## References

1. Feltner CK, Jones CD, Cene CW, et al. Transitional care interventions to prevent readmissions for people with heart failure: A systematic review and meta-analysis. *Journal of General Internal Medicine*. 2014;29:S238-S9.
2. Furlan AD, Olson DM, Bettger JP, et al. Transition of care for acute stroke and myocardial infarction patients: from hospitalization to rehabilitation, recovery, and secondary prevention. Evidence report/technology assessment. 2011(202):1-197.
3. Shepperd S, Lannin Natasha A, Clemson Lindy M, et al. Discharge planning from hospital to home. *Cochrane Database of Systematic Reviews*: John Wiley & Sons, Ltd; 2013.
4. Fearon P, Langhorne P, Early Supported Discharge T. Services for reducing duration of hospital care for acute stroke patients. *Cochrane database of systematic reviews (Online)*. 2012;9:CD000443.
5. Kruis AL, Smidt N, Assendelft WJ, et al. Integrated disease management interventions for patients with chronic obstructive pulmonary disease. *The Cochrane database of systematic reviews*. 2013;10:CD009437.
6. Hussenbux A, Morrissey D, Joseph C, et al. Intermediate Care pathways for musculoskeletal conditions - Are they working? A systematic review. *Physiotherapy (United Kingdom)*. 2015;101(1):13-24.
7. Joseph C, Morrissey D, Abdur-Rahman M, et al. Musculoskeletal triage: A mixed methods study, integrating systematic review with expert and patient perspectives. *Physiotherapy (United Kingdom)*. 2014;100(4):277-89.
8. Parab Chitra S, Cooper C, Woolfenden S, et al. Specialist home-based nursing services for children with acute and chronic illnesses. *Cochrane Database of Systematic Reviews*: John Wiley & Sons, Ltd; 2013.
9. Ballini L, Negro A, Maltoni S, et al. Interventions to reduce waiting times for elective procedures. *Cochrane Database of Systematic Reviews*: John Wiley & Sons, Ltd; 2015.
10. Khangura Jaspreet K, Flodgren G, Perera R, et al. Primary care professionals providing non-urgent care in hospital emergency departments. *Cochrane Database of Systematic Reviews*: John Wiley & Sons, Ltd; 2012.
11. Huntley AL, Thomas R, Mann M, et al. Is case management effective in reducing the risk of unplanned hospital admissions for older people? A systematic review and meta-analysis. *Family Practice*. 2013;30(3):266-75.
12. Okoniewska B, Santana MJ, Groshaus H, et al. Barriers to discharge in an acute care medical teaching unit: A qualitative analysis of health providers null perceptions. *Journal of Multidisciplinary Healthcare*. 2015;8:83-9.
13. New PW, Cameron PA, Olver JH, et al. Defining barriers to discharge from inpatient rehabilitation, classifying their causes, and proposed performance indicators for rehabilitation patient flow. *Archives of Physical Medicine and Rehabilitation*. 2013;94(1):7.
14. Van Dyke KJ, McHugh M, Yonek J, et al. Facilitators and barriers to the implementation of patient flow improvement strategies. *Quality management in health care*. 2011;20(3):10.
15. De Silva D. *Improving patient flow across organisations and pathways* London: The Health Foundation, 2013. Available from: <http://www.health.org.uk/publications/improving-patient-flow-across-organisations-and-pathways/>.
16. Brunton G, Harden A, Rees R, et al. *Children and physical activity: a systematic review of barriers and facilitators*. London: Institute of Education, University of London, 2003. Available from: <https://eppi.ioe.ac.uk/cms/LinkClick.aspx?fileticket=pPtDU1S8W1c%3D&tabid=245&mid=1081>.
17. Oliver K, Innvar S, Lorenc T, et al. A systematic review of barriers to and facilitators of the use of evidence by policymakers. *BMC health services research*. 2014;14(2).
18. Ducharme J, Doyon O, White M, et al. Impact of care at a multidisciplinary congestive heart failure clinic: a randomized trial. *Canadian Medical Association Journal*. 2005;173(1):5.
19. Bolas H, Brookes K, Scott M, et al. Evaluation of a hospital-based community liaison pharmacy service in Northern Ireland. *Pharmacy World and Science*. 2004;26(2):6.

20. Rice KL, Dewan N, Bloomfield HE, et al. Disease management program for chronic obstructive pulmonary disease: a randomized controlled trial. *Am J Respir Crit Care Med*. 2010;182(7):890-6.
21. Salisbury C, Foster NE, Hopper C, et al. A pragmatic randomised controlled trial of the effectiveness and cost-effectiveness of 'PhysioDirect' telephone assessment and advice services for physiotherapy. *Health Technology Assessment*. 2013;17(2).
22. Goodwin N, Smith J. The Evidence Base for Integrated Care [presentation]. London: The Kings Fund and The Nuffield Trust, 2011. Available from: <http://www.nuffieldtrust.org.uk/sites/files/nuffield/evidence-base-for-integrated-care-251011.pdf>.
23. Purdy S. Avoiding hospital admissions. What does the research evidence say? London: The King's Fund, 2010. Available from: <http://www.kingsfund.org.uk/sites/files/kf/Avoiding-Hospital-Admissions-Sarah-Purdy-December2010.pdf>.
24. Shepperd S, McClaran J, Phillips CO, et al. Discharge planning from hospital to home. *Cochrane Database Syst Rev*. 2010(1):CD000313.
25. Bolch D, Johnston JB, Giles LC, et al. Hospital to home: an integrated approach to discharge planning in a rural South Australian town. *Aust J Rural Health*. 2005;13(2):91-6.
26. Hostetter M, Klein S. Quality Matters. In *Focus: Improving Patient Flow—In and Out of Hospitals and Beyond*. Washington (DC): The Commonwealth Fund, 2013. Available from: <http://www.commonwealthfund.org/publications/newsletters/quality-matters/2013/october-november/in-focus-improving-patient-flow>.
27. Improving Patient Flow in the NHS. Case studies on reducing delays. Leeds: NHS Institute for Innovation and Improvement, 2013. Available from: [www.carebydesign.org/files/no\\_delays\\_achiever\\_case\\_studies.pdf](http://www.carebydesign.org/files/no_delays_achiever_case_studies.pdf).
28. Ziguas SJ, Stuart GW. A meta-analysis of the effectiveness of mental health case management over 20 years. *Psychiatr Serv*. 2000;51(11):1410-21.
29. Foundation TH. My discharge: getting discharge right for someone with dementia. London: The Health Foundation, 2013. Available from: <http://www.health.org.uk/node/28>.
30. Lewis G, Bardsley M. Examining the effectiveness of Virtual Wards. London: Nuffield Trust, 2013.
31. Corben S, Rosen R. Self-management for Long-term Conditions. Patients' perspectives on the way ahead. Working paper. London: The King's Fund, 2005. Available from: [http://www.kingsfund.org.uk/sites/files/kf/field/field\\_publication\\_file/self-management-long-term-conditions-patients-perspectives-sara-corben-rebecca-rosen-kings-fund-26-july-2005.pdf](http://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/self-management-long-term-conditions-patients-perspectives-sara-corben-rebecca-rosen-kings-fund-26-july-2005.pdf).
32. Effing T, Monnikhof EM, van der Valk PD, et al. Self-management education for patients with chronic obstructive pulmonary disease. *Cochrane Database Syst Rev*. 2007(4):CD002990.
33. Boyd M, Lasserson TJ, McKean MC, et al. Interventions for educating children who are at risk of asthma-related emergency department attendance. *Cochrane Database Syst Rev*. 2009(2):CD001290.
34. De Silva D. Helping people help themselves. A review of the evidence considering whether it is worthwhile to support self-management. London: The Health Foundation, 2011. Available from: <http://www.health.org.uk/publication/evidence-helping-people-help-themselves>.
35. Bodenheimer T, Lorig K, Holman H, et al. Patient self-management of chronic disease in primary care. *JAMA*. 2002;288(19):2469-75.
36. Naylor C, Imison C, Addicott R, et al. Transforming our health care system. Ten priorities for commissioners. London: The King's Fund, 2015. Available from: <http://www.kingsfund.org.uk/publications/articles/transforming-our-health-care-system-ten-priorities-commissioners>.
37. Mair FS, Hiscock J, Beaton SC. Understanding factors that inhibit or promote the utilization of telecare in chronic lung disease. *Chronic Illn*. 2008;4(2):110-7.
38. Henderson C, Knapp M, Fernandez JL, et al. Cost effectiveness of telehealth for patients with long term conditions (Whole Systems Demonstrator telehealth questionnaire study): nested economic evaluation in a pragmatic, cluster randomised controlled trial. *BMJ*. 2013;346:f1035.
39. Shepperd S, Doll H, Broad J, et al. Early discharge hospital at home. *Cochrane Database Syst Rev*. 2009(1):CD000356.

40. Government TS. 2020 Vision. Edinburgh: The Scottish Government, 2015. Available from: <http://www.gov.scot/Topics/Health/Policy/2020-Vision>.
41. Improvement IfH. Improving Patient Flow: The Esther Project in Sweden. Cambridge (MA): Institute for Healthcare Improvement, [2015].
42. Robertson H. Integration of health and social care. A review of literature and models. Implications for Scotland. Edinburgh: RCN Scotland, 2011.
43. Weatherly H, Mason A, Wright K, et al. Financial Integration across Health and Social Care: Evidence Review. RF 95/2010. York: University of York, 2010.
44. Thistlethwaite P. Integrating health and social care in Torbay. Improving care for Mrs Smith. London: The King's Fund, 2011.
45. The Torbay Model - "Mrs Smith". Torquay: Torbay and Southern Devon Health and Care NHS Trust, 2014.
46. Timmins N, Ham C. The quest for integrated health and social care. A case study in Canterbury, New Zealand. London: The King's Fund, 2013.
47. Goodwin N, Dixon A, Anderson G, et al. Providing integrated care for older people with complex needs. Lessons from seven international case studies. London: The King's Fund, 2014.
48. Nolte E, Pitchforth E. What is the evidence on the economic impacts of integrated care? Policy Summary 11. Copenhagen: World Health Organization Regional Office for Europe, 2014.
49. Ballini L, Negro A, Maltoni S, et al. Interventions to reduce waiting times for elective procedures. Cochrane Database of Systematic Reviews [Internet]. 2015; (2). Available from: <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD005610.pub2/abstract>.

## Appendix A: Scope

Table 5: Scope

Systematic literature review of patient flow for the Irish health system to support the work of Integrated Clinical Care Programs		
Scope for:	Inclusions	Exclusions
Population	All patients treated in a healthcare system	None
Intervention	Integrated care interventions or systems explicitly put in place to improve patient flow	<ul style="list-style-type: none"> <li>Interventions or systems not explicitly described as integrated care or synonyms such as co-ordinated care</li> <li>Interventions or systems not explicitly aimed at improving patient flow</li> <li>Interventions focussed solely at increasing efficiency at a single level of the health system (as opposed to two or more levels of the health system, i.e. primary, secondary, tertiary, and social care)</li> </ul>
Comparisons	<ul style="list-style-type: none"> <li>Traditional ‘non-integrated’ healthcare systems</li> <li>Integrated healthcare systems that have not put in place particular interventions to improve patient flow</li> <li>Non-integrated healthcare systems pre-intervention (for “before and after” studies)</li> </ul>	
Outcomes	<ul style="list-style-type: none"> <li>Patient outcomes e.g. survival, symptoms, patient satisfaction (prioritised outcome)</li> <li>Economic outcomes (prioritised outcome)</li> <li>Patient flow outcomes e.g. throughput (secondary outcome, will only be extracted if no or limited information identified on patient outcomes)</li> </ul>	Process outcomes other than patient flow
Study design	Systematic reviews	Non-systematic reviews Primary studies
Setting	OECD/developed countries	Non-OECD/developing countries
Other	Published from 2000 onwards English language	

## Appendix B: Search strategy

### Patient outcomes and economic effectiveness

- 1 (patient\* NEAR/3 flow):ab,ti OR (outpatient\* NEAR/3 flow):ab,ti OR workflow:ab,ti OR 'work flow':ab,ti OR 'patient access':ab,ti
- 2 (timely NEAR/3 care):ab,ti OR 'timeliness of care':ab,ti OR 'time-sensitive care':ab,ti OR 'time sensitive care':ab,ti
- 3 'patient journey':ab,ti OR 'client journey':ab,ti
- 4 'managing patient pathways':ab,ti OR ('optimal management' NEAR/3 patients):ab,ti OR (pathway\* NEAR/3 efficiency):ab,ti OR 'process redesign':ab,ti OR 'clinical pathway'/mj
- 5 (occupancy NEXT/3 level\*):ab,ti OR 'emergency department load':ab,ti OR 'load balancing':ab,ti OR 'load-balancing':ab,ti OR 'emergency department flow':ab,ti OR 'hospital bed utilization'/mj
- 6 'interface between acute care and rehabilitation':ab,ti OR (transfer NEAR/3 (acute OR care OR rehab\* OR primary OR specialist)):ab,ti OR (referral NEAR/3 (acute OR care OR rehab\* OR primary OR specialist)):ab,ti OR (transition NEAR/3 (acute OR care OR rehab\* OR primary OR specialist)):ab,ti OR (divert NEXT/1 rate\*):ab,ti OR 'patient transport'/mj OR 'patient referral'/mj
- 7 capacity:ab,ti OR 'bed status':ab,ti OR 'bed management':ab,ti OR 'bed capacity':ab,ti OR 'bed utilisation':ab,ti OR 'operational efficiency':ab,ti OR throughput\*:ab,ti OR turnover\*:ab,ti OR 'capacity building'/mj OR 'hospital bed capacity'/mj
- 8 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7
- 9 improv\*:ab,ti OR optim\*:ab,ti OR increas\*:ab,ti
- 10 8 AND 9
- 11 overcrowding:ab,ti OR crowding:ab,ti OR 'length of stay':ab,ti OR 'length-of-stay':ab,ti OR los:ab,ti OR 'delays in services':ab,ti OR 'door-to-balloon time':ab,ti OR 'door to balloon time':ab,ti OR 'door-to-needle time':ab,ti OR 'door to needle time':ab,ti OR 'crowding'/mj OR 'length of stay'/mj OR 'therapy delay'/mj
- 12 'delayed-discharge':ab,ti OR 'delayed discharge':ab,ti OR 'discharge delay':ab,ti OR 'delays in discharge':ab,ti OR 'discharge timing':ab,ti OR 'discharge procedure':ab,ti OR bottleneck\*:ab,ti OR 'hospital discharge'/mj
- 13 'patient transfer time':ab,ti OR (access NEAR/3 block\*):ab,ti OR 'inpatient boarding':ab,ti OR 'emergency department boarding':ab,ti OR 'downstream blocking':ab,ti
- 14 11 OR 12 OR 13
- 15 excess\*:ab,ti OR reduc\*:ab,ti OR target\*:ab,ti OR improv\*:ab,ti OR optim\*:ab,ti
- 16 14 AND 15
- 17 (waiting NEXT/1 time\*):ab,ti OR 'waiting management':ab,ti OR 'waiting time intervals':ab,ti OR 'waiting list management':ab,ti OR 'waiting list':ab,ti OR 'hospital admission'/mj
- 18 'queuing theory':ab,ti OR 'split-flow approach':ab,ti OR lean:ab,ti OR 'six sigma':ab,ti OR 'six-sigma':ab,ti OR 'integrated facility design':ab,ti
- 19 17 OR 18
- 20 improv\*:ab,ti OR optim\*:ab,ti OR increas\*:ab,ti
- 21 19 AND 20
- 22 10 OR 16 OR 21
- 23 (integrat\* NEAR/3 (care OR delivery OR pathway\* OR team\* OR service\* OR system\* OR network\*)):ab,ti
- 24 ((health OR social OR medical) NEAR/3 (service\* OR system\*)):ab,ti AND integrate\*:ab,ti
- 25 icp:ab,ti AND integrated:ab,ti

26 'integrated health care system'/exp  
 27 ('delivery system' OR 'delivery-system' OR 'delivery systems' OR 'delivery-systems') NEAR/3  
 (reform\* OR organi?ed)  
 28 'critical pathway':ab,ti  
 29 'clinical pathway'/mj  
 30 ((coordinated OR 'coordinated' OR 'co-ordinated' OR multidisciplinary OR 'multi disciplinary'  
 OR 'multi-disciplinary' OR interdisciplinary OR 'inter disciplinary' OR 'inter-disciplinary' OR  
 interagency OR 'inter agency' OR 'inter-agency' OR 'multi agency' OR multiagency OR 'multi-  
 agency' OR collaborative OR partnership) NEAR/3 (care OR delivery OR pathway OR team OR  
 service\* OR system\* OR work\* OR collaborat\*)):ab,ti  
 31 23 OR 24 OR 25 OR 26 OR 27 OR 28 OR 29 OR 30  
 32 22 AND 31  
 33 'systematic review'/de OR 'review'/de OR 'meta analysis'/de  
 34 (review\* NEAR/3 (systematic\* OR narrative\* OR integrative OR thematic OR qualitative\* OR  
 'mixed-method' OR 'mixed method' OR 'mixed-methods' OR 'mixed methods' OR 'realist review'  
 OR 'critical review' OR metasynthesis OR 'meta synthesis' OR metaethnography OR 'meta  
 ethnography' OR 'meta-ethnography')):ab,ti  
 35 (synthes\* NEAR/3 (systematic\* OR narrative\* OR integrative OR thematic OR qualitative\* OR  
 'mixed-method' OR 'mixed method' OR 'mixed-methods' OR 'mixed methods' OR 'realist review'  
 OR 'critical review' OR metasynthesis OR 'meta synthesis' OR metaethnography OR 'meta  
 ethnography' OR 'meta-ethnography')):ab,ti  
 36 ('systematic review' NEAR/3 (systematic\* OR narrative\* OR integrative OR thematic OR  
 qualitative\* OR 'mixed-method' OR 'mixed method' OR 'mixed-methods' OR 'mixed methods'  
 OR 'realist review' OR 'critical review' OR metasynthesis OR 'meta synthesis' OR  
 metaethnography OR 'meta ethnography' OR 'meta-ethnography')):ab,ti  
 37 (search\* NEAR/1 (hand OR manual OR bibliograph\* OR 'reference lists' OR cochrane OR  
 embase OR psychlit OR psyclit OR psychinfo OR psycinfo OR cinahl OR cinhal OR 'science  
 citation index' OR 'relevant journals')):ab  
 38 33 OR 34 OR 35 OR 36 OR 37  
 39 letter:it OR editorial:it  
 40 'animal'/de NOT ('animal'/de AND 'human'/de)  
 41 39 OR 40  
 42 32 OR 38  
 43 42 NOT 41  
 44 43 AND (2000:py OR 2001:py OR 2002:py OR 2003:py OR 2004:py OR 2005:py OR 2006:py OR  
 2007:py OR 2008:py OR 2009:py OR 2010:py OR 2011:py OR 2012:py OR 2013:py OR 2014:py OR  
 2015:py) AND [english]/lim

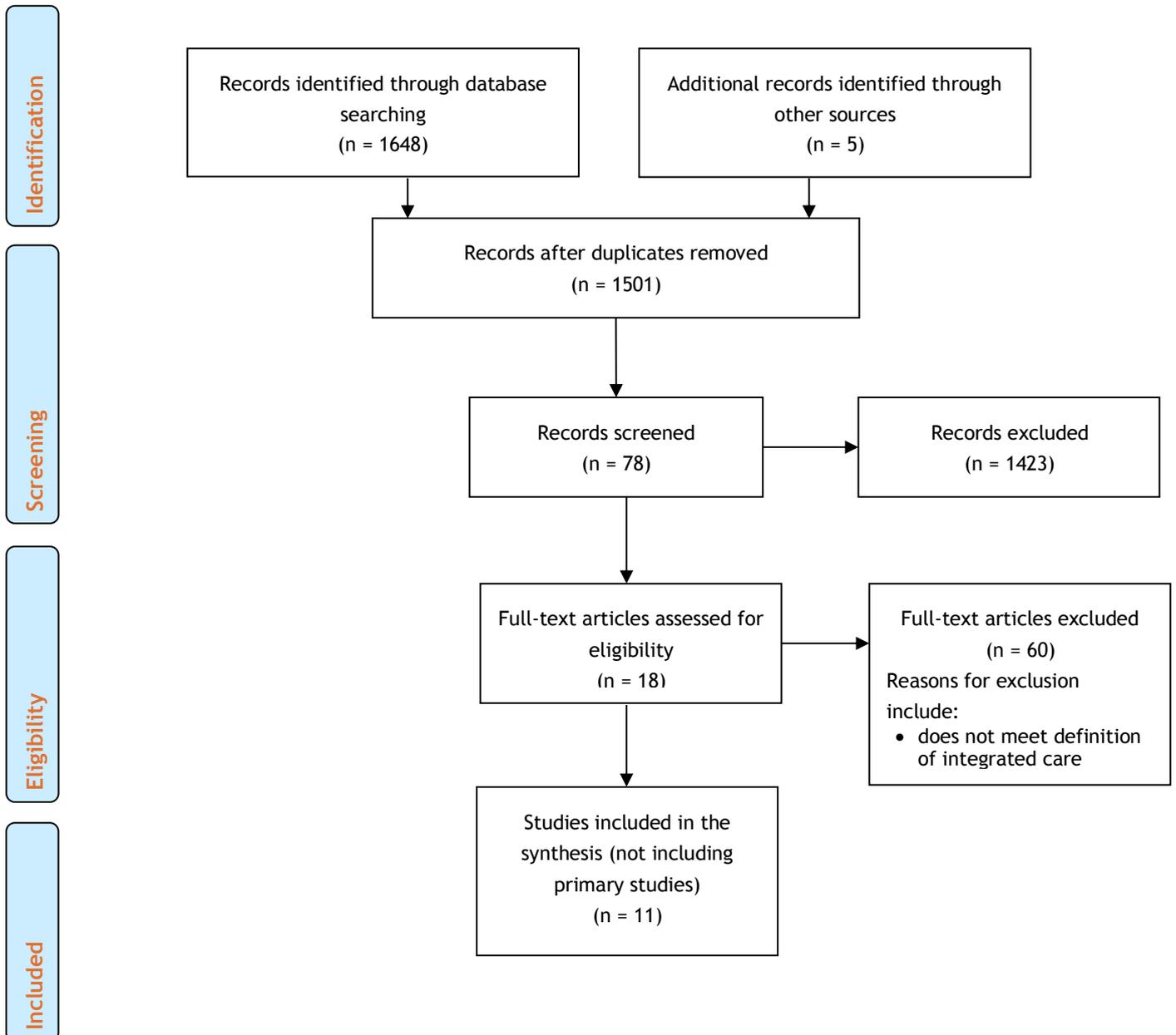
## Barriers, facilitators and enablers

1 barrier\$:ab,ti OR facilitator\$:ab,ti OR determin\$:ab,ti OR enable\$:ab,ti 3,544,163  
 2 (patient\* NEAR/3 flow):ti OR (outpatient\* NEAR/3 flow):ti OR workflow:ti OR 'work flow':ti  
 OR 'patient access':ti 5,128  
 3 (timely NEAR/3 care):ti OR 'timeliness of care':ti OR 'time-sensitive care':ti OR 'time sensitive  
 care':ti 104  
 4 'patient journey':ti OR 'client journey':ti 117  
 5 'managing patient pathways':ti OR ('optimal management' NEAR/3 patients):ti OR (pathway\*  
 NEAR/3 efficiency):ti OR 'process redesign':ti OR 'clinical pathway'/mj 2,630

- 6 (occupancy NEXT/3 level\*):ti OR 'emergency department load':ti OR 'load balancing':ti OR 'load-balancing':ti OR 'emergency department flow':ti OR 'hospital bed utilization'/mj 1,173
- 7 'interface between acute care and rehabilitation':ti OR (transfer NEAR/3 (acute OR care OR rehab\* OR primary OR specialist)):ti OR (referral NEAR/3 (acute OR care OR rehab\* OR primary OR specialist)):ti OR (transition NEAR/3 (acute OR care OR rehab\* OR primary OR specialist)):ab,ti OR (divert NEXT/1 rate\*):ti OR 'patient transport'/mj OR 'patient referral'/mj 24,130
- 8 capacity:ti OR 'bed status':ti OR 'bed management':ti OR 'bed capacity':ti OR 'bed utilisation':ti OR 'operational efficiency':ti OR throughput\*:ti OR turnover\*:ti OR 'capacity building'/mj OR 'hospital bed capacity'/mj 80,256
- 9 #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 113,119
- 10 improv\*:ab,ti OR optim\*:ab,ti OR increas\*:ab,ti 6,744,979
- 11 #9 AND #10 39,908
- 12 overcrowding:ti OR crowding:ti OR 'length of stay':ti OR 'length-of-stay':ti OR los:ti OR 'delays in services':ti OR 'door-to-balloon time':ti OR 'door to balloon time':ti OR 'door-to-needle time':ti OR 'door to needle time':ti OR 'crowding'/mj OR 'length of stay'/mj OR 'therapy delay'/mj 53,482
- 13 'delayed-discharge':ti OR 'delayed discharge':ti OR 'discharge delay':ti OR 'delays in discharge':ti OR 'discharge timing':ti OR 'discharge procedure':ti OR bottleneck\*:ti OR 'hospital discharge'/mj 9,458
- 14 'patient transfer time':ti OR (access NEAR/3 block\*):ti OR 'inpatient boarding':ti OR 'emergency department boarding':ti OR 'downstream blocking':ti 119
- 15 #12 OR #13 OR #14 62,642
- 16 excess\*:ab,ti OR reduc\*:ab,ti OR target\*:ab,ti OR improv\*:ab,ti OR optim\*:ab,ti 5,886,751
- 17 #15 AND #16 12,100
- 18 (waiting NEXT/1 time\*):ti OR 'waiting management':ti OR 'waiting time intervals':ti OR 'waiting list management':ti OR 'waiting list':ti OR 'hospital admission'/mj 13,717
- 19 'queuing theory':ab,ti OR 'split-flow approach':ab,ti OR lean:ab,ti OR 'six sigma':ab,ti OR 'six-sigma':ab,ti OR 'integrated facility design':ab,ti 36,616
- 20 #18 OR #19 50,299
- 21 improv\*:ab,ti OR optim\*:ab,ti OR increas\*:ab,ti 6,744,979
- 22 #20 AND #21 27,333
- 23 #11 OR #17 OR #22 78,321
- 24 (integrat\* NEAR/3 (care OR delivery OR pathway\* OR team\* OR service\* OR system\* OR network\*)):ab,ti 40,288
- 25 ((health OR social OR medical) NEAR/3 (service\* OR system\*)):ab,ti AND integrate\*:ab,ti 12,550
- 26 icp:ab,ti AND integrated:ab,ti 264
- 27 'integrated health care system'/exp 7,232
- 28 (('delivery system' OR 'delivery-system' OR 'delivery systems' OR 'delivery-systems') NEAR/3 (reform\* OR organi?ed)):ab,ti 161
- 29 'critical pathway':ab,ti 766
- 30 'clinical pathway'/mj 2,499
- 31 ((coordinated OR 'co ordinated' OR 'co-ordinated' OR multidisciplinary OR 'multi disciplinary' OR 'multi-disciplinary' OR interdisciplinary OR 'inter disciplinary' OR 'inter-disciplinary' OR interagency OR 'inter agency' OR 'inter-agency' OR 'multi agency' OR multiagency OR 'multi-agency' OR collaborative OR partnership) NEAR/3 (care OR delivery OR pathway OR team OR service\* OR system\* OR work\* OR collaborat\*)):ab,ti 83,750

32 #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 134,809  
33 #23 AND #32 2,714  
34 #1 AND #33 AND (2000:py OR 2001:py OR 2002:py OR 2003:py OR 2004:py OR 2005:py OR  
2006:py OR 2007:py OR 2008:py OR 2009:py OR 2010:py OR 2011:py OR 2012:py OR 2013:py OR  
2014:py OR 2015:py) AND [english]/lim 432

## PRISMA Flow Diagram for the systematic review (section 1)



## Appendix C: Systematic review AMSTAR quality ratings

**Table 6: AMSTAR quality assessment**

AMSTAR Quality Assessment											
	Hussenbux et al. 2015	Joseph et al. 2014	Ballini et al. 2015	Huntley et al. 2013	Khangura et al. 2012	Kruis et al. 2013	Feltner et al. 2014	Sheppard et al. 2013	Parab et al. 2013	Fearon et al. 2012	Furlan et al. 2011
Was an a priori design provided?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Was there duplicate study selection and data extraction?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Was a comprehensive literature search performed?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Was the status of publication used as one of the inclusion criteria?	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes
Was a list of studies (included and excluded) provided?	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes
Were the characteristics of the included studies provided?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Was the scientific quality of the included studies assessed and documented?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Was the scientific quality of the included studies used appropriately in formulating conclusions?	yes	can't answer	yes	yes	yes	yes	yes	yes	yes	yes	yes
Were the methods used to combine the findings of studies appropriate?	yes	can't answer	yes	yes	yes	yes	yes	yes	yes	yes	yes
Was the likelihood of publication bias assessed?	no	no	yes	no	yes	yes	yes	no	no	yes	yes
Was the conflict of interest included?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

## Appendix D: Evidence table

Table 7: Details of included systematic reviews

Study	Participants	Intervention	Key findings/outcomes	Applicability and limitations	Other
<p><b>Ballini et al 2015<sup>49</sup></b></p> <p>Systematic review</p> <p><b>Quality of review:</b> 11/11</p> <p><b>Review aim:</b> Reducing waiting times for elective care</p>	<p><b>Number of studies:</b> 8</p> <p><b>Study types:</b> RCT: 3 Cohort: 0 Other: 5 (Interrupted time series [ITS])</p> <p><b>Participants:</b> Age NR, study size ranged from 136 to 2501 people. Included referral to Ear Nose and Throat, Dermatology, Spinal surgery, Colposcopy, Lower urinary tract symptoms or microscopic haematuria.</p> <p><b>Countries:</b> UK, USA, Australia</p>	<p>Restructuring intake assessment/referral process such as open access and direct booking/referral.</p>	<p>One RCT found open access to investigative services reduced the waiting time by 30% for people with lower urinary tract syndrome (LUTS) but not for people with haematuria.</p> <p>Same-day scheduling for paediatric health clinic appointments reduced waiting times (direct reduction of 25.2 days).</p> <p>An ITS study showed no effect of a direct booking system on the proportion of participants receiving a colposcopy appointment within the recommended time.</p> <p>One RCT and one ITS showed no effect of distant consultancy (instant photography for dermatological conditions and telemedicine for ear nose throat (ENT) conditions) on waiting times; another ITS study showed no effect of a pooled waiting list on the number of participants waiting for uncomplicated spinal surgery.</p>	<p>Quality of evidence was low to very low</p>	
<p><b>Fearon et al. 2012<sup>4</sup></b></p>	<p><b>Number of studies:</b> 14</p>	<p>Early supported discharge for stroke patients. The</p>	<p>Significant reductions in length of stay of approximately 7 days.</p>	<p>The apparent benefits were no longer</p>	<p>Belfast 2004, Glostrup 2006,</p>

Study	Participants	Intervention	Key findings/outcomes	Applicability and limitations	Other
<p>Systematic review</p> <p><b>Quality of review: 11/11</b></p> <p><b>Review aim:</b> To establish the effects and costs of early supported discharge services compared with conventional services.</p>	<p><b>Study type:</b> RCT: 14 Cohort: 0 Other: 0</p> <p><b>Participants:</b> 1957 stroke patients (mainly elderly with moderate disability)</p> <p><b>Countries:</b> Ireland, UK, Australia, Norway, Sweden, Denmark, Canada, Australia, Thailand</p>	<p>definition varied across individual studies but researchers defined it as: teams comprising nursing, allied health and social care professionals, either in hospital or community bases. Support comprised discharge planning with the patient and carer, including recovery planning.</p>	<p>There were statistically significant improvements in rates of “death or institutionalisation” after up to a year (OR 0.78, 95% CI 0.61 to 1.00, P = 0.05). This would mean an extra 4 people living at home out of 100 treated. It also improved “death or dependency” at the end of follow-up (OR 0.80, 95% CI 0.67 to 0.97) which would mean 5 people regaining independence for every 100 treated.</p> <p>There was no statistically significant effect solely on death rates.</p> <p>There were statistically significant improvements in patients’ scores on the extended activities of daily living (standardised mean difference 0.12, 95% CI 0.00 to 0.25, p=0.05) and people were more likely to be satisfied with services if early supported discharge was included in their care (OR 1.60, 95% CI 1.08 to 2.38, p=0.02).</p> <p>There were no statistically significant improvements in carers’ subjective health status, mood or satisfaction with services.</p> <p>Greatest benefits were seen in co-ordinated early supported discharge teams working with stroke patients with mild to moderate disability.</p>	<p>statistically significant at 5-year follow-up.</p>	<p>London 1999, Manchester 2001, Newcastle 1997</p>

Study	Participants	Intervention	Key findings/outcomes	Applicability and limitations	Other
			Service costs were between -30% and +15% (page 91)		
<p><b>Feltner et al 2014<sup>1</sup></b></p> <p>Systematic review and meta-analysis</p> <p><b>Quality of review:</b> 11/11</p> <p><b>Review aim:</b> To assess transitional care interventions to reduce readmissions</p>	<p><b>Number of studies:</b> 47</p> <p><b>Study types:</b> RCT: 47 Cohort: 0 Other: 0</p> <p><b>Participants:</b> 8253 older adults with moderate to severe heart failure, range 34 to 715. Mean age 70.</p> <p><b>Countries:</b> Ireland, UK, US, Canada, Netherlands, Belgium, Italy, Sweden, Spain, Germany, Australia, Brazil, Taiwan, Hong Kong.</p>	<p>Transitional care interventions were defined as “interventions designed to prevent readmissions among populations transitioning from one care setting to another”.</p> <p>They included home-visiting programs, structured telephone support, telemonitoring outpatient clinic, and patient or caregiver education.</p>	<p>Home visiting programs reduced all-cause readmission and heart failure readmission between 3 to 6 months and improved mortality.</p> <p>Multidisciplinary heart failure clinic interventions reduced all-cause readmission between 3 to 6 months and mortality.</p> <p>Structured telephone support reduced heart failure readmission and improved mortality.</p> <p>Telemonitoring and primarily educational interventions did not reduce readmission or mortality rates.</p>	<p>Applicability to Ireland: The multidisciplinary clinics were in the US, Canada and Taiwan. Half of the home-visiting programs were in the US, one of them was in Ireland (McDonald 2001, 2002, Ledwidge 2003 - MDS-HF clinic).</p> <p>Authors limitations: Low strength of evidence and limited data for outcomes at 30 days after discharge. Insufficient direct evidence to conclude whether one type of transitional care intervention was more effective than another. Reporting of other</p>	<p>Ireland McDonald UK Holland and Dar</p>

Study	Participants	Intervention	Key findings/outcomes	Applicability and limitations	Other
				<p>healthcare utilisation (e.g. A&amp;E visits) was inconsistent.</p> <p>People with end-stage renal disease or severe or unstable cardiovascular disease were excluded.</p>	
<p><b>Furlan et al. 2011</b></p> <p>Systematic review</p> <p><b>Quality of review: 11/11</b></p> <p><b>Review aim:</b> To assess models for transition of care for acute stroke and myocardial infarction patients</p>	<p><b>Number of studies:</b> 62 articles (representing 44 studies)</p> <p><b>Study types:</b> RCT: 22 Cohort: 0 Other: 22</p> <p><b>Participants:</b> post-acute care of patients hospitalised with first or recurrent stroke or myocardial infarction (MI)</p> <p><b>Countries:</b> UK, Norway, Sweden, Canada, Denmark, Netherlands, Italy, Mexico, Australia, New Zealand, Brazil, Poland, Finland, Iran</p>	<p>Transition of care interventions were grouped into 4 categories: (1) hospital-initiated support for discharge including early supported discharge and integrated-care pathways, (2) patient and family education interventions (3) community-based models of support following hospital discharge such as from GPs, nurses, therapists etc and (4) chronic disease management programs for long-term care</p>	<p>Early supported discharge after stroke was associated with reduced total hospital length of stay without adverse effects on functional recovery, quality of life or survival. No difference on adverse events. Some studies found reduced caregiver strain and quality of life. This was cost neutral or trending towards savings.</p> <p>Dr appointments or home visits by physiotherapists may reduce readmission rates for stroke patients.</p> <p>Cardiology follow-up after MI was associated with reduced mortality.</p> <p>Education after stroke or MI may reduce visits to A&amp;E.</p>	<p>Studies were of low quality from small sample size, inadequate length of study time, unvalidated outcome scales, treatment interventions that were not clearly described. They often included more than one intervention which made it difficult to determine individual effects on outcomes. Standard care was poorly defined and made cross-study comparisons difficult.</p>	<p>England Sulch et al. 2000, 2002 X 2</p> <p>UK Mant et al. 2000 and 2005</p> <p>UK Mayou et al. 2002</p> <p>UK Lacey et al. 2004</p> <p>UK Sinclair et al. 2005</p> <p>Barlow et al. 2009</p>

Study	Participants	Intervention	Key findings/outcomes	Applicability and limitations	Other
			No other interventions had sufficient evidence of benefit.		
<p><b>Huntley et al. 2013<sup>11</sup></b></p> <p>Systematic review and meta-analysis</p> <p><b>Quality of review: 10/11</b></p> <p><b>Review aim:</b> To assess the effectiveness of case management for reducing unplanned admission and length of admission</p>	<p><b>Number of studies: 11</b></p> <p><b>Study type:</b> RCT: 11 Cohort: 0 Other: 0</p> <p><b>Participants:</b> 3613 people aged 65 or more</p> <p><b>Countries:</b> US, Germany, Denmark, Canada, Australia, Sweden</p>	<p>Hospital and community led case management</p>	<p>2 of the 6 trials of case management initiated in hospital or on discharge found a reduction in unplanned admissions and 3 found reduced length of stay. Overall, no statistically significant reduction in unplanned admissions.</p> <p>None of the 5 trials of case management initiated in the community found reduced unplanned admissions. One trial (GP led case management) found a reduction in admissions to the emergency department as well as admissions to nursing homes and non-acute hospitals. This was a study of 200 home-dwelling older people in the US who were identified through home health services or home assistance programs (Bernabie et al. 1998). The GPs made an initial global assessment which was communicated to the geriatric unit. The GP then made home visits every 2 months, the results of which were discussed at weekly MDT meetings. The total number of admissions over one year was 36 for the intervention compared to 51 (hazard ratio 0.74, 95% CI 0.56 to 0.97). This study in the US estimated \$1800 per capita savings per year based on 1998 prices.</p>		<p>One US study did reduce readmissions</p>

Study	Participants	Intervention	Key findings/outcomes	Applicability and limitations	Other
			5 studies presented cost-outcome descriptions. All 5 reported favourable cost-outcome descriptions for case management.		
<p><b>Hussenbux et al. 2015<sup>6</sup></b></p> <p>Systematic review</p> <p><b>Quality of review: 8/11</b></p> <p><b>Review aim:</b> To describe intermediate care pathways, evaluate effectiveness, describe outcomes and identify gaps in the evidence</p>	<p><b>Number of studies: 23</b></p> <p><b>Study types:</b> RCT:1 Cohort: 10 Other: 12</p> <p><b>Participants:</b> Adults, study size ranged from 38 to 10,000</p> <p><b>Countries:</b> NR - includes UK and Canada</p>	<p>Any primary care based triage of musculoskeletal conditions (MSK) by allied health practitioners, GPs with a special interest (GPSIs) and MSK physicians.</p>	<p>Overall, the review reports that 72% to 97% of patients were managed entirely within Intermediate care. There was a 20 to 60% reduction in orthopaedic referral rate. Physiotherapist diagnostic accuracy was 68% to 96% that of medical doctors.</p> <p>Studies investigating physiotherapy-led triage reported appropriate referral, and high patient satisfaction. A quantitative analysis reported 66% of patients were “very satisfied” with the service.</p> <p>Physiotherapy-led triage reduced waiting times for musculoskeletal patients due to reductions in inappropriate referrals and increases in the number of patients discharged with a thorough explanation of self-management procedures.</p>	<p>Included studies were mainly observational and of low quality. Only 11% of the studies on MSK Clinical Assessment Treatment Service (CATS) had a clear evaluation strategy.</p> <p>Children, emergencies and self-referral were excluded.</p> <p>The effectiveness of intermediate care remains unclear as there is a lack of prospective randomised trials.</p> <p>Cost was also not assessed in the included</p>	<p>9 studies are in Joseph et al. 2014</p> <p>14 of the 23 studies were on the UK MSK CATS model.</p>

Study	Participants	Intervention	Key findings/outcomes	Applicability and limitations	Other
<p><b>Joseph et al. 2014<sup>7</sup></b></p> <p>Systematic review</p> <p><b>Quality of review: 8/11</b></p> <p><b>Review aim:</b> To determine the optimum features of triage systems for patients with MSK conditions.</p>	<p><b>Number of studies:</b> 34</p> <p><b>Study types:</b> RCT: 2 Cohort: 0 Other: 32</p> <p><b>Participants:</b> Adults, study size ranged from 52 to 4568</p> <p><b>Countries:</b> NR - includes UK</p>	<p>Triage by physiotherapist, extended scope physiotherapist, GP and specialist nurses.</p> <p>Settings: outpatients, telephone</p>	<p>Physiotherapists with postgraduate training were effective at diagnosing and managing orthopaedic cases and reduced waiting lists for specialist appointments and reduced hospital costs.</p> <p>Patients on a waiting list triaged by physiotherapists reported meaningful relief of symptoms, functional disability, perceived handicap and pain. Improvements in pain and quality of life were found at 3 and 6 months after treatment.</p> <p>There were mixed results for GP triage of rheumatology cases with low diagnostic accuracy.</p>	<p>studies.</p> <p>Studies were of low quality, mostly observational.</p> <p>There was insufficient evidence to determine the most effective triage system.</p>	<p>9 studies are in Hussenbux et al. 2015</p>

Study	Participants	Intervention	Key findings/outcomes	Applicability and limitations	Other
<p><b>Khangura et al. 2012<sup>10</sup></b></p> <p>Systematic review</p> <p><b>Quality of review: 11/11</b></p> <p><b>Review aim:</b> To assess the effect of having GPs in A&amp;E to provide non-urgent care</p>	<p><b>Number of studies: 3</b></p> <p><b>Study type:</b> RCT: 0 Cohort: 0 Other: 3 (non-randomised controlled trials)</p> <p><b>Participants:</b> 11,203 patients with minor injuries and illnesses, range 1878 to 4684</p> <p><b>Countries:</b> Ireland (Dublin) and UK</p>	<p>Introduction of GPs into A&amp;E to provide care for “primary care suitable” patients (i.e. with non-urgent problems). GPs were in addition to existing A&amp;E staff. High heterogeneity in the type of triage system used, the level of expertise or experience, and type of hospital.</p>	<p>Insufficient evidence to conclude whether GPs in A&amp;E reduce overcrowding, waiting times or improve patient flow.</p> <p>2 of the studies (Dale and Murphy) found that GPs ordered fewer blood tests and X-rays, admitted fewer people and referred less people to specialists than emergency doctors. There were associated marginal cost savings.</p> <p>Murphy and Gibney found that GPs prescribed more medications.</p> <p>Gibney did not find a significant difference in the number of blood tests ordered, X-rays or admissions to hospital, but found significantly more referrals to specialists.</p>	<p>Authors’ limitations: low quality of evidence due to non-randomised design. No data on waiting times, length of hospital stay or patient outcomes such as mortality.</p>	<p>Studies were: Gibney 1999 Small rural hospital outside Dublin  Murphy 1996 Hospital in Dublin  Dale 1995 UK</p>
<p><b>Kruis et al. 2013<sup>5</sup></b></p> <p>Systematic review</p> <p><b>Quality of review: 11/11</b></p> <p><b>Review aim:</b> To assess integrated disease</p>	<p><b>Number of studies: 26</b></p> <p><b>Study type:</b> RCT: 26 Cohort: 0 Other: 0</p> <p><b>Participants:</b> 2997 people with COPD, range 30 to 713</p>	<p>Integrated disease management (IDM) interventions for COPD.</p> <p>IDM was defined as at least 2 different categories of healthcare provider and at least 2 of the following interventions for at least 3 months:</p>	<p>Clinically relevant improvement in 6-minute walking distance after 12 months, fewer participants with <math>\geq 1</math> hospital admissions in 3-12 months, reduced length of hospital stay by 4 days. No difference between groups for mortality.</p> <p>Statistically and clinically significant improvements in disease-specific QoL on the Chronic Respiratory Questionnaire: dyspnoea,</p>	<p>Studies were of high to moderate quality.</p> <p>Insufficient evidence to confirm or refute the long-term effectiveness of IDM.</p> <p>Authors’ limitations: IDM is not consistently</p>	

Study	Participants	Intervention	Key findings/outcomes	Applicability and limitations	Other
management for COPD on health related QoL, exercise tolerance and number of exacerbations.	<b>Countries:</b> Netherlands, Spain, Australia, UK, US, Denmark, Sweden, Brazil, Canada, Japan and New Zealand	<ul style="list-style-type: none"> <li>● Education/self-management</li> <li>● Exercise</li> <li>● Psychological input</li> <li>● Smoking cessation</li> <li>● Optimal medication</li> <li>● Dietary intervention</li> <li>● Case management</li> <li>● MDT involvement</li> <li>● Financial intervention</li> </ul> <p>Settings were primary care (8 studies), secondary care (12 studies) and tertiary care (1 study), and both primary and secondary care (5 studies).</p>	fatigue, emotional and mastery (moderate quality evidence). On the St George's Respiratory Questionnaire there were clinically relevant differences on QoL in "impact", significant improvements in disease-specific QoL in the activity domain and no significant differences in symptoms (high quality evidence).	defined. There was possible bias arising from inconsistent reporting in the included studies, only 3 published a study protocol. There was heterogeneity in the care received by "controls".	
<p><b>Parab et al. 2013<sup>8</sup></b></p> <p>Systematic review</p> <p><b>Quality of review: 10/11</b></p> <p><b>Review aim:</b> To evaluate specialist</p>	<p><b>Number of studies:</b> 7</p> <p><b>Study type:</b> RCT: 7 Cohort: 0 Other:</p> <p><b>Participants:</b> 840 children, range 29 to 399. Ages were 3 months to 17</p>	Specialist home-based nursing services for children with acute and chronic illnesses	<p>No significant differences in health outcomes were reported.</p> <p>2 studies found a significant reduction in length of hospital stay (but no difference in hospital readmission rates).</p> <p>3 studies found a reduction in parental anxiety and improvements in child behaviour. One study reported no impact on parental burden of care or functional status of children.</p>	<p>Inconsistent data on costs.</p> <p>Wide heterogeneity across studies due to differences in the type of illness and required care. Some studies were of small sample size.</p>	UK Sartain 2001

Study	Participants	Intervention	Key findings/outcomes	Applicability and limitations	Other
home-based nursing services for children with acute and chronic illnesses.	years.  <b>Countries:</b> UK, US, Canada, Australia		2 studies reported that home care was more expensive for service providers but led to substantial cost savings for the family (another study found no cost benefits for the family).	Only one study blinded participants and personnel so there is a risk of bias in the results.  Limited data precluded making definitive recommendations about the effectiveness of this intervention.	
<b>Shepperd et al. 2013<sup>3</sup></b>  Systematic review and meta-analysis  <b>Quality of review: 10/11</b>  <b>Review aim:</b> To determine the effectiveness of discharge planning	<b>Number of studies:</b> 24  <b>Study types:</b> RCT: 24 Cohort: 0 Other: 0  <b>Participants:</b> 8098 adults and older people admitted to hospital for a medical, surgical or psychiatric condition.  <b>Countries:</b> Ireland, Scotland, UK, US, Canada, Netherlands, Denmark, France, Taipei, Australia	Individualised discharge planning to reduce hospital length of stay, unplanned readmission and improve co-ordination of services compared to routine discharge	Structured individualised discharge planning reduced hospital length of stay and readmissions for people with a medical diagnosis (mean difference length of stay -0.91, 95% CI -1.55 to -0.27, from 10 trials and readmission rates reduced by 18% (RR 0.82, 95% CI 0.73 to 0.92, from 12 trials).  3 trials reported increased patient satisfaction.  There was no difference in mortality or rates of discharge from hospital to home for elderly people with a medical condition, people following surgery or people with a mix of medical and surgical conditions.	Authors limitations: There was little available evidence on health costs.	Bolas 2004 Ireland, Naji 1999 Scotland, Sulch 2000 London, Nazareth 2001

## Appendix E: Systematic review case studies

### Case study 1: RCT of a multidisciplinary heart failure clinic versus standard care follow-up

Canadian study by Ducharme et al. 2005<sup>18</sup> identified from Feltner et al. 2014<sup>1</sup>

#### Introduction and background

Congestive heart failure is a common and costly condition that places great strain on healthcare services. In developed countries it is estimated that around 2% of adults have heart failure, rising to 6% to 10% in the elderly (aged 65 and over). Most cases cannot be cured, and therefore treatment is a combination of lifestyle changes, medicines and devices or surgery, with a view to improving heart function and maintaining a reasonable quality of life. Because heart failure is a chronic condition in which patients often suffer from rapid escalation of symptoms, it contributes to the unscheduled use of secondary care and therefore impacts negatively on the planning of patient flow. A number of institutions in healthcare systems have investigated ways in which unplanned hospital admissions in chronic heart failure can be reduced, including in this case the Montreal Heart Institute in Canada.

#### The integrated care intervention

Between 1998 and 2000, the Montreal Heart Institute recruited patients with a primary diagnosis of heart failure to take part in a randomised controlled trial (RCT). Two hundred and thirty people were recruited, 115 were randomised to the intervention arm and 115 received usual care as a control. The intervention group were referred to a multidisciplinary specialised heart failure outpatient clinic at the Institute. The clinic provided rapid access to specialised equipment and personnel, including cardiologists, clinician nurses, dieticians, pharmacists and social workers. Cardiologists worked with pharmacist and dieticians to develop individualised treatment plans with regular follow-up either at the clinic or at the patient's home, and patients and their families were given structured education and advice and an education booklet entitled "Living with Heart Failure". In addition to this, a nurse telephoned patients every month, or more often if required, and discussed problems as clinically indicated. If symptoms worsened, patients were told to call the clinic nurse who would then evaluate the need for further follow-up. Non-cardiac related issues were treated by the patients' usual primary care providers, while cardiac deterioration was immediately scheduled to see one of the institute's cardiologists, often on the same day.

The control group received treatment and appropriate follow-up according to the usual standards of the attending physicians (cardiologists of the same university hospital).

#### The outcomes

After six months, the intervention had reduced the number of hospital readmissions by 41% and hospital days by 44% at 6 months; the 115 patients in the intervention group stayed in hospital for 514 days between them, compared with 815 days for patients in the control group. Patient outcomes included improved physical and emotional quality of life (as measured by the Minnesota Living with Heart Failure questionnaire). There was no difference in the number of A&E visits or mortality. There were fewer deaths in the control group, but the trial was not powered to demonstrate a difference in mortality.

#### Implications and learnings for HSE

This was a single institution study, but the trial design was robust and randomised, and there is only a low risk of bias in the results. The study included all heart failure patients, including the very elderly and those with complications such as renal failure, and therefore was typical of the usual cross-

section of patients that will be found in similar countries such as Ireland. The control was also typical of usual care, led by cardiologists at a well-respected tertiary cardiology centre and therefore of a high quality. The results and improvements seen in the intervention arm are therefore likely to be genuine.

While this study was published in 2005, the [Heart Failure Clinic \(CLIC\)](#) remains a central part of Montreal Heart Institute and continues to run its multidisciplinary team approach to managing people with heart failure. The website states that they run “an innovative model and truly interdisciplinary, the team has developed high standards of care. These clinic’s services are personalized and continually incorporate the latest standards in the care and treatment of heart failure. Giving patients responsibility over their health and providing them with tools are the best way to prevent decompensation episodes.”

The Institute is the largest of its kind in Canada, and 70% of its patients are from outside the Montreal area. The success of the approach outlined in this case study is therefore one that can be used to treat a patient group that does not necessarily reside in close proximity to the clinic. During the study, on average, each patient in the intervention group visited the clinic just once a month, with the rest of the intervention delivered over the telephone.

## **Case study 2: RCT of a community liaison pharmacy service to improve consistency of pharmaceutical care between primary and secondary care settings.**

Northern Ireland study by Bolas et al. 2004<sup>19</sup> identified from Shepperd et al. 2013<sup>3</sup>

### **Introduction and background**

Poor communication of medication regimes between primary and secondary care can lead to errors in prescribing such as the wrong dose, drug, frequency or drugs missing from the recommended regimen. These errors or omissions can have serious consequences including readmission to hospital. This study aimed to see if a hospital based community liaison pharmacist could reduce these errors and improve the communication between care settings.

### **The integrated care intervention**

People aged over 55 who were admitted to a medium-sized hospital on an unplanned or emergency basis were eligible for the study. Half of them, 81 people, were randomly assigned to have input from the liaison pharmacist. This included: preparation of an accurate medication record following a full review of current medication use; daily discussion about any medication change; provision of a medicines record sheet informing the patient how to take their drugs; faxing a discharge letter signed by the junior doctor with medication regime to the GP and community pharmacist on the day of discharge; and the provision of a Medicines Helpline.

Usual care was not described in the study, but the discharge letter was not usually faxed or signed by the junior doctor.

### **The outcomes**

The liaison pharmacist intervention improved the accuracy of the actual drug regime the patient was taking when assessed 10 to 14 days after discharge. The drug name was correct in 98.5% of cases

with the liaison intervention compared to 93% in the control group. The drug dose was correct 90% of the time compared to 83% in the control group and dosage frequency was correct 89% compared to 82%. There was also an improvement in returning drugs patients brought into hospital with them and reconciling them with the new medication regime. This occurred in 90% of cases in the liaison pharmacy group compared to 44% in the usual care group. The researchers estimated that the hospital cost of medicines which could have been returned to the patients was £4,582 per year, based on 2005 costs. There was no significant difference in emergency readmission rates. The study did not report on other readmission rates, but this was described by the Northern Ireland Department of Health, Social Services and Public Safety as being 2.4%.

### **Implications and learnings for HSE**

Though the study did not show major improvements in patient flow per se, the liaison service provided clear benefits in adherence to medication regimes across settings. As a result of this pilot study, the Integrated Medicines Management was implemented across Northern Ireland's healthcare trusts. The service has been internationally recognised as a successful programme and replicated in the Republic of Ireland, other parts of the UK, Sweden and the Netherlands.

### **Case study 3: RCT of a simple disease management program for COPD across healthcare settings.**

US study by Rice et al. 2010<sup>20</sup> identified from Kruis et al. 2013<sup>5</sup>

#### **Introduction and background**

COPD is one of the commonest lung conditions and is known to affect around 110,000 people in Ireland, but is likely to affect 200,000 according to [HSE](#). It is caused by long-term damage to the lungs, due to smoking in the majority of cases. The condition is characterised by breathlessness and exacerbations which can cause disease progression. The mainstay of treatment is to prevent further damage through stopping smoking, and reducing the number of exacerbations by appropriate use of inhaled corticosteroids, bronchodilators and vaccinations.

#### **The integrated care intervention**

People at high risk of COPD exacerbations were identified from five medical centres in the US and 743 people participated in the study. Half of them were randomised to have the intervention. This consisted of a single group educational session of one to one and a half hours provided by a respiratory case manager from secondary care. The session included general information about COPD, direct observation of inhaler technique, a medication review including any required adjustments, counselling on stopping smoking and advice on influenza and pneumococcal vaccinations, the benefits of regular exercise and hand hygiene to prevent infections. An individualised action plan was then written for each person for dealing with exacerbations which included repeat prescriptions for prednisolone and an oral antibiotic. They were advised to call the case manager during office hours if they needed to use the action plan, but also if they had any questions. The case manager telephoned each person once per month. Additionally, they were given the details of a 24 hour nursing helpline.

Usual care consisted of a one-page handout of the principles of COPD care and the 24 hour nursing helpline.

## The outcomes

After one year, the intervention reduced the rate of A&E visits for any cause by 27% (67.0 visits per 100 patient-years compared to 91.2 visits per 100 patient-years [rate ratio 0.73; 95% CI 0.56 to 0.96;  $p=0.02$ ]). The intervention also reduced the rate of hospital admission for any cause by 28% (56.8 admissions per 100 patient-years versus 91.2 admissions per 100 patient-years [rate ratio 0.72; 95% CI 0.54 to 0.94]). The average total number of hospital days was 1.7 compared to 2.8.

The intervention reduced hospital admissions or A&E visits for COPD by 41% (48.4 events per 100 patient-years versus 82.2 events per 100 patient-years [rate ratio 0.59; 95% CI 0.44 to 0.78]).

Self-reported respiratory health status was worse in the usual care group. The intervention group used nearly double the amount of prednisolone and had on average 4.2 courses of antibiotics compared to 1.6 courses in the usual care group. Other medication use was similar.

## Implications and learnings for HSE

This RCT found that a relatively simple disease management program was effective for improving patient flow not only in reducing hospital admissions and A&E visits for COPD, but also for other conditions in this group of people. Though the researchers did not perform a cost benefit analysis, they say that this type of intervention has the potential for reducing health care costs in addition to improving quality of life. The main limitations to this research are that the participants were mostly male and at high risk of COPD exacerbations so the outcomes may differ in less severe cases and in women. Additionally, it is not clear if the increased use of medications was always appropriate in the intervention group.

However, overall this study showed benefits to patient flow and although this study was conducted in the US, this type of intervention would be relatively simple to replicate within the Irish healthcare system. The principles behind it may also be effective for other chronic conditions where self-management could play a stronger role.

## Case study 4: PhysioDirect' telephone assessment and advice services

UK study by Salisbury et al. 2013<sup>21</sup> identified from Hussenbux et al. 2015<sup>6</sup>

### Introduction and background

Musculoskeletal (MSK) problems are very common and inflict a burden on patients due to pain and functional impairment. MSK issues are also a major economic burden because of not only direct healthcare costs but also time lost from work. Physiotherapy is a common and often effective intervention for MSK problems but the weight of demand for such services combined with a limited supply of physiotherapists means that there are often long waiting lists, up to several months in some cases. Such backlogs in the system are likely to increase the number of unscheduled admissions to hospitals and impair efficient patient flow. In order to reduce the backlog and improve physiotherapy services for MSK in the UK, several physiotherapy services have introduced "PhysioDirect" services. In order to understand the effectiveness and cost-effectiveness of the service, the UK's National Institute for Health Research (NIHR) recently funded an evaluation of the service.

## **The integrated care intervention**

Four physiotherapy services in the UK recruited MSK adult patients from across 94 general practices. Inclusion criteria were kept broad so that the results would be widely applicable. A total of 1513 patients were randomised to PhysioDirect and 743 to usual care. Those in the intervention arm were invited to telephone a senior physiotherapist for assessment and advice; this followed a computerised template that was standardised as much as possible across the four sites. Based on this initial assessment, most patients were sent a patient information booklet and a list of recommended exercises and tips for self-management and invited to call back to discuss progress after 2 to 4 weeks. If the patient did indeed phone back they would then receive further advice or be offered face-to-face care if deemed necessary. Through this telephone interaction the physiotherapist was not only able to offer advice and support, but also identify those patients that urgently needed treatment, or those that could be discharged because they were unlikely to benefit from physiotherapy.

Patients allocated to usual care were put on to a waiting list for face-to-face care.

## **The outcomes**

The intervention was successful in terms of patient flow. Patients allocated to PhysioDirect had a shorter wait for treatment than those allocated to usual care (median 7 days vs 34 days). Patients in both arms were broadly satisfied with their access to care, though patients were actually slightly less satisfied overall with PhysioDirect compared to usual care.

Patient clinical outcomes were not significantly different between the two arms. The study was designed to establish clinical equivalence between the two arms, and the researchers were not expecting to find superior clinical outcomes in the intervention arm, but rather were looking to ensure that outcomes were not inferior. No adverse effects were detected in either arm of the trial.

The cost effectiveness analysis suggested that PhysioDirect was slightly less costly than usual care, and was probably cost-effective.

## **Implications and learnings for HSE**

Patients offered PhysioDirect were provided with faster access to assessment and advice, and had clinical outcomes that were equal to those on the usual waiting list. Almost half the PhysioDirect patients were managed entirely by telephone, and patients in the intervention arm were less likely to have a face-to-face appointment with a physiotherapist than those in usual care. Also, those that did have a face-to-face appointment arranged through PhysioDirect were more likely to show up than those in the control arm.

Interviews and surveys showed that PhysioDirect was broadly acceptable to patients, though a number remarked that they perceived the service as a first step in accessing treatment, rather than a replacement of face-to-face consultation. A few found the service “impersonal” and “remote”.

These results are generalizable to other countries with a shortage of physiotherapists. A recent report in the Irish Independent suggested that 1 in 4 people in Ireland wait 3 months for an appointment with a physiotherapist. PhysioDirect is now an established part of the physiotherapy landscape in the UK, and through its efficient use of telehealth technology, and triaging of patients it continues to improve the flow of patients through the healthcare system.