A Systematic Literature Review

On Tackling Delayed Discharges in Acute Hospitals Inclusive of

Hospital (Re) admission Avoidance.

Prepared by a team of researchers from University College Cork, Ireland

Dr Alice Coffey[1], Dr Patricia Leahy-Warren[1], Professor Eileen Savage[1,] Professor Josephine Hegarty[1]Dr Nicola Cornally[1],Dr Mary Rose-Day[1], Dr Bridget Maher[2] , Dr John Browne[3] ,Dr Laura Sahm[4], Dr Rónán O'Caoimh[9] Maura Flynn[5],Dr Stephen Hutton[1], Elizabeth Healy[6],Dr Ciaran O'Connor[7],Kay McGrath[8],Aoife O'Mahony[1],Katherine Arenella[1],

1. School of Nursing and Midwifery; 2. School of Medicine; 3. Epidemiology and Public Health; 4. School of Pharmacy; 5. Library, UCC; 6. Public health Nursing HSE South/South West; 7.Mercy University Hospital; 8. Cork University Hospital; 9. Centre for Gerontology & Rehabilitation UCC.

National Clinical Strategy and Programmes

The National Clinical Strategy and Programmes was established by the Health Service Executive (HSE) to improve and standardise patient care throughout the organisation by bringing together clinical disciplines and enabling them to share innovative solutions to deliver greater benefits to every user of HSE services. The directorate has established a number of National Clinical Programmes. The Programmes are based on three main objectives:

- To improve the quality of care delivered to all users of HSE services

- To improve access to all services

- To improve cost effectiveness.

This desk-based research review was commissioned by The Health Service Executive to inform the integrated programme for patient flow with a particular focus on Delayed Discharges in the Acute Hospital system.

Clinical Strategy & Programmes Steering Group for this Systematic Review

- Dr Margo Wrigley, National Clinical Advisor & Group Lead – Mental Health **(Chairperson)**,
- Anne McMenamin, National Clinical Strategy & Programmes Division
- Dr Kathleen MacLellan, Director of Clinical Effectiveness, Department of Health
- Samantha Rayner, National Specialist Services for Older Persons, Social Care, HSE
- Maeve Raeside, Business Manager, National Clinical Strategy & Programmes Division.

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Abbreviations

A&E	Accident and Emergency
AC	Ambulatory Care
ACE	Acute Care for Elders
ACP	Advanced Care Planning
ACS	Acute Coronary Syndrome
AD	Advanced Directives
ADE	Adverse drug events
AE	Adverse events
AECOPD	Acute Exacerbation of Chronic Obstructive Pulmonary Disease
AHRQ	Agency for Healthcare Research and Quality
AMI	Acute myocardial infarction
AMPS	Assessment of Motor and Process Skills
AMU	Acute Medical Unit
APN	Advanced Practice Nurse
ASH	Ambulatory Sensitive Hospitalisations
AZA	Azathioprine
CABS	Coronary Artery Bypass Surgery
CASP	Critical appraisal skills programme
CCT	Controlled clinical trial
CD	Crone's Disease
CG	Control group
CGA	Comprehensive geriatric assessment
CHA	Choices for Healthy Ageing
CHD	Coronary heart disease
CHF	Congestive Heart Failure
CK-MB	Creatine kinase MB enzyme
CM	Case Manager
CMR	Cardiac Magnetic Resonance imaging
COPD	Chronic Obstructive Pulmonary Disorder
CSI	Caregiver Strain Index
CTI	Care transitions intervention

C-TraIn	Care Transitions Intervention
CVD	Cardio-vascular disease
DNI	Discharge Nursing Intervention
DNS	Diabetes Nurse Specialist
DRP	Drug-Related Problem
ECG	Electrocardiogram
ED	Emergency department
EECU	Emergency Extended organisation of appropriate community equipment
ENT	Ear, nose and throat
EPOC	Effective Practice and Coordination of Care
ER	Emergency room
ESD	Early supported discharge
GDT	Goal-directed fluid therapy
GNS	Gerontology Nurse Specialist
GP	General Practitioner
HBPC	Home Based Primary Care
HCP	Health Care Professionals
HF	Heart failure
HRQoL	Health related quality of life
I-TEAM	Integrated Tele-health Education and Activation of Mood
ICU	Intensive Care Unit
IDG	Intervention-dedicated geriatrician
IG	Intervention group
IS	Integrated System
ISAR	Identification of Seniors at Risk
IT	Information Technology
KORINNA	Coronary artery follow-up in the elderly
LOS	Length of stay
MAI	Medication Appropriateness Index
MCCD	Medicare Coordinated Care Demonstration Project
MDT	Multidisciplinary team
MDS-HF	Multidisciplinary heart failure (clinic)

MI	Myocardial infarction
MLHF	Minnesota Living with Heart Failure Questionnaire
MMSE	Mini-Mental Status Examination
MPADSS	Modified Post-Anaesthetic Discharge Scoring System
MSZ	Mesalazine
NHS	National Health Service
NR	Not reported
NS	Not significant
NYHA	New York Heart Association
ODM	Oesophageal Doppler monitoring
OMAGE	Optimization of Medication in AGEd
ON	Overnight Hospitalisation
OT	Occupational Therapist
OU	Observation unit
PADDLE	Patient-directed discharge letter
PCI	Percutaneous coronary intervention
PCM	Pharmacist case manager
PCP	Primary Care Programmes
PCP	Primary Care Provider
QALY	Quality Adjusted Life Year
QoL	Quality of Life
RACF	Residential aged care facilities
RACIP	Residential Aged Care Integration Program
RATPAC	Randomised Assessment of Treatment using Panel Assay of Cardiac markers
RCT	Randomised controlled trial
RECIPE	Residential Care Intervention Program in the Elderly
RfD	Readiness for Discharge
RN	Registered Nurse
RR	Readmission Rate
SEISAR	Standardized Evaluation and Intervention for Seniors At Risk tool
SDD	Same-Day Discharge
SF-36	Medical Outcomes Survey Short Form

SIGN	Scottish Intercollegiate Guideline Network
SMCCC	Specialised multidisciplinary community based care
SN	Special Needs
SOE	Strength of evidence
STS	Structured telephone support
SU	Stroke Unit
Syst. Rev.	Systematic review
T2/T3	Time 2/ Time 3
TCP	Transitional Care Programme
THR	Total Hip Replacement

Executive Summary

Achieving safe, timely and person centred discharge from hospital to home is an important indicator of quality and a measure of effective and integrated care (Joint Improvement Team, 2014). Delayed discharge refers to the situation where a patient is deemed to be medically well enough for discharge but they are unable to leave hospital because arrangements for continuing care have not been finalized (Bryan, 2010). Tackling delayed discharge, and decreasing readmission rates are key priorities in the HSE service plan (HSE, 2014). The longer the delay the greater the chance of dependency and institutionalization, therefore ways of preventing avoidable admission must be explored (Joint Improvement Team, 2010).

The aims of this research were:

(1) to complete a systematic literature review to identify successful systems and models emanating from international research to tackle delayed discharges inclusive of hospital (re)admission avoidance.

(2) to review data and other supporting information that identified initiatives and practices in place to actively manage delayed discharges in the Irish context and the impact of same.

The review is composed of two parts. Part 1 relates to the empirical literature and part 2 relates to the grey literature. Key data bases and grey literature sources were searched. Key terms used were discharge, bed utilisation, length of stay, delayed, transition, intermediate care, homecare, residential care, primary care, model, intervention, technology, hospital avoidance, admission. Consideration was given to search term combinations using PICOS by identifying: Patient Population or Problem, Intervention (treatment/test), Comparison (group or treatment), Outcomes, and Setting when searching for systematic reviews (and or meta-analysis, meta-synthesis).

A total of 85 empirical papers representing four types of evidence (see Table 1), and 19 reports met with the criteria for inclusion in the review.

To support the structure of this review in relation to the term 'delayed discharge', only one paper used this term as an outcome measure. There was considerable variation across the papers reviewed regarding the extent to which the 13 questions relevant to this review were addressed. All empirical papers focussed on interventions; however, due to the complexities of discharge and admission avoidance, the interventions were not exclusively related to admission, readmission, or discharge processes. The following intervention categories were identified: Clinical/Medical; Pre-Discharge Support; Transitional Care; Post-Discharge Support; Primary Care; Ambulatory/ Assessment Care; Hospital at Home Care; Home Based Care; Tele-healthcare and Residential Care. These were not mutually exclusive but based on the context of the intervention and taking cognisance of the patient journey from hospital to home.

Findings revealed systems and interventions that were varied and multifaceted. However there were particular components of all interventions that positively affected patient outcomes in relation to discharge and (re)admission avoidance. These components broadly agree with the recommendations from a review of the grey literature within the Irish context.

As outlined below (and in table 5 p.98) the summary of results reflect the complexity of care and patient needs, the diversity in care contexts and the multiplicity of components that emerged from our systematic review of the literature. This summary of results will inform decision making relating to discharge and (re) admission avoidance within the Irish healthcare System.

Summary of Results	Components
Integration between care providers; services that span hospital activities, post- discharge & home based services	° 'transitional care' interventions that emphasise in-hospital assessments before discharge; ° care co-ordination between hospital and post-discharge service providers; ° information and communication transfer; ° in-hospital liaison nursing or other care co-ordination specialists ° post discharge assessment.
Multidisciplinary & interdisciplinary approaches to assessment and provision of services.	° Interventions involving teams of health and social care professionals in hospital and in the community ° For older people : multidisciplinary teams with expertise in gerontology; high intensity rapid assessment and diagnosis with medication review
Personalised / Individualised services related to assessment of need	° Patient centred interventions that focus on individualised assessment, care and services. ° These include components such as patient specific education and counselling on disease state, lifestyle medication and focused on the individual needs, emotional and therapeutic support and carer education
Hospital initiated discharge support and specialist follow-up.	° 'Bridging interventions' with dedicated personnel e.g. 'Transition Navigator', to manage and co-ordinate the transition of patients from hospital to discharge destination. ° Follow-up community care or home care. ° For people with complex health needs; interventions such as outreach Specialist and Advanced-Practice nursing services and or Geriatrician led services for older people.

Our review indicates that to tackle delayed discharge and avoid (re)admission to acute services an integrated, personalised, and multi-disciplinary approach is required. The ageing population and growing complexity in health care needs of people with chronic illnesses, requires an interconnected, comprehensive system that spans all levels and types of care and follows the individual through their care continuum.

Chapter 1: Introduction and Review Methods

1.1 Structure of Review

This review is divided into 3 sections. The first chapter provides a context for the systematic review and an over view of the methodology used. In Chapter 2, a synthesis of data extracted from the empirical literature is structured using ten categories of interventions addressing discharge from hospital and/or hospital (re)admission avoidance. This is followed by a narrative summary of Irish data from reports and other supporting documentation addressing initiatives and practices to actively manage delayed discharges and preventing avoidable emergency admission. The discussion and overview of recommendations are outlined in chapter 3. The detailed data extraction tables are provided within the Appendices.

1.2 Background

Demands for health care services are increasing due to increased longevity, an ageing population, increased disease burden, advances in treatments and technology and an increased public expectation of the health services. Currently there are 535,393 people aged over 65 years in Ireland (Central Statistics Office (CSO), 2012). Tackling delayed discharge, and decreasing readmission rates are key priorities in the HSE service plan (HSE, 2014). A review of acute hospital beds reported that 40% of all patients had a discharge plan and just 17% had an estimated date of discharge (PA Consulting Group, 2007). Rashwan et al. (2013) also reported that long term strategic policy planning can potentially reduce acute bed occupancy to 76% and can significantly impact on delayed discharge. The National Integrated Care Advisory Group, an umbrella of the Quality and Patient Safety (QPS) Directorate in the Health Service Executive (HSE) have identified the need to review the existing Integrated Discharge Planning Standards and commissioned a systematic review of evidence to make recommendations for practice.

Discharge is described as a selective process that distinguishes between patients who are able to continue the recovery process outside the hospital and those who are not yet ready to leave (Galai, Israeli, et al., 2003). Achieving safe, timely and person centred discharge from hospital to home is an important indicator of quality and a measure of effective and integrated care (Joint Improvement Team, 2014). Delayed discharge refers to the situation where a patient is deemed to be medically well enough for discharge but they are unable to leave hospital because arrangements for continuing care have not been finalized (Bryan, 2010). The Health Service Executive Special Delivery Unit (SDU) defines delayed discharge as: "A patient who remains in hospital after a senior doctor has documented in the healthcare record that the patient can be discharged (Health Service Executive, 2013). One systematic review, found that the percentage of inappropriate use of acute care beds ranged between 15% and 50% (Sheppard, 2010). The issue of delayed discharge from hospital is a longstanding concern nationally and internationally and although it is a common problem, few countries have managed to successfully tackle it (Joint Improvement Team, 2010). According to Hendy et al, (2012), discharge delays are costly for hospitals and depressing for patients.

To improve the process of discharge and address inconsistencies in discharge documentation and referral, a national code of practice for integrated discharge planning was published by the HSE in 2008 with local guidelines for nurse / midwife-facilitated discharge planning (HSE 2008, 2009). These have recently been replaced by the Integrated Care Guidance: A practical guide to discharge and transfer from hospital (HSE, 2014). The Health Information & Quality Authority (2013) has developed National Standards for Patient Discharge. Similar planned approaches to patient discharge were introduced through policy and guidance by Departments of Health in England, Wales, Northern Ireland and Scotland. The UK National Health Service programme introduced 'Ready to go' comprehensive guidance on planning the discharge and transfer of patients (DH, 2010). Nevertheless, delays in the discharge of

patients from acute hospitals persist. The factors linked to such delays are complex and multifactorial. As Holmås, *et al.* (2013, p1) argue, "a potentially important conflict is that hospitals prefer comparatively short length of stay (LOS) at hospital, while social care services prefer longer LOS". One of the key performance indicators within the HSE National Service Plan (2014b) is to reduce delayed discharge by 10% per year.

Post-hospitalisation, patients, particularly those who are older and /or who suffer from chronic conditions are considered more at risk (Mahoney *et al* 2000; Meinow *et al*, 2005). Over the past 20 years a substantial body of literature has emerged on various aspects of the transition from hospital to home. There is research on patient readiness for discharge (Weiss *et al* 2006; 2007; Coffey & McCarthy 2012; Brent & Coffey, 2012), interventions to improve the process (Chapin *et al*. 2014; Schuller *et al*, 2014, Saleh,*et al*. 2010), and examination of the interface between acute and community services (Johnson *et al*, 2013; Arbaji *et al*, 2008, Coffey & McCarthy, 2012). Different service delivery models have been described in the literature including rehabilitation and intermediate care in the UK (Dahl *et al*, 2014) and hospital at home in the US (Sheppard, *et al*. 2010).

A number of factors have been associated with delayed discharge including: patient characteristics (Challis, Hughes *et al*. 2014); organisation of care in hospital (Glasby, *et al*. 2006); access to long-term care and community services on discharge (Gallagher *et al*. 2008). In Sweden, Swanson (2013) reported that districts with higher percentages of older inhabitants had greater delays in discharges but those with greater investment in nursing care had less discharge delays.

Evidence exists that patients who experience delayed discharge have higher risk of negative outcomes, for example increased anxiety (Kydd, 2008); increased exposure to hospital acquired infection and functional decline (Hendy *et al*, 2012). According to a report of the expert group on delayed

discharge in Scotland, the longer the delay the greater the chance of dependency and institutionalization, therefore ways of preventing avoidable admission must be explored (Joint Improvement Team, 2010). Best practice advocates early identification of potential challenges that could delay discharge and identification of interventions that would keep people out of hospital (HSE, 2013).

1.2 Aims of the Research Review

The purpose of this review is to identify the models, systems, policies or interventions that are deemed successful and supportive of 'good practice' in preventing or managing delayed discharge and/or hospital (re)admission avoidance. This desk-based research review has been undertaken to inform the integrated programme for patient flow, with a particular focus on delayed discharges in the acute hospital system inclusive of hospital (re)admission avoidance.

The first aim of the research review was to:

Identify successful systems and models emanating from international research about policies to tackle delayed discharges inclusive of hospital (re)admission avoidance.

Specific review questions relating to this aim included:

1. What definitions exist for the concepts of discharge and hospital (re)admission avoidance and their variants?

2. What type of models, systems, policies or interventions have been developed in relation to preventing or managing delayed discharge and/or hospital (re)admission avoidance?

3. What are the main components of the various types of models, systems, policies or interventions identified?

4. What population groups have been sampled and targeted?

5. What specific health conditions/problems have been targeted in preventing or managing delayed discharge and/or hospital (re)admission avoidance?

6. What healthcare contexts/settings have been addressed?

7. What healthcare professionals and/or other personnel were involved in implementing the various models, systems, policies or interventions identified?

8. What is the range of outcomes that have been assessed?

9. What are the effects of each model/system/policy/intervention on outcomes assessed?

10. What components of each model/system/policy/intervention are associated with improved outcomes?

11. What are the resource implications of implementing each type of model, system, policy, or intervention?

12. What are the enablers associated with implementing each type of model, system, policy, or intervention?

13. What are the barriers associated with implementing each type of model, system, policy, or intervention?

The second aim was to:

Review data and other supporting information that identifies initiatives and practices in place to actively manage delayed discharges in the Irish context (national, regional and local) and the impact of same.

Specific additional review questions relating to this aim included:

15. Identify recommendations from national reports and Irish initiatives and practices in place pertaining to:

I: Managing delayed discharge

ii: Preventing avoidable emergency admission

iii: Promoting integration of care between community and acute care

iv: Improving patient flow

The review methods are therefore presented in two distinct parts to address these aims. Part 1 formed the basis for addressing the first aim and Part 2 the second aim.

1.3 Review Methods

The review methods for **Part 1** were based on desk-based secondary research guided by the principles of systematic review methodology published by University of York (*The Centre for Systematic Reviews and Dissemination*, 2008), and in the *Cochrane Handbook for Systematic Reviews* (Higgins and Green 2011).

In addressing the first aim, the review specifically aimed to scope the international peer reviewed literature on existing policies, models or systems that provide evidence of 'good practice' in both preventing and managing delayed discharges from the acute hospital system inclusive of hospital (re)admission avoidance

1.3.1 Inclusion and Exclusion criteria

Papers considered for inclusion were peer reviewed and those that:

- explicitly addressed discharge relating to the context of the acute general hospital system inclusive of (i) in-patient discharge from the hospital to home/community service or any other setting, (ii) discharge

within the hospital i.e. from one in-patient setting to another, and (iii) prevention of/ reducing hospital (re)admission (i.e. keeping people out of hospital). In addition, peer reviewed papers addressing discharge/ (re)admission avoidance interventions in relation to specific health problems/diseases (e.g. pre-discharge or post discharge rehabilitation following stroke; mobilization following hip replacement surgery) were included provided that measurements of discharge or (re)admission rates were explicitly stated as the primary outcomes.

- sampled population groups of all ages from children through to older adults

- provided evidence on any type of intervention, including system changes or models of practice designed to tackle or offset delayed discharge and/or hospital (re)admission avoidance (such as avoiding emergency admissions, improving patient flow between services, integrating care between acute and community services, and providing step-down or long-term care services)

- compared discharge/ hospital (re)admission avoidance interventions with no intervention, standard care or a different type of intervention

- reported on outcomes or impacts specifically related to (i) services e.g. length of stay, bed utilization, bed occupancy, discharge rates and (re)admission rates; costs to health service providers, costs to social care providers, and (ii) patient outcomes e.g. patient safety, mortality; health status/morbidity, patient satisfaction, quality of life

- reported on studies that were meta-analyses, meta-syntheses, meta-reviews, systematic reviews, or randomized controlled trials.

Papers excluded were those that:

- focused on discharge/hospital (re)admission avoidance relating to any type of hospital or healthcare setting other than the acute general hospitals for example mental health services, intellectual disability services, maternity hospitals, neonatal units;

- reported on interventions on discharge/hospital (re)admission avoidance in relation to specific health problems/diseases (e.g. pre-discharge or post discharge rehabilitation following stroke; mobilization following hip replacement surgery) where measurements associated with discharge or hospital(re)admission rates were not explicitly stated as the primary outcomes;

- were not evidence based reviews, syntheses or meta-analyses of previous research;

- were not randomized controlled trials;

- reported on randomized controlled trials found to be included as evidence in systematic reviews or meta-analysis eligible for this review;

- reported on randomized controlled trials at protocol or pilot stage.

1.3.2 Search processes

A full search strategy was developed by the research team in consultation with the librarian on the team to include key terms and their variations. The search strategy for each guidance type was checked by two team members for accuracy. Key terms included a combination of terms associated with "delayed discharge", re-admission and admission avoidance.

> Key Terms:
> - bed utilisation
> - length of stay
> - delayed

- transition
- intermediate care
- homecare
- residential care
- primary care
- model
- intervention
- technology
- hospital avoidance
- admission
- discharge

For each search, consideration was given to search term combinations using PICOS by identifying: Patient Population or Problem, Intervention (treatment/test), Comparison (group or treatment), Outcomes, and Setting when searching for systematic reviews (and or meta-analysis, meta-synthesis) which have formally evaluated any of the review questions outlined above. It was decided not to use the PICOS concepts in the search strategy for each individual review question given the breadth of discharge contexts being reviewed as well as the breadth of population groups and clinical contexts included within the initial scoping of the search. The PICOS framework is more applicable when addressing a clearly defined clinical question relevant to a defined population group and clinical context (Caldwell et al., 2012).

Full details of the search performed including complete search strings are available in Appendix 1.

1.3.3 Search Strategy for Part 1

A systematic search strategy was developed using various combinations of text words (in title or abstract) and subject headings relevant to the individual databases searched. Using the EBSCO platform, the databases searched

were: MEDLINE, CINAHL, PsychINFO, Psychology and Behavioral Sciences Collection, Social Sciences Full Text (H.W. Wilson), and SocINDEX with Full Text. All searches were limited to English language papers published between January 1st 2005 and January 31st 2015. Additional limits applied were peer reviewed/scholarly journals (CINAHL/psychological and social science databases) and publication type (MEDLINE & CINAHL).

1.3.4 Review Process and Outputs

All results yielded from the search process were exported to Endnote (Version 7) following which duplicates were identified and removed. The total volume of search outputs (n=4,189) were then divided between five paired team members. Each pair screened titles and abstracts of papers according to the inclusion criteria with consideration for which papers needed full text review. The potentially eligible full text papers were then read by the paired teams who through a process of consensus agreed on which papers were to be included in or excluded from the review. When consensus could not be reached within paired team members, another paired team reviewed the papers and disagreements were resolved by both paired teams through a process of consensus. All decisions were recorded and records were maintained.

A summary of the search outputs from the review process is provided in Figure 1. A total of 85 papers met the inclusion criteria. The reference lists of all research papers included in the review were screened to identify additional studies for inclusion.

Figure 1: The identification, screening, and eligibility of publications for inclusion in the review: Part 1.
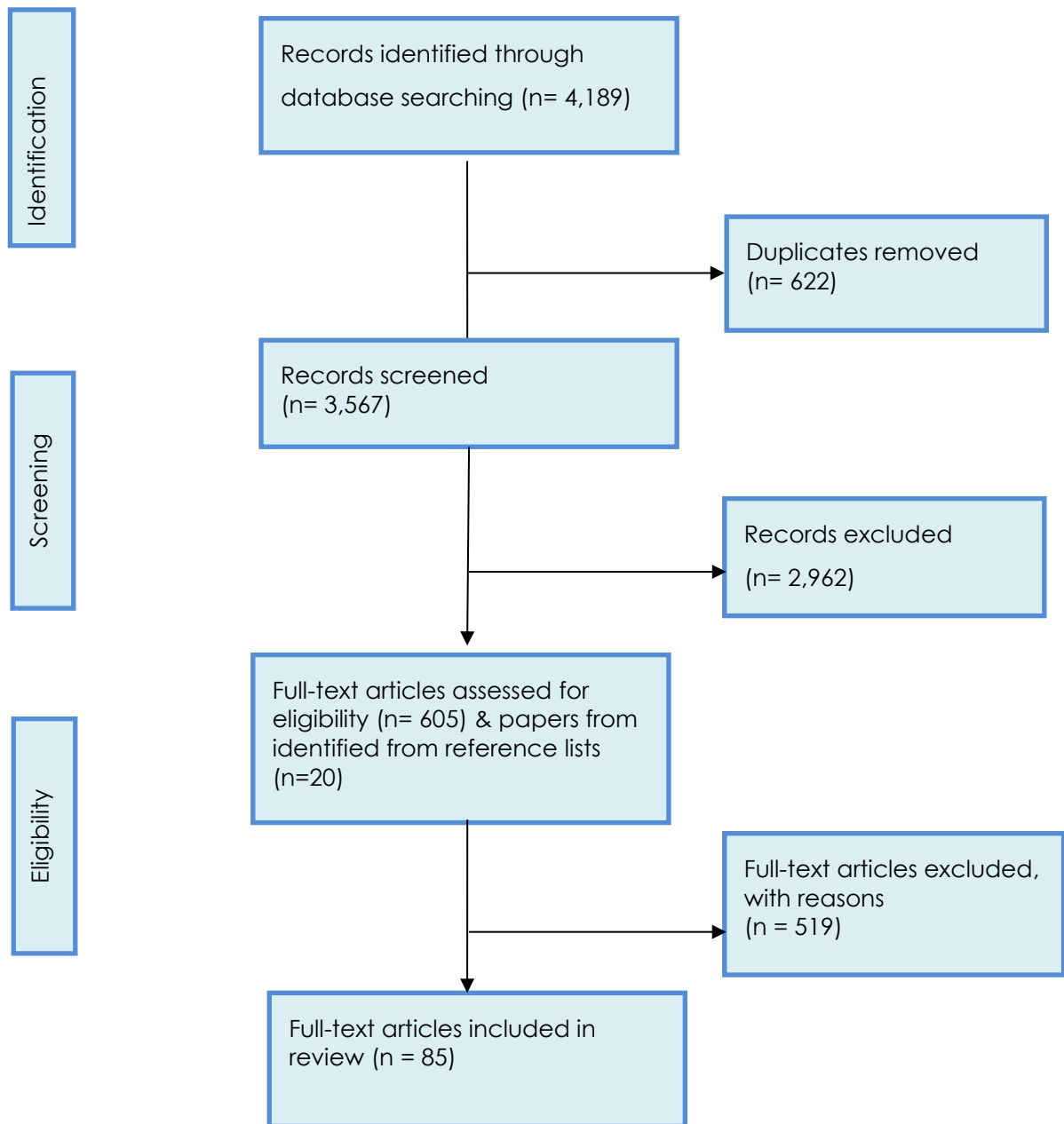
1.3.5 Data Extraction Part 1

Data were extracted from all papers that met the inclusion criteria. The review questions formed the basis for structuring the data extraction tables. Data were extracted on: authors & date; type of evidence; aim of paper; definitions relating to delayed discharge, admission avoidance, readmission and transition; models/systems/policy/interventions and their components;

population group and sample size; health condition/problem; healthcare context or setting; healthcare professionals/personnel involved; outcomes assessed and effects; components of the intervention associated with improved outcomes; resource implications and enablers and barriers relating to hospital discharge or (re)admission avoidance. Additional comments were made as reported by authors including quality appraisal of studies and recommendations of note. Data were extracted by team members (AC, SH, AOM, ES, JH, PL-W, MRD, LS, NC, BM & KA). The characteristics of studies are presented in 10 distinct tables, representing the various categories of interventions identified in the literature. These tables are presented as Appendices.

1.3.6 Search Strategy for Part 2

A search of the grey literature was conducted predominantly to source relevant Irish data, policy and reports not published commercially or indexed by major databases. The purpose of this search was to identify initiatives and practices in place to actively manage delayed discharges in the Irish context (national, regional and local). Search approaches used in the search of the grey literature involved the utilisation of "*Advanced Search*" interfaces where available to include the terms "delayed discharge" and "admission avoidance", the application of limits as stated elsewhere, were applied where possible. Papers which: identified initiatives and practices in place to actively manage delayed discharges in the Irish context (national, regional and local); provided an insight into bed capacity/demand and delayed discharge; reports which had a primary focus on addressing delayed discharge or admission avoidance were included. Given the volume of materials returned the "relevance" ordering filter was applied (where available) to ensure that the materials most relevant to the search were returned in order of relevancy. Each database was then scrutinised until the materials returned were no longer relevant to the review.

The grey literature was accessed by conducting electronic searches within: government departments, health institutions and websites (Irish e.g. DoH, The NCEC, HSE (Lenus), HSE Land, HRB, HIQA, Google Ireland) including Google Scholar. In addition searches were conducted of the Irish Medical Journal and The Irish Journal of Medical Science.

A notable limitation of the grey literature is the potential absence of peer reviewed publications and therefore the grey literature is subject to some biases which a peer review process is designed to diminish.

1.3.7 Review Process and Outputs for Part 2

All relevant results yielded from the search process were exported to a shared file. The total volume of search outputs were screened by two team members (JH, PLW) were 117 papers. Each member screened the publications according to the inclusion criteria with consideration for which publications needed full review. The potentially eligible publications were then read by the team who through a process of consensus agreed on which were to be included in or excluded from the grey literature review (Irish context). All decisions were recorded and records were maintained.

Sixteen empirical papers, six reports and two guidance documents were sourced through a search of the Grey literature and included in part 2 of the review (i.e. data extraction tables). The characteristics of papers are presented in two distinct tables; representing the two categories of papers reviewed i.e. one relating to empirical papers and the second relating to reports and guidance documents identified in the literature. These tables are presented as Appendices.

1.3.8 Data Synthesis

The extracted data were synthesised into a narrative summary of findings focusing on discharge from hospital and (re)admission avoidance. These findings are reported in the next chapter.

Chapter 2: Results

Introduction

In this chapter, the results of Part 1 and Part 2 of the systematic review are presented. The first relates to Part 1, which is a synthesis of the findings in relation to each category of intervention addressing discharge from hospital and/or hospital (re)admission avoidance. This is followed by a narrative summary of data from reports and other supporting documentation for managing delayed discharges, preventing avoidable emergency admission, promoting integration of care between acute and community and improving patient flow between services in an Irish context (Part 2).

2.1 Characteristics of Included Papers Part 1

A total of 85 empirical papers for Part 1 were included in this systematic review. The papers reviewed represent 4 types of evidence as presented in the Table 1. There was 1 meta- review of meta analyses, 8 systematic reviews & meta analyses, 36 systematic reviews and 41 individual RCTs.[1]

Table 1:   Types of Evidence

	Transitional Care	Pre-Discharge	Post Discharge Support	Home Based	Hospital at Home	Primary Care	Ambulatory /Assessment Unit	Clinical/ Medical	Tele-healthcare	Residential Care
MR	1									
MA										
SR & MA	2	1	2				2	1		
SR	9	6	3	3	2	6	5		2	
RCT	8		5	4	1	3	3	10	4	3
Total	20	7	10	7	3	9	10	11	6	3

MR = Meta-review; MA = Meta-analysis; SR = Systematic review; RCT = Randomised control trial

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[1] Individual RCTs were included in our review if they had not been included in other systematic reviews identified for inclusion in this review.

An analysis of coverage in terms of the number of papers that addressed each question in the empirical review is presented in Table 2. There was some diversity across the papers on the extent to which the 13 questions relevant to this review were addressed. Taken as a whole, the number of papers addressing individual questions ranged from 0-20. Questions 10-13 were addressed sparsely across the papers reviewed.

Table 2. Number of papers providing data on each question addressed in this *Report*.

	Transitional Care (n=20)	Pre-Discharge (n=7)	Post Discharge Support (n=10)	Home Based (n=7)	Hospital at Home (n=3)	Primary Care (n=9)	Ambulatory / Assessment Unit (n=10)	Clinical/ Medical (n=11)	Tele-healthcare (n=6)	Residential Care (n=3)
Q.1. Definitions	11	2	1	1	1	1	2	3	0	0
Q.2.Model/system/policy/ intervention	20	7	10	7	3	9	10	11	6	3
Q.3. Main components of Q2	20	7	10	7	3	9	10	10	6	3
Q.4. Population group & size	20	7	10	7	3	9	10	11	6	3
Q.5. Health condition/problem	20	6	8	7	3	7	10	11	6	3
Q.6. Healthcare context/setting.	20	7	10	7	3	9	9	11	6	3
Q.7. Healthcare professionals/ personnel involved	19	7	10	7	2	8	9	10	6	3
Q.8.&9. Outcomes assessed and effects on outcomes	20	7	10	7	3	9	10	11	6	3
Q.10. Components of intervention associated with improved outcomes	9	0	3	2	0	3	3	1	1	1
Q.11. Resource implications	5	0	4	3	2	5	3	7	2	2
Q.12. Enablers	4	3	0	3	1	4	0	2	1	0
Q.13. Barriers	6	1	0	2	0	2	4	4	0	0

2.2 Definitions

The first question of this review related to definitions of key terms. A number of papers cited definitions pertinent to this report, which are outlined in Table 3.

Table 3. Definition of terms taken from the review of the empirical literature

Term	Source of definition (author, year)	Definition	Key components of definition
Preventable/avoidable hospitalisations/admission	Ryan et al. (2014)	Preventable hospitalisations: readmissions, ambulatory care sensitive conditions, or other investigator defined criteria.	Hospitalisations caused by modifiable factors.
Readmission	Meisinger et al., 2013, p4	"Readmission was defined as admission to any hospital after discharge from the index hospital"	Unplanned admission to hospital following recent discharge.
	Linertová et al., 2010	Readmission is the next subsequent admission, urgent or unplanned, of a patient to any hospital within the same area and within a defined reference period	May occur within defined time frame. May occur for any reason
	Miller et al., 2013, p. 788	"an overnight stay or placement into observation or inpatient status for >8 h, for all causes, after the index visit"	
Rehospitalisation	Abdelaal et al. 2013, p. 101	Re-hospitalisation was defined as "repeat hospital admission within 30 days of intervention for any reason related to the index procedure	Unplanned admission to hospital following recent discharge. Occurs within 30 days of discharge.
Hospital presentations/Admission	Edmans et al. 2013	hospital presentations, defined as the total number of inpatient admissions, attendances to accident and emergency/ acute medical unit without admission, and day cases	All attendances at hospital including admissions and assessment unit visits.
Early Support Discharge	Landhorne et al., 2005	ESD services aim to	

	page 501	accelerate discharge home from hospital and provide rehabilitation / support in the home setting	Accelerated discharge Home support/rehabilitation
Transfer	House of Commons Health-Third Report 2002	A patient is ready for transfer when a clinical decision has been made that the patient is ready for transfer: A multidisciplinary team decision has been made that the patient is ready for transfer: The patient is safe to discharge/transfer	Patient clinically fit for discharge. MDT agree patient fit for discharge
Safe to transfer	NHS Northamptonshire, 2012	"Safe to transfer" indicates that the patient may be transferred to an interim setting whilst awaiting service provision of the required package of care of placement into nursing or residential care or other placements. The patient will need to be over the acute phase of their illness or treatment and no longer in need of an acute hospital bed (or rehabilitation / respite bed).	Discharge delayed by 3 days or more. Patient has completed in-hospital treatment Patient remains in hospital despite being medically fit for discharge. Senior doctor has documented that patient can be discharged. Patient agreed to be ready for discharge by all agencies involved in discharge planning for the person. Destination of discharge may be patient's home, a nursing home or another non-hospital setting

2.3 Review and Analysis of Data

To facilitate review and analysis of this large number of papers it was necessary to identify distinct but not mutually exclusive categories based on the primary aim of each research paper. This resulted in the emergence of ten categories i.e. Transitional Care Interventions (n=19); Clinical/ Medical Interventions (n=11); Ambulatory/ Assessment Unit Interventions (n=10); Assessment; Post-Discharge Support Interventions (n=10); Primary Care

Interventions (n=9); Home Based Interventions (n=7); Pre-Discharge Interventions (n=7); Tele-healthcare / Electronic Interventions (n=6); Hospital at Home Interventions (n=3)and Residential Care Interventions (n=3). There was considerable diversity across the papers reviewed on the extent to which the 13 questions relevant to this review were addressed regarding what type of models, systems, policies or interventions have been developed in relation to preventing or managing delayed discharge and/or hospital (re)admission avoidance. The following sections present a synthesis of the findings under the identified categories addressing each of the questions as appropriate. The sequencing of the presentation takes cognisance of the patient journey from hospital to home and the interface between primary, secondary and tertiary care. Therefore sections 2.2.1 to 2.2.11 present interventions relating to these categories.

2.3.1. Clinical/Medical Interventions

Clinical interventions discussed herein are many and varied and refer to clinically based interventions such as multidisciplinary rehabilitation whereas a medical intervention may focus on pharmacological regimes. A total of 11 papers reported on clinical/medical interventions. These papers included one systematic review with meta-analysis, 1 systematic review and 9 RCTs (Appendix 2a). The majority of studies reported hospital re-admission outcomes (Sales *et al,* 2013; Davidson *et al.,* 2010; de Souza *et al.,* 2013; Greening et al., 2014; Jennings et al., 2014; Bonnet-Zamponi, 3013; Abdelaai *et al.,*2013; Jesudason *et al.,* 2012). Three studies evaluated both length of hospital stay and hospital re-admission (Ortiz et al. 2014; Miller et al., 2013; Challand et al., 2012).

The interventions were disparate and varied and ranged from educational (RCT's by Sales *et al,* 2014; Jennings et al., 2014 and a systematic review and meta-analysis by Abdelaai *et al,* 2013), multi-disciplinary rehabilitation programmes (Davidson *et al,* 2010), physiotherapy programmes (Greening *et*

al, 2014; Jesudason *et al,* 2012), and discharge plans (Bonnet-Zamponi., 2013) to more specific medical interventions such as pharmacological/fluid regime (De Souza et al., 2013; Ortiz *et al.,* 2014; Challand *et al.,* 2012) imaging modality (Miller *et al.,* 2013) and biomarker testing. Patient education strategies also incorporated post-discharge phone follow-up in some cases (Sales *et al,* 2014; Jennings *et al.,* 2014).

The components included; patient dietary and medication education, including follow-up telephone calls; a multi-pronged intervention for patients with COPD involving a mix of educational and screening; patient education for patients having percutaneous coronary intervention (PCI) procedures; multi-disciplinary cardiac rehabilitation programme for patients with heart failure; exercise-based physiotherapy-led intervention, rehabilitation programme for patients with chronic obstructive lung disease; post-discharge education and training, including self-management tools; medication review, and organisation of appropriate community equipment and resources.

Three papers involved trials of specific treatments e.g. medication in patients with inflammatory bowel disease; intra-operative supplementary colloid boluses and inhalational versus intravenous anaesthesia in children having elective surgery. Two papers focused on diagnostic interventions e.g. stress cardiac MRIs in patients with acute coronary syndrome and evaluating the measurement of CK-MB, myoglobin and troponin 1 at baseline and 90 minutes later in patients suspected of having acute myocardial infarction.

The population groups sampled were all adults with the exception of the anaesthesia study which involved children (Ortiz *et al.,* 2014). Three studies specifically involved older adults (Greening *et al.,* 2014; Bonnet-Zamponi, 2013; Abdelaal et al, 2013). Health conditions/problems were primarily specific diseases such as Chronic Obstructive Pulmonary Disease (COPD); congestive cardiac failure; acute coronary syndrome; inflammatory bowel disease; Crohn's disease or multiple chronic conditions and mobility

problems. The sole paediatric study involved healthy children undergoing routine elective surgery (Orlitz et al., 2014). The majority of studies were hospital-based. In the childhood anaesthetic study, the children were day-case patients (Orlitz et al., 2014).

Healthcare professionals involved in the studies were primarily medical professionals (Geriatricians, Surgeons, Emergency Medicine Consultants, General Physicians, Gastro-Enterologists, Anaesthetists). Three studies involved multi-disciplinary teams i.e. physicians, nurses, cardiac rehabilitation coordinator, cardiologist, GP, physiotherapists (Davidson et al., 2010; Greening et al., 2014; Abdelaai et al., 2013). One study involved physiotherapists only (Jesudason et al., 2012) and one study used trained volunteers (premedical students) to deliver patient information (Sales et al., 2014).

The principal outcomes were hospital admission/ re-admission rates (n=8), and length of hospital stay (n=4). One study focused on drug-related re-admissions (Bonnet-Zamponi, 2013). Mortality (all-cause or disease-specific) was also a common outcome (n=5). Other outcomes included quality of life (n=1), functional measures (n=3), Emergency Department (ED) visits (n=5), number of medications prescribed for chronic disease at discharge (n=1), speed of discharge/successful from hospital after evaluation of chest pain (n=1), use of coronary/critical care (n=2), number of coronary interventions (n=1), outpatient visits (n=1), major adverse events (n=1), readiness for discharge (n=1), use of community healthcare resources (n=1), return to normal activities (n=1) and patient satisfaction (n=1).

Educational interventions in targeted groups were shown to be beneficial. Medication and dietary advice by trained volunteers and phone-call follow-up (Sales et al., 2014) reduced the rate of hospital re-admission. Similarly, a multi-disciplinary cardiac rehabilitation study in Australia (Davidson et al., 2010) reported a significantly decreased rate of hospital admissions, either all

cause admissions or for a major acute coronary event. There was also a significantly lower mortality rate in the intervention group at 12 months. In the OMAGE hospital discharge planning study, no difference was shown between those who received the educational intervention (medication review and improved discharge communications). However subgroup analysis showed that patients with 4 or more chronic conditions or who were taking diuretics, had a lower rate of emergency re-admission and ED attendance (Bonnet-Zamponi, 2013).

Quality of life scores also improved at 3 months compared with baseline. (Davidson *et al*, 2010). However, a rehabilitation programme, (pulmonary rehabilitation team including a physiotherapy intervention) for patients with COPD found no difference in hospital re-admission rates (Greening *et al.*, 2014). Similarly, use of an educational and screening intervention in patients with COPD did not lead to any difference in hospital readmission (Jennings *et al.*, 2014). In the only medication study, treatment with azothioprine significantly reduced all-cause re-hospitalization and hospitalizations for surgical procedures compared with MSZ treatment in patients with Crohn's disease (De Souza et al., 2013).

A radiological intervention (stress cardiac MRI testing in patients with suspected acute coronary syndrome) reported a reduction in both the length of hospital stay and rate of re-admission (Miller et al, 2013). A Systematic Review and Meta-Analysis of same day discharge intervention versus overnight admission in patients undergoing percutaneous coronary intervention (PCI) procedures showed mixed and non -significant results regarding hospitalization. Use of intra-operative colloid infusion increased length of hospital stay in patients who were fit (Challand *et al.*, 2012). Inhalational versus intravenous anaesthesia in children, showed no difference in duration of hospitalization (Ortiz *et al.*, 2014). A hospital-based physiotherapy intervention (Jesudason et al., 2012) had no effect on any of the outcomes measured (admission, ED visits, return to work, patient

satisfaction). The only study where an identified component was associated with reduced readmissions was the use of azathioprine in patients with Crohn's disease (De Souza et al., 2013).

Most of the papers did not report economic analyses. However long-term use of azothioprine in ileocecal Crohn's disease patients recovering from a sub-occlusion episode may reduce healthcare costs by decreasing re-admission and interventions (De Souza *et al.,* 2013).

In summary, studies evaluating the impact of clinical and medical interventions on hospital discharge and admission avoidance are heterogeneous and varied, with educational/rehabilitation interventions being the largest sub-group (Sales et al., 2014; Jennings et al., 2014; Bonnet-Zamponi, 2013; Davidson et al. 2010; Greening eta l., 2014). There is little similarity in study designs and interventions and few true 'clinical' interventions. Overall, evidence is mixed in relation to educational interventions and rehabilitation programmes – some studies report benefits while other studies did not shown any benefits on readmission or duration of hospital stay. Therefore it is necessary to review interventions including educational interventions that take place in hospital prior to discharge.

2.3.2 Pre-Discharge Interventions

Pre-discharge interventions refer to those that occur within the hospital setting to endeavour a smooth, safe transition of discharge for patients. A total of seven papers reported on hospital pre-discharge interventions. The evidence across all seven papers is drawn from one systematic review with meta-analysis, one systematic review and six RCTs, one of which included an economic evaluation (Appendix 2b).

The specific focus on pre-discharge mostly related to: early discharge planning in one systematic review (Fox et al. 2013) and two RCTs which were nurse-led (Dawes et al. 2007; Wong et al. 2006); nurse led pre-discharge self-

management education in one RCT (Goldman et al. 2014); nurse led post–operative protocol driven discharge process in one RCT (Webster et al. 2011); an instructional discharge letter provided by physician in one RCT (Lin et al. 2014); and discharge medication planning in one RCT (Gillespie et al. 2009). As can be seen from this overview, nurses were the health professionals mostly involved in delivering early discharge planning. Pharmacists were the professionals involved in the two RCTs on medication discharge plans. Taken together, across the 7 papers reviewed, the core components of pre-discharge interventions included patient education, patient assessment and individualised discharge planning, follow up visits/calls (noted in Fox et al., 2013's systematic review), clinical care pathway or rehabilitation.

One review specifically examined the rate and causes of delayed hospital discharges, together with policies and practices that may reduce delayed discharges and improve the experiences of older people in the UK (Glasby et al, 2006). The results of this review estimated the rate of delayed discharge ranged from 8% to 66% and their findings indicated that barriers to discharge were 'internal hospital factors' and the complex and multi-faceted nature of the factors contributing to delayed discharge. Researchers recommended rehabilitation services to reduce the rate of delayed discharge. Evidence concerning delayed hospital discharges and older people in UK was noted to be weak and further research was recommended.

The population groups sampled across the seven papers were all adults with three papers specifically reporting on older adults (Lin et al. 2014; Fox et al. 2013; Gillespie et al. 2009). The health conditions/problems most commonly associated with pre-discharge interventions were reported as chronic diseases (e.g. respiratory, cardiovascular and/or endocrine) in three papers (Lin et al. 2014; Fox et al. 2013; Wong et al. 2006) and post-surgical procedures in two papers (Webster et al. 2011; Dawes et al. 2007). Drug related problems were reported in one paper (Gillespie et al. 2009). The context of health condition/problem was not reported in one paper

(Goldman et al. 2014). The health care setting/context addressed in all seven papers related to hospital in-patient medical or surgical units.

A range of outcomes were reported across the seven papers with outcomes relating to service utilisation being most commonly assessed, namely, readmission (n=6), length of stay (n=2), and timing of discharge (n=1). Other outcomes included mortality (n=2), complications/adverse events (n=1), patient satisfaction (n=5), quality of life (n=2), patient knowledge/information (n=2), treatment/therapy adherence (n=1) and costs (n=3). Overall, pre-discharge interventions did not have a significantly positive effect on most outcomes assessed apart from some outcomes reported in individual papers. A meta-analysis by Fox et al. (2013) showed that early discharge planning resulted in significantly fewer readmissions up to 12 months post discharge compared to usual care and also found that readmission length of stay was significantly lower by almost 2.5 days. Apart from this meta-analysis, the evidence on pre-discharge interventions reported in a total of four RCTs found no significant differences between intervention and usual care groups on rates of readmission (Goldman et al. 2014; Webster et al. 2011; Gillespie et al. 2009; Dawes et al. 2007; Wong et al. 2005). Pre-discharge planning was seen to have some improvements for quality of life (Fox et al. 2013; Dawes et al. 2007), patient knowledge/understanding regarding their treatment/therapies (Lin et al. 2014; Dawes et al. 2007).

Evidence on what components of each intervention were associated with improved outcomes could not be extracted because this was not reported in any of the seven papers reviewed. Likewise, the resource implications of implementing pre-discharge interventions were not reported in any of the papers reviewed, although financial savings were reported as cost outcomes in three papers (Gillespie et al. 2009; Dawes et al. 2007; Wong et al. 2005).

In summary, the evidence overall suggests that pre-discharge planning interventions result in few positive effects. However, it is worth noting, that a positive effect on readmission was found in a meta-analysis by Fox et al. (2013) in a large sample of 1736 older adults with chronic conditions. As with any intervention that is patient centred, consideration needs to be given to those that cross the various pathways of care. Thus the focus of the next section is on transitional care interventions.

2.3.3 Transitional Care Interventions

Transitional care interventions are wide-ranging, as defined in the literature, but the core commonality is the concept of transition, usually from hospital to some post-hospital destination with a focus to prevent repeated and avoidable admissions. A total of 19 papers reported on transitional care interventions. The evidence is drawn from two systematic reviews with meta-analysis, nine systematic reviews and eight RCTs (Appendix 2c).

The interventions assessed included in-hospital assessments before discharge (Verhaegh *et al.*, 2014; Allen et al., 2014; Prieto-Centurion et al., 2013; Rennke et al., 2013; Linertova et al., 2010; Zhao & Wong, 2009; Brotons et al., 2009), post-discharge assessments (Naylor et al., 2011; Herfjord et al., 2014), patient self-management education, counselling, training programmes and coaching (Verhaegh *et al.*, 2014; Allen et al., 2014; Prieto-Centurion et al., 2013; Rennke et al., 2013; Prvu-Bettger et al., 2012; Naylor et al., 2011; linertova et al., 2010; Farris et al., 2014; Zhao & Wong, 2009; Brotons et al., 2009), peer support (Naylor et al., 2011), care co-ordination between hospital and post-discharge service providers (Verhaegh *et al.*, 2014; Allen et al., 2014; Guerin et al., 2013; Rennke et al., 2013; Naylor et al., 2011; Linertova et al., 2010; Englander et al., 2014; Faris et al., 2014; Brotons et al., 2009), communication between hospital and post-discharge service providers (Verhaegh *et al.*, 2014; Prieto-Centurion et al., 2013), home visits (Verhaegh *et al.*, 2014; Rennke et al., 2013; Naylor et al., 2011; Englander et al., 2014; ,Wong et al., 2014; ,Zhao & Wong et al., 2009; Brotons et al., 2009), telephone follow-

up calls to patients (Verhaegh *et al.*, 2014; Prieto-Centurion et al., 2013; Linertova et al., 2010; Wong et al., 2014; Farris et al., 2014; Wong et al., 2012; Brotons et al., 2009), discharge planning protocols (Allen et al., 2014;   Naylor et al., 2011), medication reconciliation and review (Lehnbom et al., 2014;Rennke et al., 2013; Linertova et al., 2010; 15Farris et al., 2014; Wong et al., 2012), in-hospital liaison nursing or other care co-ordination specialist (Tabanejad et al., 2014; Linertova et al., 2010), referral to social services or other community level supports (Prieto-Centurion et al., 2013; Naylor et al., 2011), 'transition navigators' (Prieto-Centurion et al., 2013), patient hotlines (Prieto-Centurion et al., 2013), structured telephone support to patients (Feltner et al., 2014; Rennke et al., 2013; Naylor et al., 2011), telemonitoring (Feltner et al., 2014), post-discharge care plans (Linertova et al., 2010), outpatient clinic support programmes (Feltner et al., 2014; Rennke et al., 2013; Naylor et al., 2011), community-based support including home rehabilitation services (Rennke et el., 2013; Prvu-Bettger et al., 2012; Naylor et al., 2011; Linertova et al., 2010), use of health information records (Naylor et al. 2011), geriatric based wards for early rehabilitation (Linertova et al., 2010), dedicated hospital units to help with rehabilitation and self-care (Linertova et al., 2010), dedicated transitional care providers with dedicated facilities (e.g. community hospital) (Linertova et al., 2010; Englander et al., 2014; Herfjord et al., 2014) and free pharmacy services for those without insurance (Englander et al., 2014).

The population groups covered by the 19 papers were adults with unspecified conditions (Lehnbom et al., 2014; Trabanejad et al., 2014; Englander et al., 2014; Wong et al., 2012), adults of all ages with chronic conditions (Verhaegh *et al.*, 2014; Farris et al., 2014; Brotons et al., 2009), older adults with chronic conditions (Allen et al., 2014; Prieto-Centurion et al., 2013; Feltner et al., 2014; Guerin et al., 2013; Naylor et al., 2011; Wong et al., 2012; Zhao & Wong et al., 2009), children with unspecified conditions (Trabanejad et al., 2013), older adults with unspecified conditions (Rennke et al., 2013; Linertova et al., 2010; Herfjord et al., 2014), adults who have had acute

myocardial infarction or a stroke (Prvu-Bettger et al., 2012), and adults undergoing interventional procedures for cardiovascular disease (Gould et al., 2011).

All but one paper covered patients in their transition from hospital to some post-hospital destination. This single paper (Trabanejad et al., 2013) covered the transfer of patients from ICU to a hospital ward. Most papers covered discharge to the patient's place of normal residence but one (Herfjord et al., 2014) covered discharge to an intermediate care facility.

The healthcare professionals involved in delivering the interventions were hospital nurses (Verhaegh *et al.*, 2014; Allen et al., 2014; Trabanejad et al., 2013; Feltner et al., 2014; Guerin et al., 2013; Rennke et al., 2013; Prvu-Bettger et al., 2012; Linertova et al., 2010; Englander et al., 2014; Herfjord et al., 2014; Wong et al., 2014; Wong et al., 2012; Gould et al., 2011; Brotons et al., 2009), advanced nurse practitioners (Verhaegh *et al.*, 2014; Prvu-Bettger et al., 2012; Naylor et al., 2011; Wong et al., 2012), primary care doctors (Verhaegh *et al.*, 2014; Lehnbom et al., 2014; Guerin et al., 2013; Linertova et al, 2010; Brotons et al., 2009), community/primary care nurses (Allen et al., 2014; Lehnbom et al., 2014; Zhao & Wong, 2009), geriatricians (Allen et al., 2014; Lehnbom et al., 2014; Herfjord et al., 2014;), physical therapists (Allen et al., 2014; Linertova et al., 2010; Herfjord et al., 2014), community pharmacists (Lehnbom et al., 2014; Feltner et al., 2014), specialist hospital doctors (Lehnbom et al., 2014; Feltner et al., 2014; Guerin et al., 2013; Prvu-Bettger et al., 2012; Linertova et al., 2010; Englander et al., 2014; Gould, 2011; Brotojns et al., 2009), social workers (Lehnbom et al., 2014; Guerin et al., 2013; Naylor et al., 2010; Linertova et al., 2010; Englander et al., 2014), hospital pharmacists (Feltner et al., 2014; Guerin et al., 2013; Rennke et al., 2013; Farris et al., 2014), hospital dieticians (Feltner et al., 2014), unspecified community-based allied health professionals (Guerin et al., 2013; Prvu-Bettger et al., 2012), peers (Naylor et al., 2011), case managers (Linertova et al., 2010; Englander et al., 2014), junior doctors (Herfjord et al., 2014) and student nurses (Wong et al., 2014). The identity of

healthcare professionals was not identified in two papers (Prieto-Centurion et al., 2013; Wong et al., 2012).

A large body of evidence from systematic reviews presents a generally positive picture of the effectiveness of transitional care interventions in speeding up discharge and reducing re-admissions. A meta-analysis of 26 RCTs found that transitional care was ineffective at reducing re-admission rates for adults with chronic conditions in the short-term (30 days or less) but more effective over longer follow-up periods (Verhaegh *et al.*, 2014). Similarly, a systematic review of 21 RCTs found that transitional care interventions for older patients with chronic disease were generally effective at reducing readmission rates, time to readmission and length of stay once readmitted (Naylor et al., 2011). This was also supported by a systematic review of 32 studies, 25 of which were RCTs, which found that transitional care Interventions for older patients that incorporate geriatric management supported with home care post discharge were more likely to reduce or prevent hospital readmissions (Linertova et al., 2010). Following the same pattern, a systematic review of 12 RCTs found that re-hospitalisation rates and length of stay were reduced following hospital based discharge planning by ANPs but no significant effects were found from primary care involvement (Allen et al., 2014). This review also found positive effects on functional status, quality of life and patient satisfaction. However, one systematic review of 12 studies, 5 of which were RCTs found that transitional care interventions with older adults with complex chronic conditions or frailty had no impact on readmission rates but some impact on length of stay (Guerin et al., 2013).

Some reviews focused on specific types of transitional care intervention. A systematic review of 83 studies, 30 of which were RCTs found that medication reconciliation and review tended to reduce hospital length of stay and readmissions (Lehnbom et al., 2014). A systematic review of 6 quasi-experimental studies found that a liaison nursing service was effective at reducing delayed discharge from ICU to a hospital ward (Trabanejad et al.,

2014). One of the reviewed studies found a positive impact on patient self-care abilities. A systematic review of 47 studies, 28 of which were RCTs, found mixed evidence about the impact of transitional care interventions for older patients on readmission rates. The focus of this review was on the use of bridging interventions to reduce post-discharge adverse events. The review reported that many studies found no evidence of effectiveness, but there were also some studies which reported positive findings (Rennke et al., 2013).

Some reviews focused on specific types of patients. A systematic review and meta-analysis which focused only on patients with heart failure found that transitional care interventions had no impact on readmission within 30 days but more positive results for longer follow-up periods, especially for home visit programmes. Home visits, structured telephone support and outpatient clinics also reduced mortality up to 6 months after discharge (Feltner et al., 2014). A systematic review of 5 RCTs of transitional care interventions for older adults with COPD found that rehospitalisations were reduced but that mortality increased in the intervention groups (Prieto-Centurion et al., 2013). A systematic review of 44 studies, 36 of which were RCTs, focused on transitional care interventions for patients recovering from AMI or stroke. The review found that only hospital-initiated support for stroke patients reduced length of stay. The interventions led to no reduction in rehospitalisation rates. No important differences were reported for stroke patients for mortality and basic activities of daily living. Hospital-initiated support in relation to AMI reported reduced mortality (Prvu-Bettger et al., 2012).

A number of smaller RCTs have recently been published and are not included in the above reviews. The evidence from these studies is generally less positive than that seen in the systematic reviews. A US based RCT evaluated the effectiveness of transitional care interventions for low income hospital patients. It found no reduction in readmissions or ED visits within 30 days of discharge but lower mortality in the intervention group (Englander et al., 2014). A Norwegian RCT examined the effectiveness of intermediate care

services and facilities. It found that intermediate care did not significantly improve the proportion of patients living at home but reduced demand for nursing home care and home care services (Herfjord et al., 2014). A Chinese RCT found that bundled transitional care interventions for discharged patients with chronic conditions were effective in reducing readmissions and improving quality of life, self-efficacy and patient satisfaction (Wong et al., 2014). Two other Chinese RCTs were less positive and found no differences in readmission rates (Wong et al., 2012; Zhao & Wong et al., 2009) or length of stay (Wong et al. 2012). A US based RCT found that a pharmacist case manager providing a faxed discharge medication care plan from a tertiary care institution to primary care was not effective at reducing post-discharge healthcare utilisation or adverse events in patients with chronic conditions (Farris et al, 2014). Another US based RCT found that a nurse-led discharge intervention for patients undergoing cardiovascular interventions was no more effective than standard care on a variety of outcome measures including the utilisation of urgent care after discharge and medication adherence (Gould et al. 2014). Finally, a Spanish RCT found that a home based intervention for patients with heart failure was not effective at reducing readmissions or a range of other health outcome measures (Brotons et al., 2009).

In summary a large body of evidence suggests a generally positive picture of the effectiveness of transitional care interventions i.e. spanning hospital activity, post-discharge facilities and home in speeding up discharge and reducing re-admissions. Although there is mixed evidence about the impact of transitional care interventions for older patients on readmission rates, transitional care Interventions for older patients that incorporate geriatric management (supported with home care) post discharge were more likely to reduce or prevent hospital readmissions. Re-hospitalisation rates and length of stay were reduced following hospital based discharge planning by nurses. For discharged patients with chronic conditions transitional care interventions were effective in reducing readmissions and improving quality of life, self-

efficacy and patient satisfaction. Some had impact on length of stay in hospital. The impact on readmission within 30 days was mixed but more positive results for longer follow-up periods, especially for home visit programmes. Supporting patients after discharge is a critical part of any successful discharge care program, therefore the focus of the next section is post discharge interventions.

2.3.4 Post Discharge Interventions

Post discharge interventions refer to those with an emphasis on support following discharge from hospital to home or another care facility. A total of ten papers reported on Post-Discharge Support Interventions. The evidence across all ten papers is drawn from two systematic reviews with meta-analysis, three systematic reviews and five RCTs (Appendix 2d).

The predominant focus of included papers was on post discharge interventions either commencing in the hospital prior to discharge in acute care and/or followed out in to the home. The post discharge support examined in two systematic review and meta analyses papers were hospital/ community pharmacists led interventions (Thomas et al., 2014) and case management (CM) (Huntly et al. (2013); with systematic reviews focused on: post discharge telephone call (Bahr et al., 2014); follow up specific to patients with heart failure (Adib-Hajbaghery et al., 2013) and early supported discharge in stroke patients (Rousseaux et al, 2009). The RCTs were varied and examined the effectiveness of a virtual ward which is a model of care that uses some of the systems of a hospital ward to provide inter professional care in the community (Dhalla et al., 2014), another examined nurse-led telephone support (Li et al.,2014); nurse-based case management in Germany (Meisinger et al., 2013) with two RCTs in the US focused on a simplified disease management program (Rice et al., 2010) and a discharge nursing intervention (DNI) aimed at promoting self-regulation of care at home (Gould et al., 2011). The healthcare professionals engaged in providing these

interventions varied across papers to include: interdisciplinary teams of physician, physiotherapist, occupational therapist, and nurses (Dhalla et al., 2014, Hutley et al.,2013,Rousseaux et al,2009) doctors and nurses (Li et al.,2014), pharmacist-led, with primary care physician (Thomas et al., 2014); nurses only (Bahr et al., 2014;Gould et al.,2011, Meisinger et al., 2013) and a respiratory therapist case manager (Rice et al., 2010). As can be seen from the above, nurses were predominantly included in the majority of the interventions. The core components of these interventions included individually or as a combination of: patient education, telephone/internet contact, home visits, individualised care planning, case management, discharge plans and institution of self-management principles.

All of the papers included adult sample populations and 4 papers specific to older adults (Rice et al., 2010, Thomas et al., 2014, Hutley et al., 2013, Rousseaux et al., 2009), with the latter predominantly related to multiple comorbidities and the former on specific health issues, for example heart failure (Adib-Hajbaghery et al., 2013) and cardiovascular disease (Gould et al., 2011). The health care settings were either acute care wards, specific care units or in the home.

The primary outcome reported across the ten papers was mostly related to admission/readmission, with three papers on planned readmission; readmission or death (n=2); unplanned admission or death (n=1) and unplanned admission (n=2) with other primary outcomes related to hospitalisation within 12 months (n=1) and medication adherence (n=1). Other outcomes measured were: patient satisfaction (n=4); quality of life (n=1); compliance with care treatment (n=2); cost (Huntly et al., 2013) and resource use (Rousseaux et al., 2009). Overall the evidence suggests that post discharge interventions had mixed results across the ten papers.

With regard to readmission, one systematic review which included 15 RCTs and 4 quasi experimental studies reported a significant reduction in

readmission in 15/20 studies varying from 10% to 33% (Adib-Hajbaghery et al. (2013). Similarly, Li et al (2014) in their RCT, reported a statistically significant difference between groups in 84 day readmissions but a non- significant reduction in readmission rates in relation to intention to treat results. However, Rousseaux et al. (2009) in their systematic review of 10 RCTs reported no significant difference (n= 3) with just one study demonstrating lower rates in early supported discharge group (ESD). Meisinger et al. (2013) in their RCT, reported that nurse-based management among elderly patients with a myocardial infarction had no significant influence on the rate of first unplanned readmissions or death during a one-year follow-up. Hutley et al., (2010) from their systematic review & meta- analysis on case management (CM) in hospital or on discharge, (n= 6) overall reported no significant results related to unplanned admissions. However, two individual trials reported a significant decrease in unplanned admissions (one at 6 months, one at 18 months). With regards to CM based in the community (n= 5) overall there were no statistically significant reduction in unplanned admissions reported. However there was a significant reduction reported in admissions to ED. Similarly, Thomas (2014) in their systematic review & meta analyses reported that older people with heart failure receiving pharmacist-led/GP intervention within the hospital setting had a significant reduction (25%) in unplanned admissions (n= 3), and absolute risk reduction of 19 cases per 100. However, no reduction was found in unplanned admissions in the community setting (n= 1). The findings also remained non-significant for older people with various conditions in both the hospital and community settings.

There were positive outcomes for ESD from Rousseaux et al. (2009) which reported reduced duration of initial inpatient hospitalization of up to 8 days and reduced LOS in the Stroke Unit and reduced cost of care in ESD groups. Similarly, Hutley et al (2010) indicated that case management in hospital or on discharge significantly reduced length of stay reported in three trials and a significant difference in number of days until first admission. Furthermore, CM in community also demonstrated significant reduction reported in

admissions to ED. Rice et al., (2010) reported a significant reduction in hospitalisations and ED visits for COPD patients following a disease management program where the intervention group spent 36% less time in hospital and less time in the ICU. There were less positive outcomes from Gould et al (2011) RCT where DNI did not result in any significant positive outcomes with regards to medication adherence, patient satisfaction or utilization of urgent care, however there was some improvement of patients' acceptance of long-term condition.   However, some improvements were noted in some studies within Bahr et al (2014) systematic review with regards to patient satisfaction, medication adherence, medication adverse events and follow-up attendance.

Overall, information on resource implications was only reported within two of the papers reviewed. Huntly et al. (2013) demonstrated that CM intervention in community significantly reduced costs in 5 studies and Hutley et al., (2010) reported a favourable outcome in another 4. Whereas, Dhalla et al (2014) in their RCT concluded that the intervention of the virtual ward model of care is unlikely to be an efficient use of health care resources. Evidence on what components of post discharge interventions were associated with improved outcomes were reported in two systematic reviews as: pre-discharge patient education/ home visits, & telephone follow up (Adib-Hajbaghery et al. 2013) and quality of home care (ESD Type 1 - most beneficial) (Rousseaux et al. 2009). It is worth noting that one systematic review/ meta-analysis (20 trials) reported that in 3 trials the components of intervention associated with improved outcomes was education about heart failure prior to hospital discharge with continuing follow-up post discharge (NOTE - trials were of different intensities and follow-ups) (Thomas et al. 2014). Evidence on what components of post discharge interventions were associated with improved outcomes were not reported in two systematic reviews (Bahr et al. 2014; Huntly et al. 2014) and 5 RCTs (Dhalla et al. 2014; Lia et al. 2014;Meisinger et al. 2013; Gould, 2011; Rice et al. 2010).

In summary, the evidence overall suggests that post discharge planning interventions provide some positive results relating to reducing readmission (Adib-Hajbaghery et al. 2013, Li et al (2014); unplanned admission (Hutley et al., 2010) but these results were from individual trials only and not included in results of systematic reviews & meta analyses. However, community based interventions in the two systematic review & meta analyses papers (Thomas et al., 2014, Hutley et al., 2010) demonstrated a decrease in unplanned admission. Community based care involves close communication and liaison within the context of primary care and thus incorporate primary care interventions which will be reviewed in the next section.

2.3.5 Primary Care Interventions

Primary care is health care provided in the community close to where people live and can be the first point of contact for advice or treatment. Nine papers reported on interventions which occur in primary care. These papers included one meta-analysis, four systematic reviews, three RCTs and one review of literature (Appendix 2e). The interventions were multifaceted and varied from those conducted by specialized multidisciplinary team (MDT) (Ontario Health Technical Ad. Committee, 2009, Stall et al., 2014, Holland et al., 2005) to those which were principally conducted by nurses (Chow et al., 2008, Delgado-Passler & McCaffrey, 2006). Interventions included: counselling on disease state / lifestyle / medication and care plans (Ontario Health Technical Ad. Committee, 2009; Stall et al., 2014; Delgado-Passler & McCaffrey, 2006). In addition, there was a focus on telephone contact with the patient (Crocker et al., 2012) with some providing additional home visits (Holland et al., 2005; Carroll et al 2007 and Delgado-Passler &McCaffrey 2006) and some analysing the effects of home visits alone (Chow et al., 2008). Lainscak et al., (2013) focused on the patients' needs and discharge coordination and similarly Ryan et al., (2014) implemented a 'wrap-around service' that focused on co-ordination across the interface and included members of the MDT (e.g. Occupational therapists, Psychology, Speech and Language therapists).

The populations involved in the 9 studies were all adult apart from Ryan et al., (2014) which had a paediatric focus. Of the remaining 8 studies, four were included older adults (Ontario Health Technical Ad Committee, 2009; Stall et al 2014; Carroll et al 2007; Delgado-Passler &McCaffrey 2006) whilst the remaining four had an adult cohort whose ages were not defined.

The health conditions studied included cardiovascular diseases e.g. heart failure (Ontario Health Technical Ad. Committee, 2009; Holland et al 2005; Delgado-Passler &McCaffrey 2006); myocardial infarction and coronary artery bypass surgery (Carroll et al., 2007); mixed cardiovascular and respiratory conditions (Chow et al., 2008), respiratory alone (Lainscak et al., 2013) or other medical complexities e.g. cerebral palsy (Ryan et al;2014) whilst the remainder did not specify their emphasis.

The majority of studies were set in the community or primary care settings. The remainder included: a specialist pulmonary hospital (Lainscak et al., 2013) and a medical unit of three regional hospitals (Chow et al., 2008). The personnel involved in the nine studies included nurses (n=8), physicians (n=4) and other members of the MDT (e.g. psychologists / OT/ speech and physiotherapists) (n=4) whilst one study did not specify the HCPs involved (Holland et al; 2005). The outcomes assessed included; all-cause mortality (n=3), mortality rate (n=1), all-cause hospitalisation (n=2), ER/ ED visits (n=3), reduced avoidable hospitalisations (n=1), hospital (re)admissions (n=6), patient engagement (n=2), long term care admissions (n=1), bed days (n=2), patient self-reported health status (n=1) and cost (n=1). Statistically significant improvement in outcome(s) was observed in Specialised, Multidisciplinary, Community-based Care (SMCBC) compared with usual care (Ontario Health Technical Ad. Committee, 2009). This was also the case for Ryan et al., (2014), Stall et al., (2014), Holland et al., (2005), Lainscak et al., (2013), Delgado-Passler &McCaffrey 2006. Crocker et al., (2012) showed no significant effect in ED visit rate or re-admissions but did show an increase in patient engagement as evidenced by office contact and office visits.

Similarly for Carroll et al (2007) whilst there were no statistical differences, it would seem that community-based interventions can promote active participation in cardiac rehabilitation programmes.

In summary, the variety of different interventions implemented by the differing groups combined showed some successful outcomes.

2.3.6 Assessment /Ambulatory Unit Interventions

Medical Assessment/ambulatory Units provide another avenue for entry to hospital care, especially for those patients who have already been assessed by their GP, and with the additional benefit of reducing demand on Emergency Departments. A total of ten papers reported on interventions that involved assessment or ambulatory units. These papers included two systematic review and meta-analysis papers, five systematic reviews and three RCT's (Appendix 2f).

The focus of the majority of papers related to units for older people. Acute Care for Elderly Units (ACE) were the focus of a systematic review and meta-analysis by Fox et al, (2012) and two systematic reviews (Ahmed & Pearse, 2010; Scott et al, 2009); Comprehensive Geriatric Assessment (CGA) and specialised multidisciplinary clinics were the focus of one systematic review and meta-analysis (Thomas et al, 2013), a systematic review (Conroy et al 2011) and two RCT's (Rosted et al 2013; Edmans et al, 2013); a medical respite / care for homeless programme and meta-analysis was the focus of one systematic review (Doran et al, 2013) and one RCT assessed the effects of day hospital care (Crotty et al 2008). One systematic review related to Acute Paediatric Assessment Units (Ogilvie et al 2005). As can be seen from this overview, the interventions were mainly provided by Interdisciplinary Teams.

These interventions for older adults involved multidisciplinary teams i.e. Geriatricians, Specialist Nurses, Occupational Therapists, Social workers,

Physical Therapists and Pharmacists (Thomas et al, 2013; Doran et al 2013; Fox et al 2012; Ahmed & Pearse 2010; and Crotty et al 2008). Two RCTS's also included GP's (Rosted et al, 2013 and Crotty et al 2008). The involvement of Generalist Physicians, Allied Health Professionals and Clerical Staff were reported in one RCT (Crotty et al, 2008). Thomas et al, (2013) in their systematic review and meta-analysis reported the involvement of additional specialists such as cardiologists and psychologists. In the case of Paediatric Assessment the Health Professionals involved were not reported.

taken together, across the 10 papers reviewed, the core components of the interventions included interdisciplinary teams/multidisciplinary care; individualised geriatrician or nurse led assessment, rapid assessment and diagnosis, medication review, high intensity/one on one rehabilitation, case management, care pathways, patient education, clinical monitoring, tele-monitoring and telephone follow-up, liaison / referral to community services, advanced care planning.

The population groups sampled across 8 of the papers were adults, with seven papers specifically reporting on older adults (Thomas et al, 2013; Edmans et al, 2013; Rosted et al, 2013; Fox et al, 2012; Conroy et al, 2011; Ahmed & Pearse, 2010; Crotty et al, 2008). One systematic review reported on studies conducted with children (Ogilvie et al 2005). The health conditions/problems most commonly associated with the interventions were reported as acute medical or surgical conditions/illnesses (Fox et al, 2012; Conroy et al, 2011; Ahmed & Pearse, 2010; Scott et al, 2009), Heart failure / chronic (Thomas et al, 2013), frailty, multiple chronic conditions (Doran et al, 2013), stroke (Crotty et al, 2008) and those at risk of functional decline and / or deterioration (Edmans et al, 2013; Rosted et al, 2013). The health care setting/context addressed in all nine papers related to hospital in-patient medical or surgical units or emergency department.

A range of outcomes were reported across the nine papers. outcomes related to service utilisation being most commonly assessed, namely, readmission/ hospitalisations (n=7), length of stay (n=3). Other outcomes included mortality (n=5), nursing home placement (n=1), patient / provider satisfaction (n=2), functional ability (n=3), health related quality of life (n=1), days at home (n=1) and costs (n=3).

Overall, interventions that involved assessment/ambulatory units had a significantly positive effect on most outcomes assessed. One systematic review and meta-analysis (Thomas et al, 2013), along with three systematic reviews and two RCTS (Rosted et al, 2013; Doran et al, 2013; Ahmed & Pearse, 2010; Scott et al, 2009; Crotty et al, 2008) showed a significant reduction in readmissions within the intervention groups (30 days – 12 months following discharge) compared to usual care. One RCT reported a reduction in hospitalisations by 29% (Doran et al 2013). Thomas et al, (2013) reported no unplanned readmissions within 30 days of discharge and a significant reduction in unplanned readmissions after 3 months and six months. However a systematic review and meta-analysis by Fox et al. (2013) to compare the effectiveness of Acute Care for Elders model and usual care involving 6839 participants showed no significant difference between groups in relation to readmission in five studies reviewed. Nevertheless there were significantly shorter lengths of stay (p=0.04), significantly fewer falls (p=0.02) and significantly less likelihood of functional decline (p=0.001 in the intervention groups (Fox et al, 2013). In one RCT a Day Hospital Intervention resulted in twice the risk of readmission compared to home rehabilitation (Crotty et al, 2008) and yet another RCT showed that hospitalisations were slightly increased in the intervention group who received Specialist Geriatric assessment prior to Discharge (Edmans et al, 2013). In relation to paediatric assessment units, one systematic review reported that 40% of children attending acute assessment in paediatric units and over 60% attending assessment units in A&E were discharged without acute admission.

Unscheduled returns for readmission within 72 hours were between 0.4% and 7% (Ogilvie et al, 2005)

Interventions that involved assessment/ambulatory units for older people were reported to have resulted in improvements for quality of life (Conroy et al, 2011); Fox et al. 2013; Dawes et al. 2007), patient and provider satisfaction (Ahmed & Pearse, 2010; Scott et al, 2009) and patients were significantly more likely (p<0.001) to be discharged home (Scott et al, 2009). These interventions were also found to lower polypharmacy (Ahmed & Pearse, 2010) and result in a reduction in costs (Fox et al, 2012; Ahmed & Pearse, 2010; Scott et al, 2009).

Evidence on the components of each intervention that were associated with improved outcomes was not reported in all papers. From those reported, evidence suggested that intensive case management and assistance with housing were associated with improved outcomes in Care for the Homeless / respite care project (Doran et al, 2013). In a systematic review and meta-analysis by Fox et al, (2012) components reported to be associated with improved outcomes were patient centred care, early rehabilitation, early discharge planning and interdisciplinary team work. In Thomas et al, (2013) components reported to be associated with improved outcomes were management conducted over a period of 12 months utilising decreased intensity of follow-up. One systematic review, reported that appropriate and rapid assessment, diagnosis and treatment along with improved rostering of staff were associated with effectiveness of acute medical assessment units (Scott et al, 2009).

In summary, the evidence overall suggests that assessment / ambulatory care interventions result in a number of positive effects. It is worth noting, that in a systematic review and meta-analysis by Fox et al. (2013) in a large sample of 6839 older adults with acute medical conditions results showed no significant difference between groups in relation to readmission. However Thomas et al,

(2013) in a systematic review and meta-analysis of data from 2780 participants showed that unplanned readmissions were significantly reduced over a 12 month period following the introduction of specialist multidisciplinary clinics. Patients with chronic conditions can often be treated successfully in the home, thus avoiding admission to acute health services. A discussion on specific hospital at home interventions is provided in the next section.

2.3.7 Hospital at Home Interventions

Hospital at home interventions are frequently specific to a medical condition or a chronic illness. A total of three papers reported on Hospital at Home Interventions. These papers were two systematic reviews and one RCT (Appendix 2g).

The focus of all three papers related to specialist services provided in the home. These interventions were; Hospital at Home for adults with Chronic Obstructive Pulmonary Disease (COPD) (Jeppesen *et al*, 2012; Utens *et al*, 2012) and specialist home-based nursing services for children (Parab *et al*, 2013). The health care professionals involved in the interventions were: specialist respiratory nurses, respiratory physicians, General Practitioners and Community Nurses. Across the three papers reviewed, the core components of the interventions included regular home visits, at home therapies/ treatments, education and symptom review. One RCT included 24hr telephone access to hospital ward for 4 days (Utens et al, 2012).

The population groups sampled in two papers were adults with COPD. One included children with various chronic conditions. The context in all papers was home care. The primary outcome in all interventions was hospital readmission. Other outcomes were mortality (n=1); length of hospital stay los (n=1); satisfaction with care (n=2); health status/physical health (n=2); quality of life (n=2); mental health (n=1).

Hospitals at home interventions were reported to have significant positive outcomes in relation to readmission, mortality, LOS and satisfaction. A systematic review of 8 trials involving 870 participants, reported a significant reduction in readmission rates for hospital at home compared with hospital inpatient care of acute exacerbations of COPD (Jeppesen *et al*, 2012). In contrast one RCT in the Netherlands reported no significant difference in readmissions (Utens *et al*, 2012). In relation to hospital at home for children a systematic review involving 840 children with various chronic diseases found no significant differences in readmissions over 90 days but evidence from one trial was that the hospital in the home' treatment group spent significantly less time in a hospital bed (55.2 hours) compared to those in the hospital group (96.9 hours)(Parab *et al*, 2013). There was significant evidence of greater satisfaction in family functioning; greater parental ability to cope; greater perception of helpfulness from healthcare providers and institutional sources and Improved ability to cope with stress point intervention (6.1% versus 6.8%). There were also significant improvements reported in physical and mental health of children in the intervention groups (Parab *et al*, 2013). The components associated with improved outcomes of hospital at home intervention were not reported.

In summary, there is evidence in this review that hospital at home interventions for adults with COPD result in overall positive effects on readmission rates. For children with various chronic diseases, although hospital at home had no significant effect on readmission there was evidence of a significant positive effect on length of hospital stay, physical and mental health and satisfaction with care. While hospital at home interventions tend to be for patients with a chronic illness, home based interventions can also be provided and thus are not mutually exclusive. The next section provides a review of home based interventions.

2.3.8. Home Based Interventions

Home based interventions are those that are provided within the home care context. A total of seven papers reported on home based interventions. The evidence base across all seven papers is drawn from three systematic reviews and two of these are Cochrane systematic reviews, and four RCTs, one of which included an economic evaluation (Aquado et al. 2010) (Appendix 2h).

The focus of all seven was on home based interventions. Three systematic reviews examined a comprehensive community wide strategy (interdisciplinary home health visits, patient provider agency) (O' Connor et al. 2014); case management/collaborative care and chronic care model (telephone based care; early home support; flexible stepped care model; individualised care packages) (Reilly et al. 2015) and supervised home based interventions (Wong et al. 2012). Four RCTs examined a home based palliative care model Choice for Healthy Ageing (CHA) (Levine et al. 2012); a home visiting programme (Bourman et al. 2008); nurse-led case management (Latour et al. 2006) and a home based educational intervention (Aquado et al. 2010).

As can be seen from this overview, interdisciplinary teams (IDTs) were involved in four studies, two Cochrane reviews and two RCTs. The professionals included nurses, physical therapists, occupational therapists (OTs) speech and language therapists, medical social workers, home health aide (O' Connor et al. 2014); primary care physicians, geriatric nurse practitioner/specialist advanced nurses OT/psychiatrists (Reilly et al. 2015) trained nurse specialist, case manager and GP (Latour et al. 2006) and a physician and a nurse (Aquado et al. 2010). Home care interventions in two RCTs were nurse led by respiratory nurses (Wong et al. 2012) and trained home care nurses and public health nurse (Bouman et al. 2008).

Taken together across the seven papers reviewed, the core components of home based interventions included a multiplicity of interventions (medication reconciliation, assessment, self-management, home visits discipline specific and by health agencies), early home support (information and education, carer education, emotional and therapeutic support), home care outreach nursing visits and social work referrals (early identification and treatment exacerbation of illness, patient specific health education, self-management or caregiver management of the disease; advance care planning and follow up visits by doctor and nurse); 18 month home visiting schedule that included geriatric assessment and service referral system (noted in Bouman et al. 2008) and two RCTs included post discharge home visits, self-management education with a range of interventions (INTERMED scales completed health status and functional ability (Latour et al. 2006)), telephone follow-up and medical review 6 and 12 months (noted in Aquado et al. 2010).

The population groups sampled across the 7 papers were all adults with three papers specifically reporting on older adults (Levine et al. 2012; Aquado et al. 2010; Bouman et al. 2008). The health conditions/problems most commonly associated with home based interventions were reported as: multiple co-morbidities such as heart failure/ diabetes, dementia, COPD and medical conditions (gastroenterology, pulmonology and cardiology), Total hip replacement and moderate to good health status. One study did not report on health conditions (Levine et al. 2012) and one systematic review had missing data (O'Connor et al. 2014).

A range of outcomes were reported across the seven papers with outcomes relating to satisfaction rate (n=2), health related quality of life (n=2), rehospitalisation (n=1), length of stay (n=2) hospital admissions (n=5), emergency department visits (n=3), GP visits (n=1), contacts with medical specialists (n=1), institutionalization (n=2), mortality decrease (n=1), level of care (n=1) use of aids and in-home modifications (n=1) hours of home care

help (n=1), health care costs (n=2), homecare use at 12 months (n=1) and respite care at 12 months (n=1).

A systematic review showed that home based interventions had significantly fewer hospitalizations and length of stay was shorter for patients with total hip replacement (O'Connor et al. 2014). Two systematic reviews showed that home care use, and respite care were significantly greater at 12 months (Reilly et al. 2015) and health related quality of life was significantly improved (Wong et al. 2012). Two RCTs showed that home intervention groups were significantly more satisfied; and less likely to be admitted to hospital than control group (Levine et al. 2012, Aquado et al. 2010).

One Cochrane review reported no significant differences in number of hospital readmission and GP visits (Wong et al. 2012) and four RCTs reported no significant differences between intervention group and usual care group on length of stay (Bouman et al. 2008); readmission (Latour et al. 2006); health care utilization (Latour et al. 2006); psychological functioning (Latour et al. 2006); health care costs (Levine et al. 2012; Bouman et al. 2008) and mortality (Aquado et al. 2010).

The components of each intervention which were associated with improved outcomes including admission avoidance were rate, intensity and number of home visits per day (O' Connor et al. 2014) and application of the intervention during the first week after discharge along with faster assessment (Aquado et al. 2010). This evidence was not reported in a number of papers (Reilly et al. 2015; Wong et al. 2012; Levine et al. 2012; Bouman et al. 2008; Latour et al. 2006).

In summary, the evidence overall suggests that home based interventions result in some positive effects. Reilly et al. (2015) in a large sample of 9615 adults with dementia found case management had significantly positive effects for carers in reducing hospitalisations and emergency department visits during one three year period (O' Reilly et al. 2015) but no significant

effects in favour of case management across a number of other outcomes. Aquado et al. (2010) reported that a single educational home visit by a nurse one week post discharge reduced emergency visits and unplanned readmissions; lowered healthcare costs and trended towards improvement of quality of life. Such interventions can also be enhanced with the use of tele-health and electronic interventions which forms the basis of the following discussion.

2.3.9. Tele-health care/Electronic Interventions

Tele-health can be described as using digital information and communication technologies, such as computers and mobile devices, to manage patients' health and well-being. A total of six papers reported on tele-health care and electronic discharge systems. The evidence across all six papers is drawn from two systematic reviews and four RCTs (Appendix 2i).

The specific focus on tele-health care and electronic discharge systems mostly related to minimising risk of readmission and utilisation of primary health care services, as examined in two systematic reviews (Motamedi et al 2011; Martinez et al 2006) and four RCTs (Blum et al 2014; Gurwitz et al 2014; Gellis et al 2014; Steventon et al 2013). Two papers investigated the impact of electronic record based interventions (Gurwitz et al 2014; Motamedi et al 2011); single trials focused on telemonitoring (Blum et al 2014), telecare including functional monitoring (Steventon et al 2013); and tele-monitoring with tele-health education (Gellis et al 2014). Only one systematic review was found which explored the impact of tele-health home monitoring on health service utilisation outcomes, specifically, readmission (Martinez et al 2006). Across all studies it was evident that nurses were the health professionals mostly involved in delivering tele-health care interventions. However in four out of the six papers, primary care physicians or GPs were also part of the healthcare team. Taken together, across the six papers reviewed, the core components of the tele-health care/electronic discharge system,

interventions included remote self-monitoring of vital and functional signs (Gellis et al 2014; Steventon et al 2013; Martinez et al 2006); with or without face to face home visits by health care professionals (Blum et al 2014); remote integrated environmental sensors (Steventon et al 2013); and electronic discharge communication systems integrating acute and primary care (Gurwitz et al 2014; Motamedi et al 2011).

The population groups sampled across the six papers were all adults with the exception of a sample of 30 neonates included in the systematic review on 'computer-enabled discharge' (Motamedi et al 2011), this review also included over 3579 adults. Of the remaining studies three of the two RCTs (Gurwitz et al 2014; Gellis et al 2014) and one systematic review (Martinez et al 2066) focused on older adults only. The health conditions/problems most commonly targeted and deemed appropriate for home based electronic interventions tended to be chronic illnesses such as Chronic Obstructive Pulmonary Disease, depression, cognitive and physical impairment, cardio vascular disease and diabetes. Four of the studies included heart failure as the main health condition of interest (Blum et al 2014; Gurwitz et al 2014; Gellis et al 2014; Martinez et al 2006). The health care setting/context addressed in all six papers related to home with the majority of patients recruited through their General Practice or specialist OPD centres, only two studies, which were focused on electronic discharge and information exchange, included samples that were sourced from the acute care context.

A limited range of patient outcomes were reported across the six papers. These related primarily to health service utilisation, namely, hospital readmission (n=5), length of stay (n=3), GP visits or primary episodes of care (n=3), ED visits (n=2) and acute inpatient admission (not defined as readmission) or admission to residential care (n=1). Other outcomes of interest included mortality (n=3), patient self-efficacy or problem solving skills (n=3), quality of life (n=2), patient satisfaction (n=1), and costs (n=2).

Overall, Tele-health care/electronic discharge system interventions did not have a significantly positive effect on most health care utilisation outcomes assessed, apart from readmission which was reported in one systematic review (Martinez et al 2006) and ED visits, as reported in one RCT (Gellis et al 2014). The systematic review by Martinez et al (2006) demonstrated a significant reduction in readmission across 10 studies and a corresponding reduction in length of stay in 8 studies with up to a 50% decrease noted in one of the studies. Apart from this systematic review, the evidence on tele-health care/ electronic discharge system interventions reported in the remaining four RCTs and one systematic review found no significant differences between intervention and usual care groups on rates of readmission (Blum et al 2014; Gellis et al 2014; Gurwitz et al 2014; Steventon et al 2013; Motamedi et al 2011). Tele-health within the context of heart failure did appear to have a significant impact on quality of life and mortality (Martinez et al 2006), with some notable improvement in patient self-management skills (Gellis et al 2014). Evidence on what components of each intervention were associated with improved outcomes could not be extracted because this was not reported in any of the six papers reviewed.

In summary, the evidence overall suggests that Tele-health care/ electronic discharge system interventions result in limited statistically significant effects on outcomes such as healthcare/service utilisations, namely hospital (re)admission. However, a positive effect on readmission was found in a systematic review by Martinez et al (2006) which included 42 studies with some sample sizes noted to be over 2303. The quality of these studies varied greatly and 26 studies were categorised as fair to poor evidence. Nonetheless, for older adults with health failure, the home tele-monitoring model can positively impact on cost, QOL, readmission and mortality rates and may have some effect on symptom reduction and ED visits post discharge (Gellis et al 2014; Martinez et al 2006). Electronic health record based discharge interventions appeared to have some positive impact on accuracy, quality and provision of information transferred from acute to

primary care (Motamedi et al 2011). However, overall there was no significance difference reported on patient outcomes, such as hospital readmission. Reduction or avoidance of admission of patients from residential care to acute care warrants consideration and thus is the focus of the next section.

2.3.10. Residential Care Interventions

Residential care refers to long-term care for adults or children in a residential setting rather than the patient's home. A total of three papers reported on residential care interventions. These papers were two RCT's and one randomised comparison trial (Appendix 2j).

All three papers related to interventions to reduce hospital admission from residential care for older people. These interventions were; an outreach residential aged care integration programme (racip) (Boyd et al, 2014); residential care intervention programme in the elderly (recipe) (Harvey et al, 2014) and a facility based complex intervention (connolly et al, 2015). The health care professionals involved in the interventions were: geriatricians, primary care physicians, pharmacists, geriatric nurse specialists, residential care facility staff. One intervention was co-ordinated by gerontological nurse specialists (Boyd et al, 2014).

Across the three papers reviewed, the core components of the interventions included staff education/ clinical coaching (by gerontology nurse specialists), specialist review of residents, facility benchmarking, multidisciplinary discussions, quality improvement, onsite support, care co-ordination, comprehensive geriatric assessment and development of care plan, geriatric led visits within 96 hours of discharge and advanced care planning. The population groups sampled were older adults / residents in aged care facilities. Health conditions were mainly not reported but facilities reported the provision of dementia care. The context in all papers was residential care. The primary outcome in all interventions was avoidable

hospital admissions. Other outcomes were satisfaction with care (n=2); mortality (n=1) and acute bed days (n

Overall, residential care interventions had no significant positive effect on hospital (re)admission, mortality, or hospital bed-days, although residents were significantly less likely to need to attend medical outpatient clinics (37% vs 76%, p < 0.001) than controls (Harvey et al, 2014). In one study, acute hospitalisation rate increased for both intervention and control settings although the rate increase was significantly less for the intervention settings (Boyd et al, 2014). One study reported significantly higher satisfaction with care (p=0.006) (Harvey et al, 2014). The components associated with improved outcomes of a residential care intervention were reported in only one of the RCTs. This component was the rapid access to geriatrician review (Harvey et al, 2014).

In summary, there is no evidence in the three studies involving 3667 older participants that residential care interventions result in overall reduction in acute hospitalizations, mortality, or hospital bed-days. Patients with chronic disease were the focus of one large meta- review of meta analyses with hospital readmission rate as the primary outcome measure. This will be considered in the next section.

2.3.11 A summative review of the efficacy of broad clinical interventions in preventing hospital readmission rates of patients with chronic diseases

A meta-review of meta-analyses to assess the efficacy of broad clinical interventions in preventing hospital readmission rates of patients with chronic diseases was conducted by Benbassat and Taragin (2013). The review was confined to published systematic reviews of randomised controlled trials that compared patients who received conventional care with those who had one or more of the following: hospital based interventions (Discharge planning, pharmacological consultations, geriatric consultations, case management, disease management, in hospital management) and

community – based interventions (periodic home visits by professionals, self-management, telephone follow up, tele-monitoring, community care based rehabilitation, day care, hospital at home). A total of 99 systematic reviews were included in the meta-review, 57 of which were meta - analyses.

The population groups sampled across the 99 papers were all adults (n= 52,255 +) with chronic heart failure heart disease or chronic asthma. Professionals involved were interdisciplinary/multidisciplinary teams i.e. nurses, geriatricians, physical therapists, occupational therapists (OTs), speech and language therapists, medical social workers, primary care physicians and pharmacists. Taken together the core components of home based interventions included a multiplicity of hospital based and community based interventions.

The primary outcome reported was hospital readmission rate (HRR). Almost all papers indicated that community based interventions for patients with heart failure, coronary heart disease and bronchial asthma led to a 12-75% reduction in HRR. On the other hand systematic reviews of hospital based interventions produced inconsistent findings. The authors propose that HRR is not the most important outcome of patient care and suggest that efforts made at reduction of HRR may compromise patient's health by reducing justified re-admissions. In summary, the evidence overall suggests that community- based interventions resulted in some positive effects for adults with chronic diseases.

Summary

The inclusion of systematic reviews as the primary source of evidence for this report was intended to represent the highest level of evidence for each intervention type. A total of 85 papers were included across 10 categories of intervention. In relation to 'delayed discharge', there was only one paper where this term was used as an outcome measure. Evidence related to clinical/medical interventions and pre-discharge interventions was

unconvincing with regards to (re) admission avoidance but some potential with educational and rehabilitation programmes specific to disease conditions was evident (Davidson et al., 2010 Miller et al., 2013). Evidence on pre-discharge interventions found some positive effects on readmission (Fox et al., 2013) with a sample of older adults with chronic conditions. Transitional care interventions demonstrated a generally positive picture of effectiveness spanning hospital activity, post-discharge facilities and home in speeding up discharge and reducing re-admissions (Verhaegh et al., 2014, Naylor et al., 2011, Linertova et al., 2010). Although there is mixed evidence about the impact of transitional care interventions for older patients on readmission rates, transitional care Interventions for older patients that incorporate geriatric management supported with home care post discharge were more likely to reduce or prevent hospital readmissions (Linertova et al., 2010). Re-hospitalisation rates and length of stay were reduced following hospital based discharge planning by ANPs. Some had impact on length of stay in hospital. The impact on readmission within 30 days was mixed but more positive results for longer follow-up periods, especially for home visit programmes (Allen et al., 2014). Evidence from post discharge planning interventions provide some positive results relating to reducing readmission (Adib-Hajbaghery et al. 2013, Li et al., 2014) and unplanned admission (Hutley et al., 2010); these results were from individual trials. However, community based interventions demonstrated a decrease in unplanned admission (Thomas et al., 2014, Hutley et al., 2010). This was similar to the conclusion from primary care interventions, where specialised, multidisciplinary, community-based care (SMCBC) demonstrated significant improvements for patient care (Ontario Health Technical Ad. Committee 2009, Ryan et al., 2014, Stall et al., 2014, Holland et al., 2005, Lainscak et al., 2013, Delgado-Passler &McCaffrey 2006). This finding was also reiterated in the literature on assessment/ambulatory care interventions where key components reported to be associated with improved outcomes were patient centred care, early rehabilitation, early discharge planning and interdisciplinary team work (Fox

et al., 2012). Furthermore, unplanned readmissions were significantly reduced (Rosted et al, 2013; Doran et al, 2013; Ahmed & Pearse, 2010; Scott et al, 2009; Crotty et al, 2008) with further positive results for older people with regards to quality of life, (Conroy et al, 2011, Fox et al. 2013, Dawes et al. 2007), patient satisfaction (Ahmed & Pearse, 2010; Scott et al, 2009) and more likely to be discharged to home (Scott et al, 2009). There is evidence that hospital at home interventions for adults with specific chronic diseases as with tele monitoring result in overall positive effects on readmission rates (Gellis et al., 2014, Jeppesen et al, 2012). Readmission rates were also reduced following single educational home visit by a nurse one week post discharge reduced emergency visits and unplanned readmissions; lowered healthcare costs and trended towards improvement of quality of life (Aquado et al., 2010). Evidence from a meta -review of meta analyses suggests that community- based interventions resulted in some positive effects for adults with chronic diseases (Benbassat and Taragin, 2013).

2.4 The Irish Context: Report on the Grey Literature

Introduction

The purpose of Part 2 of this report was to review data and other supporting information that identifies initiatives and practices in place to actively manage delayed discharges in the Irish context (national, regional and local) and the impact of same. This section will report on the demographics of the population, including chronic illness relating to potential demand for beds. This is followed by an overview of recommendations emanating from empirical papers and reports published in the context of the Irish Health System.

2.4.1 Population

The Irish population was estimated at 4,609,600 in 2014 (CSO 2014). The CSO (2011) census of the population revealed that the population is continuing to

increase; in the period (2006-2011) the highest natural increase was recorded at 45,000 persons per annum (i.e. 73,000 births and 28,000 deaths) and an 8% increase in the total population since the previous Census in 2006. The CSO data reveals that the population is aging: the estimated average age (in years) of the population increased from 34.1 (1996); 35.5 (2008) to 36.8 (2014) a differential of over 2.5 years. Similarly the estimated population aged 0-14 years and over 65 have increased by 19.0% and 27.8% respectively[2].   Similarly life expectancy by age and gender is improving. Currently 12% of the population is aged 65 years or older, a figure which is projected to double by 2046.

2.4.2 The Irish Health System

The Irish health care system encompasses an combination of public and private hospitals, with the unique situation of public hospitals treating both public and private patients. There are 48 public hospitals in Ireland and 21 private hospitals affiliated with the Independent Hospital Association of Ireland and involved in the provision of acute care. These private hospitals collectively provide approximately 1 in 6 acute beds to the Irish healthcare system[3].   In spite of the rapid increase in total healthcare expenditure in the early 2000s, Ireland still has modest primary and community health services, with two thirds of the population paying the full out-of-pocket cost of primary care, and a traditional model of care that favours hospitals over community services (WHO, 2012).

The Health Service is predominantly tax funded with an overall gross budget for 2014 of €13.120billion. The budget for 2015 provides for the delivery of health and social care services within a funding allocation of €12.131billion (net revenue budget, plus an additional €35m for mental health services (HSE,

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[2] Data from 2005 to 2014 taken from Health in Ireland Key Trends (DOH, 2014).

[3] (Information taken from HSE website May 2015,
http://hse.ie/eng/services/list/1/schemes/cbd/acchealthcareireland/Accessing_Healthcare
_in_Ireland_under_CBD.html)

Health Service Plan, 2015). In tandem with the recent European Union/International Monitory Fund bailout and fiscal constraints, the Irish Health System has endured budgetary cuts, human resource constraints with associated increased service demands. Austerity has also forced the health system to evaluate all healthcare activities and costs with consequent reductions in length of stay and increased numbers of day case procedures (Thomas, Keegan, Barry, Layte, 2012; Burke, Thomas, Barry, Keegan, 2014).

The Irish public health care system can be considered as being in a process of constant fluctuation, health services were initially operated under a local authority system; these services were re-organised into eight regional health boards (each with three programme areas (hospital services, special or psychiatric hospitals and community care) overseen by the Department of Health in 1970. However such a system was criticised due to the perception of undue local parochial and political influences. A more centralised system of decision making was seen to offer the solution with the creation of a single national centralised body charged with overseeing the delivery of the Irish health and social care services. The Health Service Executive came into being in January 2005, operating through 4 regions and 32 Local Health Offices (LHOs) and the publication of an annual Service Plan. Clinical care programmes were initiated in 2009 to standardise patient care by bringing together clinical disciplines to deliver greater benefits to service users[4]. More recently the acute care services have been reconfigured linking with hospital groups with key identified academic partners as a transition to Independent Hospital Trusts (Department of Health 2013). Structures for delivering primary, social and mental health care are being re-organised with the implementation of the recommendations of Community Healthcare

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[4] Listing of National Clinical Care Programmes (May 2014)
http://www.hse.ie/eng/about/Who/clinical/natclinprog/listofprogrammes.html: Acute Coronary Syndrome, Acute Medicine, Anaesthesia, Asthma, COPD, Critical Care, Dermatology, Diabetes, Emergency Medicine (EMP), Epilepsy, Heart Failure, Medicines Management Programme, Mental Health , Neurology, Obstetrics and Gynaecology, Older People, OPAT, Ophthalmology, Orthopaedics, Paediatrics and Neonatology, Palliative Care, Pathology, Primary Care, Radiology, Rare Diseases, Rehabilitation Medicine, Renal, Rheumatology, Sepsis, Stroke, Surgery

Organisations – Report and Recommendations of the Integrated Service Area Review Group (DOH 2014).

The integration of health and social care services has been a continuing concern and the focus of renewed energies (HSE 2014). The ultimate aim of much of this change has been to re-orientate healthcare to 1) ensuring that patients attend a hospital when necessary (admission avoidance); 2) reduction in the time spent by patients in hospital (review of patient flow within the health service); 3) the transfer of the delivery of care to a setting more appropriate and convenient for the patient (community focus) and 4) increased access to specialist, acute and long-stay services .

2.4.3 Capacity within the Health System

An analysis of the total number of in-patient and day case discharges (2004 and 2013 data, by age group) within the acute hospitals reveals that the numbers are increasing across most age groups with the highest increase observed in the over 65 years age group (DOH, 2014). The total discharges recorded in 2012 were 1,403,562 equating to 4,057,436 day and inpatient bed days and a mean length of stay of 6.3 days (ESRI, 2013). The longest acute mean length of stay was recorded for neoplasms (7.0 days). The Irish Nurses and Midwives Organisation have been publishing daily trolley and ward watch figures with a number of years; an analysis of the trends relating to these figures reveals a 63% increase in total recorded figures from 2007 (n=4278) to 2014 (n=6977)[5] . The OECD publish global comparator health statistics, Irish Hospital discharge rates were quoted at 13,606 per 100,000 inhabitants[6] The OECD Definition: "hospital discharge rates are a measure of the number of patients who leave a hospital after receiving care. Hospital discharge is defined as the release of a patient who has stayed at least one night in hospital. It includes deaths in hospital following inpatient care. Same-day discharges are usually excluded. This indicator is measured per 100 000 inhabitants" OECD (2015). The HSE

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[5] Data taken from INMO website May 2015, http://www.inmo.ie/trolley_ward_watch

[6] OECD (2015), Hospital discharge rates (indicator). doi: 10.1787/5880c955-en (Accessed on 08 June 2015), OECD (2013), "Hospital discharges", in Health at a Glance 2013: OECD Indicators, OECD Publishing. http://dx.doi.org/10.1787/health_glance-2013-35-en

publishes a monthly acute services scorecard[7,8]. The trend for emergency re-admission rates was downward for 2014, decreasing from 11% at the start of the year to 9% in December 2014. The surgical re-admission rate remained at 2.0% in December 2014. Results for January 2015 outlines the target re-admission rates for medical patients (i.e. % of emergency readmissions within 28 days) as <9.6%, however January 2015 statistics were running at 10.5%, variance= -9%), whilst the target surgical patient readmission rates (i.e. % of surgical readmissions within 30 days) were <3%, however January 2015 statistics were running at 2%, variance = 33%. The 2014 target for length of stay across hospitals was 5.6; results for November and December 2015 were 5.2 and 5.3 days respectably. The monthly figures (for 2014) for the numbers of individuals who were in hospital after being clinically discharged (i.e. delayed discharges ranged from 604 (February 2014) to 835 (November 2014) (HSE 2014).

The number of beds within the acute care system gives an indication of the resource available to support the acute care of individuals. Data from the OECD, Health at a Glance (2014)[9] reveals that the European average number of publically funded beds per 1000 population is quoted at 5.2. However, the data also shows that Ireland is below the EU average in the number of hospital beds per 1,000 population (Ireland <4 against EU rate 5.2) with a bed occupancy rate of 93%.

Thus determining the future demand for acute beds is a complex process. Account must be taken of changes in population size, age profile, lifestyle factors and their impact on health, the burden of the increasing prevalence of chronic diseases; availability of health care resources and healthcare/digital innovation.   The Central Statistics Office (CSO) projects that the Irish population will increase by 19% to over 5 million citizens by 2020 with a concurrent increase in the proportion of citizens in the over 65 age range. BDO (2014) in a publication titled Health's Ageing Crisis: Time For

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[7] HSE (2014) December 2014, Health Service Performance assurance Report. Dublin: HSE
[8] HSE (2015) January 2015, Health Service Performance assurance Report. Dublin: HSE
[9] Data for 2012, taken from http://www.keepeek.com/Digital-Asset-Management/oecd/social-issues-migration-health/health-at-a-glance-europe-2014_health_glance_eur-2014-en#page72
Note this data relates to publically funded beds.

Action A Future Strategy for Ireland's Long-Term Residential Care Sector noted that as a "standard and accepted international sector benchmark, healthcare planners plan on the basis that 4.5% of the population aged 65+ will have a requirement for long-term residential care---- However, a new and emerging trend in Ireland's demographic profile is the substantial increase that is taking place in our population over 85 years. This group is forecast to increase by 46% in the same period" (p.3).

Over a third of Irish persons over 50s (36%) are obese and a further 43% are overweight (TILDA 2014). The Irish Longitudinal Study on Ageing also suggests that higher use of healthcare services is associated with the presence of 3 or more chronic diseases and poor self-rated health (TILDA 2013). The WHO (2015) predicts that 89% of Irish men and 85% of Irish women will be obese by 2030. Whilst other research confirms that the highest proportion of a healthcare budget is generally spent on hypertension, heart disease, cancer, diabetes, pulmonary conditions, trauma and mental health disorders and individuals aged between 65 and 74 years old are almost three times more likely than average to be in an acute hospital bed (HSE 2007). In contrast TILDA (2014) reports also reveal that utilisation of community health and social care services by the older population remains low despite the high numbers of study participants with multiple commodities, obesity and polypharmacy. The HSE (2007) Acute Hospital Bed Capacity Review noted that there would be an estimated 60% increase in the demand for acute hospital services from 2007 to over 1.6 million patient episodes in 2020. Based on health care delivery models in 2007, the number of public patient hospital beds that Ireland will require in 2020 would be 19,822. However if the shift of focus to primary care evolves with associated increased community health and social care capacity then looking forward the number of public patient hospital beds Ireland is going to require in 2020 would be reduced significantly (i.e. 8,834 beds) (HSE 2007).

2.4.4 Discharge processes within HSE

Integrated discharge planning relates to "the activities that facilitate a service user's movement from one health care setting to another, or to home. It is a multi-disciplinary process involving physicians, nurses, social workers, and other health and social care professionals; its goal is to enhance continuity of care. It begins before or on admission" (HSE, 2004, p.62).

The Health Information and Quality Authority (2013) noted the importance of "accurate, valid, reliable, timely, relevant, legible and complete" information being transmitted as part of the discharge process when they published national standards for patient discharge summary information. Such a summary document should be a "live document" which is continually updated throughout the patient's journey through the hospital system thus leading to improvements in the efficiency of the discharge process.

Subsequently, based upon national and targeted consultation with key stakeholders the National Integrated Care Advisory Group under the auspices of the Quality and Patient Safety Division published The National Integrated Care Guidance (HSE, 2014). The guidance document outlines a nine step process which is designed to support healthcare providers to improve their discharge and transfer processes from the acute hospital setting back into the community. Successful implementation of the guidance requires corporate ownership of the process and associated indicators for implementation of the nine steps of the process, local leadership for implementation and a shared understanding of the discharge planning processes across all levels of the organisation. Given the complexity of many of the steps involved; informatics support with automation (in terms of some of the processes) is critical for the successful implementation of the process. In addition tracking the implementation of the discharge guidance is critical to its success as an independent review found that discharge planning was not the norm in Irish hospitals, with only 40% of the surveyed inpatients having any form of discharge plan and 17% an expected discharge date (HSE 2007). This

Care needs to be taken in the interpretation of the findings of the papers included from the grey literature (Irish context) as these papers described studies which used descriptive (often retrospective) approaches to the collection of data, small sample sizes and the majority related to the review of practices in the context of single institutions.

lack of formal process unnecessarily extends the stay for some Irish hospital inpatients.

The National Integrated Care Guidance (HSE 2014) also differentiates between simple and complex discharges. Simple discharges relate the discharge of a service user from a hospital to their home with "simple ongoing healthcare needs which can be met without complex planning and service delivery"; 80% of hospital discharges fall into this category (HSE, 2014 p.64). In contrast a complex discharge relates to service users who are either "discharged home or to a carer's home, or to intermediate care, or to a nursing or residential care home, and who have complex ongoing health and social care needs which require detailed assessment, planning, and delivery by the multi-professional team and multi-agency working, and whose length of stay in hospital is more difficult to predict" (p.61).

2.4.5 Empirical perspectives on delayed discharge and admission avoidance in the Irish context

No RCTs which specifically addressed the issues of admission avoidance or delayed discharge in the Irish context were sourced. Sixteen empirical papers, six reports and two guidance documents were sourced through a search of the Grey literature and included in part 2 of the review. The sixteen empirical papers included: retrospective review of notes/data post service/intervention (n=6); prospective assessment of an intervention (n=6); survey design (n=2) and modelling of data (n=1).

Papers related to an evaluation of home care packages (DOH 2009); access to diagnostics in primary care(O' Riordan, Doran, Collins 2015); review of

community intervention teams (Donohue et al 2007); review of the cost-effectiveness of HIVA (home intravenous antibiotic therapy) in patients with acute respiratory infections (McDonnell et al 2011); bed utilisation review (Healy, Cronin, 2011); review of pre-hospital emergency care services (HIQA 2014); evaluating policy interventions for delayed discharge: a system dynamics approach (Rashwan, Ragab, Abo-Hamad, Arisha 2013); review of acute cancer beds (Evans et al 2012); report on ambulatory care sensitive conditions (ACSCs) in Ireland (Sheridan, Howell and Bedford (2012), review of emergency clinics, admission rates, follow-up ED review for selected paediatric patients (Rai et al. 2014); day of surgery admission (Kulasegarah et al 2008,Concannon et al. 2013); specialty-specific admission (Slattery and Harewood 2012); assessment of service delays and impact on bed utilisation (Conway and Murray 2011); efficiency of computerised discharge letters (Keane et al 2014) and the impact of relatives of elderly patients on the discharge process (Gallagher et al. 2008). Care needs to be taken in the interpretation of the findings of the papers included from the grey literature (Irish context) as these papers described studies which used descriptive (often retrospective) approaches to the collection of data, small sample sizes and the majority related to the review of practices in the context of single institutions.

A number of papers cited definitions pertinent to this report, which are outlined in Table 4 over.

Table 4; Definition of terms taken from the review of grey literature

Term	Source of definition (author, year)	Definition	Key components of definition
Admission	Cummings et al.,(2010)	The processes, tools and techniques by which an episode of care is formally commenced by a health professional or health provider organisation involving their acceptance of responsibility for a patient and/or their treatment and care.	Decision made by health professionals to accept responsibility for patient treatment or care
Discharge	HSE (2013)	Discharge "is the outcome of the decision made by the patient's consultant/medical team when the patient is deemed fit to leave the hospital/healthcare organisation. It also refers to the event of the patient leaving the hospital/healthcare organisation" p. 4.	Decision made by the patient's consultant/ medical team Patient is deemed fit to leave The event of the patient leaving
Discharge	OECD (2005)	Hospital discharge is defined as the release of a patient who has stayed at least one night in hospital. It includes deaths in hospital following inpatient care. Same-day discharges are usually excluded.	Release of patient Had stayed at least one night in hospital
Discharge	Cummings et al.,(2010)	The processes, tools and techniques by which an episode of treatment and/or care to a patient is formally concluded by a health professional, health provider organisation or individual.	Health professionals formally conclude an episode of treatment
Delayed Discharge	Wael Rashwan Mohamed Ragab Waleed Abo-Hamad Amr Arisha (2013)	Delayed discharge is defined as patients who have completed the acute phase of their care and are medically fit for discharge (p.2).	Acute care complete, medically fit for discharge
Delayed discharge	DOH (2009)	Delayed discharge "refers to a patient who is delayed in an acute hospital despite being medically fit to be discharged" p. 3.	Acute care complete, medically fit for discharge
Simple discharge	HSE (2014)	Simple discharge relates "to 80% of service users discharged from hospital to their own home that have simple ongoing healthcare needs which can be met without complex planning and service delivery"(p. 64).	
Complex discharge	HSE (2014)	Complex discharge "relates to service users who will be discharged home or to a carer's home, or to intermediate care, or to a nursing or residential care home, and who have complex ongoing health and social care needs which require detailed assessment, planning, and delivery by the multi-professional team and multi-agency working, and whose length of stay in hospital is more difficult to predict" (p. 61).	
Referral	Cummings et al., (2010)	The processes, tools and techniques by which a patient (and the provision of all or part of their care) is transferred between health professionals and health provider organisations to facilitate access to services and/or advice that the referring source is unable or unwilling to provide.	Patient care is transferred between health professionals and health provider organisations

Models or interventions which were subject to empirical review in the Irish context included: a paediatric emergency review clinic (Rai et al., 2014); a pre-acute care flow policy intervention coupled with a post-acute flow policy intervention (Rashwan et al 2013); pre-hospital emergency services (HIQA 2014); pre-operative assessment clinic on day of surgical admission and ring-fencing of elective and emergency surgical beds (Concannon et al. 2013); appropriateness evaluation protocol for assessing appropriateness of admitting a patient (Evans et al, 2012); computerised system for generating discharge letters (Keane et al 2014); Home care packages (HCPs) (DOH 2009); Community Intervention Teams (Donohue et al, 2007).

2.4.6. Admission avoidance

Admission avoidance was addressed through a number of papers either by keeping patients out of the hospital in the first instance or by providing alternate pathways for patients once they presented in the ED. A pre-acute care flow policy intervention was modelled by Rashwan et al (2013) which modelled the impact of increased accessibility of GPs to community services with the aim of avoiding unnecessary admissions to the acute system. Modelling demonstrated a combination of flow strategies that reduced the need for hospitalization.

A review of pre-hospital emergency care by HIQA (2014) was critical of the policy which requires that ambulance personal transport all of their patients to the hospital emergency department. The review highlighted the need for alternate pathways such as 'hear and treat' and direct access to alternative care pathways e.g. local injuries units in smaller hospitals, GPs where appropriate. A postal survey of GPs revealed a disparity between the access of GPs to diagnostics for their public versus private patients (O' Riordan et al. 2015). The researchers suggest that patients could also be kept out of hospital or fast tracked to the appropriate service if GPs had increased access to diagnostics for their public patients.

In summary, the overarching recommendations (from the review of grey literature) relating to admission avoidance included:

The acute and community sector to jointly determine the volume and types (i.e. short-term and long-term) of interventions which keep patients at home (e.g. home intravenous antibiotic therapy; ambulatory care services) based upon robust individualised needs based analysis. Special consideration should be given to the supportive care needs of the "frail" elderly.

Utilise community intervention teams to their capacity.

Reduce diagnostic delay by increasing access to diagnostics for GPs

Review the current model of ambulance/paramedic care provided moving away from admission to hospital emergency department in all cases.

Review admissions and take lessons learnt regarding inappropriate admissions.

Improve access and timeliness of transfer to long term care settings.

Implement stock and flow interventions across the system from admission avoidance and optimise the integration between acute care setting and community/primary care.

A retrospective review of data (1997-2008 in one large Dublin hospital) revealed that access to public long terms care facilities was variable as patients discharged to public versus private facilities waited longer (difference in median = 18 days, p = 0.006) (McCarroll et al 2013). A post-acute care flow policy intervention was modelled by Rashwan et al (2013) which concerned access to long term care facilities such as nursing homes. Increasing the discharge rate from long term care facilities by making improvements in homecare packages was one of the suggested solutions. Common reasons for delayed discharge include awaiting long term accommodation and the absence of home care supports (Gallagher et al. 2008).

Support to keep patients in their own home e.g. administration of home intravenous antibiotic therapy (McDonnell et al., 2011); home care packages (DOH, 2009); community intervention teams (Donohue et al 2007) are potentially cost-effective when compared to in-hospital care. However the absence of national guidelines, regional variation in availability, delivery approaches and governance is a concern for such interventions (DOH, 2009). The acute sector and primary/community care sector should determine jointly the volume and types (i.e. short-term and long-term) of such interventions that are required locally, regionally and nationally.

In summary the overarching recommendations (from the review of grey literature) relating to avoidance of delayed discharge included:

Implement the nine steps of the discharge guidance (HSE, 2014); ensure corporate ownership of the process and associated indicators for implementation; local leadership for implementation and a shared understanding of the discharge planning processes across all levels of the health care system.

Monitor discharge data; explore the variation in data; facilitate the identification of trends and seek to reduce hospitalisations.

Optimise flow through the acute service by monitoring delay times at each juncture (e.g. awaiting diagnostics) and address any points of prolonged delay.

Ring fence beds to supports day of surgery admissions, enabling streamlining of services and efficient utilisation of resources.

Introduce a centralised preoperative assessment clinic (however the decision as to suitability for day of surgery admissions should be made by the surgical teams involved).

Introduce speciality specific admissions, continue to review efficacy of same.

Implement stock and flow interventions across the system and optimise the integration between acute care setting and community/primary care to prevent delayed discharges.

Consider how advances in digital technology and informatics can automatize and increase efficiencies across the system.

Identification of patients most at risk of admission to the acute care system and the targeted focusing of resources was a recurrent theme identified. For instance particular attention needs to be given to the supportive care needs of "frail patients" i.e. those with an array of medical conditions, complex needs and amplified burden of disease as these patients usually require an extended stay in the acute system once admitted. Likewise ambulatory care sensitive conditions (ACSCs) are defined as those conditions for which the provision of timely and effective outpatient care can help to reduce the risks of hospitalisation by either preventing onset of an illness or condition, controlling an episodic illness or condition, or managing a chronic disease or condition (Billings et al 1993 cited within Sheridan et al, 2012). Sheridan et al (2012) noted that there was considerable variation in the discharge rates for the top-10 ACSCs in Ireland for the years 2005–2008. Thus, the importance of exploring the variation in Irish data to facilitate the identification of trends and seek to reduce hospitalisations and associated costs for ACSCs particularly in relation to diabetes complications. Likewise, Evans et al (2012) in a review of admissions to cancer services and the appropriateness of hospital usage, suggested that ambulatory care

capacity should be reviewed and new models of care developed to keep some cancer patients out of the acute services.

In summary, Rashwan et al (2013) note that a combination of capacity (stock) expansion policies, flow intervention policies and the creation of new pathways is required to meet the needs of the service and address the issue of admission avoidance and delayed discharge. Integration and co-ordination across the primary and secondary care interface is needed in relation to:

i. The delivery of hospital/care at home interventions;

ii. Access to diagnostics;

iii. Jointly agreed referral pathways;

iv. Early identification of patients that need services; and access to clinical pathways based on a needs stratification;

v. The number of and type of community long term support interventions and long term care.

2.4.7 Delayed Discharge

The introduction of an emergency follow-up review clinic for carefully selected children who had recently attended an ED was shown to reduce admissions and was deemed to be cost-effective (Rai et al., 2014). Mean length of stay was lower with specialty specific admissions (Slattery et al., 2012). Similarly a pre-operative assessment clinic on the day of surgical admission, ring-fencing of elective and emergency surgical beds, multidisciplinary assessment was associated with cost savings (Concannon et al., 2013). In contrast, Kulasegarah et al., 2008) noted that the Irish Hospital system has embraced the concept of day of surgery admission without evaluating the risk to patients e.g. inadequate preoperative assessment of patients, medico legal concerns, possibility of late cancellations leading to inefficient usage of resources.

Waiting for services or slow flow through the acute care system leads to longer length of stays. Median delays of 2 and 3 days for an MRI and colonoscopy, a delay of 3 days for a Holter monitor report, and 9 days for an occupational therapy referral with a median wait for consults of 1 day across a number of services were observed in one hospital (Conway, 2011).

Keane et al. (2014) audited computerised discharge letters in one setting and noted the importance of secure computerised transfer of information between hospital and GP in the discharge of patients.

2.4.8 Reports published in the Irish context pertaining to addressing the issue of delayed discharge or admission avoidance

Six reports (HIQA, 2014; HIQA 2012; HSE 2012; HSE 2009; HSE 2007,; Pike, Mongan on behalf of the HRB) and two guidance documents (HSE, 2013 and HSE 2014) were included as their primary focus related to either "delayed discharge" or "admission avoidance". Other reports (e.g. which relate to the implementation of each of the clinical care programmes, whilst deemed important in terms of their contribution to the overall integration of the health system and promotion of the health & wellbeing of society) had a secondary focus on admission avoidance; these were not included.

Whilst recommendations were common across reports, any proposed changes require careful analysis, consideration of contextual factors (e.g. the goals of the intervention/service, the needs of service users, other stakeholders involved, integration with existing services), existing provision and available resources. The importance of baseline assessment(s), monitoring impact of changes and continual evaluation as quality improvement marker(s) was reiterated in a number of reports.

The HSE (2007) in a review of acute hospital bed capacity assessed bed utilisation across the eight hospital networks (37 hospitals) using the Appropriateness Evaluation Protocol (AEP) between November 2006 and

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February 2007 (random sample n= 3,035 patients). Nationally 13% of patients could potentially have been treated outside an acute setting i.e. community level access to assessment /diagnostics without acute admission; access to a non-acute bed with therapy support e.g. physiotherapy; home-based patient care (e.g. GP support, therapy, specialist nursing, community nursing and home care packages). PA Consulting (HSE, 2007) subsequently outlined the idea of a "Preferred Health system characterised by:

- An emphasis on illness prevention, early detection and early

  Intervention;

- The nature, capacity and availability of responsive community based services is configured to avoid unnecessary admissions to acute care and to facilitate earlier discharge and a return to independence;

- Internal hospital processes are optimised to support high quality care, reduce patient delay and maximise use of the bed capacity.

- A fully integrated approach across all directorates of the health system;

- Greater involvement of patients in their own care of minor, acute and long term conditions – with professionals providing a supportive, advisory, educational and skills training role" (p.21).

HIQA (2012) in an investigation into "the quality, safety and governance of the care" provided by the Adelaide and Meath Hospital for patients who require acute admission reported that "patients attending the majority of EDs in Ireland experienced waiting times of greater than six hours, with the longest waiting times of up to 115 hours for discharge and 137 hours for admission"p.9. The report included recommendations pertaining to patient admission and discharge pathway in particular citing the need for active

individualised patient discharge planning; incorporating an estimated date of discharge from hospital. In addition the report authors recommended that all hospitals consider implementing nurse-led patient discharge processes.

Overcrowding within EDs, delayed discharges and periodic escalation of the hospital admission capacity have triggered various task forces to review the issues (Emergency Department Taskforce: HSE, 2006; HSE, 2015). The recommendations of the ED Task Force, 2015 were centred on three domains:

- Optimising existing capacity (optimise the existing capacity to manage activity levels;
- Capability (gaining efficiencies in patient flow and processes;
- Control (accountability, oversight, measurement) (p.5).

Performance indicators are cited as a 12 hour wait time (HSE 2006) to an agreed national target of 95% compliance with a 6-hour total wait time from arrival in ED to discharge or admission, although an interim of 9 hours was cited for 2015 (HSE 2015).

A number of strategy documents have been launched with programmatic focus e.g. The National Emergency Medicine Programme's strategy document (HSE 2012)). National Key Performance Indicators (KPIs) are cited which also include a "6-hour standard for ED attendances so that 95% of patients are admitted or discharged within six hours of attending an ED" (HSE, 2012, p.3). To assist in dealing with "delayed discharge" a number of pertinent recommendations were noted. The strategy speaks to the need to develop a National Emergency Care System comprising networks of EDs fully integrated with pre-hospital and hospital-based services. Structural reform e.g. clinical decision units, acute medical units have been introduced. The need for closer collaboration and integration of Geriatric Care in particular at the hospital/ community/public health interfaces were noted.   To facilitate earlier diagnosis specific early detection and screening tools for rapid

Consider the changes required in terms of three levels of integration across the health services:

Macro - across the full spectrum of services to the whole population.

Meso- for a particular group of people with the same disease or condition (example care for elderly people, disease management programmes and managed clinical networks).

Micro- individual service users through means such as care co-ordination, care planning or case management

(Pike, Mongan on behalf of the

detection of 'at risk' older patients are required and emergency diagnostics should be routinely available from 08:00 to 20:00 hrs, seven days a week. Electronic transfer and sharing of patient care data. Standard discharge instructions (with customisation as required) can be a vehicle for transfer of information. Adequate resources should be provided to ensure the needs of patients (e.g. requiring nutrition intervention) are met in an appropriate setting following discharge from the ED.

In addition, the Elective Surgery Programme aims to improve the patient journey along the elective surgical pathway by delivering on access, quality and cost. The work of the Surgical and Acute Medicine Programmes has highlighted the need to target length of stay for common surgical procedures to optimise the available capacity; the target for length of stay for medical patients, adjusted to exclude inpatients with over 30 days stay is 4.2 days[10].

Integration across services was seen as critical in terms of reducing hospital admissions, reduction of duplication and in leading to improvement in the patient experience (Pike, Mongan on behalf of the HRB, 2014).

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[10] Data cited in DOH 2015

Three levels of integration of service delivery are noted:

1) Macro (whole population perspective, across the services);
2) Meso (for a sub-group of the population e.g. persons with the same characteristics, disease or condition (example care for elderly people, disease management programmes and managed clinical networks);
3) Micro (at the level of the individual through means such as care co-ordination, care planning or case management).

Given the potential demand for services a robust understanding of patients' needs is required. The identification of patients who have a "NO CARE REQUIREMENT" where there is an emphasis on illness, prevention, early detection and early intervention, to "SELF CARE" where patients who are involved in their own care of minor, acute and long term conditions with professional advice to "PRIMARY/COMMUNITY CARE" supportive care and education thus avoiding unnecessary admissions to and/or to facilitate earlier discharge and a return to independence, to "ACUTE CARE" which   is optimised to support high quality care for patients with acute complex unmet health care needs (HSE 2007, p.103).

Integrative processes require coordination at a number of levels: systemic, organisational, clinical/service,   informational, normative and financial. The HSE (2014) launched "Integrated Care Guidance: A practical guide to discharge and transfer from hospital" a nine step process to guide the effective discharge planning and transfer of patients from the acute hospital setting. However, the reliance of some of the processes on paper based communications may lead to delayed communication of information between service providers.

Summary

The key focus of the papers reviewed related to strategies to optimise efficiencies, which has been much of the focus in the recent past. Much has been done in this area. It is clear that more needs to be done in terms of the overall system to integrate and plan health and social care across the acute and community care boundaries. Stock and flow interventions are required across the system with integration between acute care setting and community/primary care to both avoid admissions and to prevent delayed discharges. Models of disease management and health promotion interventions which keep individuals out of the hospital are critical to the management of the population and disease demographics outlined. At the individual level resources need to be targeted at those who need them the most.

Chapter 3: Discussion

Introduction

The purpose of this review was to identify the models, systems, policies or interventions that are deemed successful and supportive of 'good practice' in preventing or managing delayed discharge and/or hospital (re)admission avoidance. Following a systematic search and screening of the empirical literature, 85 papers of high level evidence types i.e. one meta review of meta-analyses, meta-review, meta-analyses, systematic reviews and a number of recent randomised controlled trials that had not been included in the previous reviews. In addition, twenty-three documents were included from the systematic review of the grey literature.

Although most papers addressed the main questions of the review in relation to the interventions examined, the aim, components, sample and professionals involved, there was considerable variation in the extent to which these were addressed. Few addressed enablers, barriers or resource issues. In addition we were seeking models or interventions to tackle two different but related concepts i.e. delayed discharge and (re)admission avoidance. Therefore our analysis produced evidence of considerable heterogeneity across empirical reviews and papers in relation to the interventions examined. This coupled with significant variation in the descriptions/definitions of outcomes measured led to a difficulty in the synthesis of evidence in providing a definitive conclusion. In contrast, it was evident that the predominant concerns within recent Irish reports and research were delayed discharge and (re) admission avoidance. The concept of delayed discharge was examined and discussed in a number of policy and guidance documents relating to the Irish health services and in six studies that were not RCT's or systematic reviews. Definitions of terms pertinent to this report are presented in Tables 3 and 4. Similarities can be found between those gleaned from the empirical and grey literature. On

balance this report provides empirical evidence of statistical significance that care interventions transcending hospital and community and encompassing elements of hospital and community based care reduced bed days, length of hospital stay and (re)admission to hospital. The results reported here are reflective of the international variations in interventions and systems of care, however results are mainly observed in adult populations with many studies specifically conducted with older adults. In addition, the interventions consisted of numerous components of various duration and intensity and involved an array of health and social care professionals.

It must be noted however that many of the interventions included were focused on specific health conditions, e.g. heart failure or were disease specific (COPD) and concentrated on subsets of patients. Therefore the applicability of results in some instances to the general population of patients affected by readmission to hospital i.e. older people with co-morbidities might be questioned. In addition, patterns of outcome were not consistent as a result of different primary outcome measures used e.g. hospital readmission rate and unplanned admission, (to hospital or ED), thus making comparisons difficult. The time span for measurement was also diverse e.g. ED visits within 30 days of discharge; 84 day readmissions; hospitalisation within 12 months. Nevertheless the strength of evidence points to groupings of intervention, systems or services with a number of commonalities deemed successful in relation to outcomes such as reduction in readmission in its broadest context.

These interventions mainly reflected the following components which provide the structure for discussion:

1. Integration between care providers with services that span hospital activities, post-discharge facilities and home based services.

2. Multidisciplinary / interdisciplinary approaches to assessment and provision of services.

3. Personalised / Individualised services related to assessment of need.

4. Hospital initiated discharge support and specialist follow-up.

3.1 Integrated systems that span hospital activities, post-discharge facilities and home based services.

A large body of evidence including a meta-review of clinical interventions (Benbasset & Taragin 2013) suggests a generally positive picture of the effectiveness of integrated systems that span acute and community settings. Most empirical papers included in this review related to transitional care interventions. Although some studies focused on specific types of transitional care intervention e.g. medication reconciliation and review; hospital based discharge planning by nurses, the majority examined interventions that included both hospital based activities and home based services. Evidence exists of the effect of transitional care interventions in speeding up discharge and reducing re-admissions. These interventions emphasise in-hospital assessments before discharge; care co-ordination between hospital and post-discharge service providers; involve in-hospital liaison nursing or other care co-ordination specialists and post discharge assessment. Although evidence suggests that transitional care interventions for older patients with chronic disease were generally effective at reducing readmission and length of stay, greater benefits were found over longer follow-up periods (Verhaegh et al., 2014). Likewise the effectiveness of transitional care may differ with different chronic conditions e.g. in older patients with COPD re-hospitalisations were reduced but mortality increased in the intervention groups (Prieto-Centurion et al., 2013) and hospital-initiated support for stroke patients reduced length of stay but led to no reduction in rehospitalisation rates (Prvu-Bettger et al. 2012).

Intermediate care at a community hospital is identified in transitional care interventions as an alternative to prolonged general hospital care, these interventions produced important differences in the number of patients readmitted after discharge. However, the outcome variables were often related to number of readmissions for the same disease, which makes it difficult to compare these data with other studies. In addition there is evidence from one trial that intermediate care did not significantly reduced demand for nursing home care and home care services. Primary care programmes alone showed mixed results but this is likely as a result of the variability in health conditions. In transitional care interventions that provide services across the interface of hospital and community there is strong evidence that care co-ordination between hospital and post-discharge service providers results in positive outcomes including a reduction in readmission (Verhaegh *et al.*, 2014; Allen et al., 2014; Guerin et al., 2013; Rennke et al., 2013; Naylor et al., 2011; Linertova et al., 2010; Englander et al., 2014; Faris et al., 2014; Brotons et al., 2009). This care co-ordination includes effective communication between hospital and post-discharge service providers via use of health information records (Naylor et al. 2011).

The provision of information and communication transfer from acute to primary care through the use of discharge interventions with electronic health records has also resulted in some positive impact on readmission (Motamedi et al 2011). In Ireland the Health Information and Quality Authority (2013) noted the importance of "accurate, valid, reliable, timely, relevant, legible and complete" information being transmitted as part of the discharge process. The concept was supported by The National Integrated Care Guidance (HSE, 2014). On the whole, empirical evidence from this review suggests that interventions supporting integration of services and communication across acute and community settings have positive effects on (re) admission. This evidence is supportive of recent initiatives and recommendations in an Irish context sourced from the grey literature e.g. Integration across services; seen as critical in terms of reducing hospital

admissions, reduction of duplication and in leading to improvement in the patient experience (Pike, Mongan on behalf of the HRB, 2014). Recommendations relating to optimising the integration between acute care setting and community/primary care (Rai et al. (2014). Centralising the process of transfer information and use of secure computerised transfer of information between hospital and GP (Gallagher et al 2008; McCarroll et al. 2013) and the use of Ambulatory care services (Evans et al. 2013).

3.2 Multidisciplinary/interdisciplinary approaches to assessment and provision of services

Convincing evidence from this review points to the positive impact of multifaceted specialized multidisciplinary team (MDT) approaches to assessment, diagnosis and care on length of stay in hospital and re admission. In-hospital multidisciplinary assessments and discharge planning were components of a number of the more successful transitional care interventions in reducing rehospitalisation rates. There were mixed results in relation to post discharge interventions involving various teams of allied health professionals commencing in the hospital prior to discharge and/or followed to the home i.e. early supported discharge, case management. Nevertheless there is some evidence of positive effects on length of stay in hospital and readmission to ED particularly in specific conditions such as COPD. Core components of successful ambulatory care interventions were interdisciplinary teams/multidisciplinary care; high intensity rapid assessment and diagnosis with medication review. Notably results show that these interventions significantly shortened length of stay in hospital and patients had less likelihood of functional decline (Fox et al, 2013). Rapid appropriate assessment and intensive case management involving specialist multi-disciplinary clinics were shown to significantly reduce unplanned readmissions over a 12 month period (Thomas et al, 2013). However there were mixed

results in relation to readmission. There is evidence that case management approaches in primary care with co-ordinated post-discharge assessments involving a multitude of health and social care professional with geriatric expertise significantly reduced length of stay in hospital and admission to ED. However again there are mixed reports regarding the effectiveness of case management in relation to reductions in unplanned admissions or (re)admission to hospital.

Evidence suggests that case management is not significant in short term but was significantly more effective at reducing hospitalisations and emergency department admissions (Reilly et al ,2010) and works best as part of a wider programme of care, where multiple strategies are employed to integrate care (Hutley et al. 2010). MDTs of health and social care professionals providing home rehabilitation and 'wrap-around' community rehabilitation services in primary care contexts improved outcomes such as quality of life and patient satisfaction, including children (Parab et al, 2013) although there are mixed results in relation to readmission(Jeppesen et al, 2012, Utens et al, 2012, Aquado et al. 2010). However there was also evidence of difficulty gaining access to professionals with appropriate levels of acute assessment skills (Scott et al. 2009; Crotty et al. 2008).

The involvement of multi –professional teams has been identified as important in the context of patients with complex ongoing health and social care needs which require detailed assessment, planning, and delivery (HSE, 2014). It is also of note that a number of reports in an Irish context have identified the importance of baseline assessment(s), closer collaboration and integration of Geriatric Care in particular at the hospital/ community/public health interfaces (HSE 2012) and electronic transfer and sharing of patient care data.

3.3 Personalised/Individualised services related to need

It is clear from our review that those interventions with positive impact on readmission had components that were focused on individualised assessment, care and services. Transitional care interventions found to have positive effect in reducing readmission included patient individual medication reconciliation and review; self-management education, counselling, and training programmes. Post discharge interventions effective in reducing readmission included a combination of patient education, telephone/internet contact, individual home visits, individualised care planning, case management, discharge plans and institution of self-management principles. Likewise, in primary care successful interventions in relation to readmission were reported to be patient centred and included components such as coaching, counselling on disease state/lifestyle/medication focused on the individual patients' needs.

Ambulatory care interventions successful in reducing admission to hospital included individualised Geriatrician or Nurse Led assessment. Likewise hospital at home and home based interventions that were successful in reducing hospitalisations and emergency department admissions reported a multiplicity of patient specific components such as individualised care packages including (information and patient specific education, carer education, emotional and therapeutic support, outreach nursing visits and social work referrals). The studies included populations with multiple co-morbidities such as heart failure/ diabetes, dementia, COPD and medical conditions (gastroenterology, pulmonology and cardiology) therefore results in relation to effect on readmission were mixed.

3.4 Hospital initiated discharge support and specialist follow-up

The interventions with positive effects on readmission included hospital initiated support and dedicated personnel to manage and co-ordinate the transition of patients from hospital to discharge destination and follow-up to

community care or home. A number of transitional care interventions described components such as 'hospital based nurse led discharge planning' and 'bridging interventions' with a dedicated 'transition provider'; 'Transition Navigator'; 'transitional nurse' who provided coaching and education and included home visits for highest risk patients. Similar to the HSE guidance on discharge (HSE 2014) a differentiation was found between simple and complex cases in a number of studies. For adults with complex health needs pre discharge interventions included components such as Specialist nurses and Advanced-Practice registered Nurses as clinical managers or leaders. Follow up from hospital to community / primary care was a core component of all successful systems/ interventions. The type of follow-up was varied and involved multi-component interventions incorporating strategies that included patients and caregivers, health and social care professionals, individualized care planning, educational and behavioural strategies, clinical management and home-visiting programs. These findings concur with the recent renewed focus of Irish health strategy (HSE 2014). Evidence exists that pre-discharge home assessment visits and hospital-initiated / nurse-initiated discharge support reduce time to discharge, however there are mixed results in relation to re admission. Positive results on the number of hospital visits were observed in a Geriatrician–led outreach service that included home visits within 96 hours post discharge, comprehensive geriatric assessment and development of a care plan. More research is necessary in different health systems to provide evidence to support this service. The involvement of pharmacists in medication reconciliation and review in hospital and follow-up in the community appears to be a promising approach although more research is necessary to support these interventions. On the whole, our review found that Interventions focused on older adult populations incorporating geriatric management supported by post discharge home care were more likely to reduce or prevent hospital readmissions. This finding is in line with the recommendations of The National Emergency Medicine Programme's strategy document (HSE

2012) where closer collaboration and integration of Geriatric Care in particular at the hospital/ community/public health interfaces were noted.

Post discharge follow–up using technology or electronic means is evident throughout the review however results are inconclusive. No significant effect on hospitalisation or readmission is reported from the use of follow –up phone calls alone. However a significant reduction in readmission resulted from a daily home videophone or telephone monitoring system in the US. This system was more comprehensive and involved the transmission of physiologic measurements, self-care instruction, and symptom management (Naylor et al, 2011). In addition, evidence of the positive effects of electronic home monitoring systems on patient outcomes particular to hospitalisation and or (re) admission to hospital is confined mainly to studies relating to specific conditions i.e. support for dialysis patients during transition from hospital to home or home monitoring for patients with heart failure. Researchers recommend that additional trials of the technology for home monitoring are needed with consideration of patient information systems and the health service model of the countries included. Similarly, disease management programs and outreach interventions with respiratory health care workers for specific health conditions e.g. COPD across a variety of health care delivery settings reduced hospitalisations and emergency department visits.

3.5 Enablers and Barriers

In response to the review questions relating to barriers or enablers (Q 12, Q 13), and resource implications (Q 14), the overall evidence was notably scant and quite heterogeneous. In some instances evidence could not be extracted because this was not reported.

3.5.1 Enablers

One enabler which was identified in the analysis of medical and clinical interventions was the provision of subsidized transport for patients to attend

rehabilitation programmes (Davidson *et al.,* 2010). The cost-effectiveness of using volunteers to deliver healthcare information could also be considered an enabler (Sales *et al.,* 2014). In relation to pre-discharge interventions the practicality of integrating the intervention into routine practice was found to be an enabler in two papers (Lin et al. 2014; Wong et al. 2005). A team approach was cited as an enabler to medication discharge planning (Gillespie et al. 2009).

With respect to transitional care interventions discharge planning and transitional care have been found to be enablers of good functioning of the health system and associated with lower costs (Lainscak et al 2013). Enablers of home based interventions included social factors, such as family support (Chow et al 2008). One RCT in a systematic review reported that case management reduced the total cost of services at 12 months and expenditure in pooled case management groups was significantly lower than in the control groups for three years (Reilly et al. 2015). Enablers were not reported in the case of hospital at home interventions for adults. However researchers suggested that a perception that children receiving the 'Hospital at Home' service recovered more quickly in their own environment was an enabler, as there was less social disruption and financial burden for the family (Parab et al. 2013). According to O'Connor et al, (2014), enablers of home based interventions were those that participate in quality improvement such as home health agencies and those with greater surveillance of deteriorations (Wong et al. 2012). Evidence on enablers was generally not reported in relation to tele- monitoring with the exception of one study that reported home monitoring easy to use and acceptable to patients (Martinez et al. 2006)

3.5.2 Barriers

A barrier to the implementation of clinical / medical interventions was identified as patients' reluctance to participate in educational and

rehabilitation programmes (Davidson *et al.*, 2010; Greening *et al.,* 2014). Same-day discharge intervention were deemed to have a number of barriers to implementation according to Abdelaai *et al* (2013). These included patient safety concerns, insufficient time for patient education, cost disincentive to change practice, and patient reluctance to accept. A barrier to implementing transitional care interventions included the identification of the most appropriate member of the MDT to implement the intervention (Crocker et al 2012). In relation to assessment / ambulatory interventions, barriers to implementation were for example a risk of clients leaving against medical advice (Doran et al, 2013). Ogilvie et al, (2005) suggested that children's use of emergency hospital services may be affected by social factors such as deprivation and proximity to hospital. Another barrier identified was a difficulty recruiting or access onsite to nurses and allied health staff with appropriate levels of skills in acute assessment (Scott et al, 2009; Crotty et al, 2008). Barriers to home based interventions were that visit intensity varied with patient condition/ type of provider and was not effective for some populations e.g. diabetes (O' Connor et al. 2014). An additional barrier was the world- wide variability of healthcare systems according to Jeppesen et al (2012) leading to the applicability of the presented results being context dependent.

3.6 Resource implications

Cost was identified as a barrier to the implementation of some transitional care interventions (Ryan et al 2014; Delgado-Passler & McCaffrey 2006). Resource implications of implementing assessment / ambulatory care interventions were not reported in the papers reviewed; however financial savings were reported as cost outcomes in four papers. A care for the homeless / medical respite /ambulatory care intervention was reported to be less than half the cost of one hospital day (Doran et al, 2013); there were anticipated cost savings reported of 246 US Dollars per hospital stay when using the ACE model (Fox et al, 2012). In contrast a day hospital programme

was reported to utilise more resources due to length of stay and increased therapy sessions (Crotty et al, 2008). Nevertheless, potential cost savings of £11 million in readmission costs were reported in Thomas et al, (2013). In relation to paediatric assessment, Ogilvie et al (2005) in their systematic review reported that one RCT while finding no significant difference in direct costs found that children spent fewer days in hospital and incurred lower therapy / ancillary charges.

Current evidence in relation to resource implications of hospital at home for COPD is that these interventions may be associated with cost savings in comparison to inpatient care, but current evidence is reported to be of very low quality. Two studies reported a significant reduction in direct costs for hospital at home (Jeppesen et al. 2012). In relation to hospital at home for children, studies found that the financial cost to the hospital of providing the home-based care programme may be higher than the hospital-based care, but suggested that there are substantial cost savings for the family (Parab et al. 2013). One RCT in a systematic review reported that case management reduced the total cost of services at 12 months. In addition, expenditure in pooled case management groups was significantly lower than in the control groups for three years (Reilly et al. 2015). Wong et al. (2012) in their discussion suggested that home based interventions may incur substantially higher health care costs than standard outpatient care for COPD patients. It was suggested that increased cost may be associated with the choice of member of the MDT to implement the intervention (Crocker et al 2012). However, substantial economic benefits of a home based-primary care team have recently been found (Stall *et al* 2014), whilst discharge planning and transitional care are linked with lower costs (Lainscak et al. 2013).

The resource implications of implementing Telehealth care/ electronic discharge system interventions were not reported in any of the papers reviewed, although cost was reported as an outcome in two papers. A significant reduction in costs was reported across nine studies included in the

systematic review by Martinez et al (2006) with a further three showing tendencies towards cost savings. Resource implications of implementing assessment / ambulatory care interventions were not reported in the papers reviewed; however anticipated financial savings were reported in one paper if a Residential Aged Care Integration Programme could minimise increases in admissions (Boyd et al, 2014).

3.7 Strengths and limitations

A strength of this systematic review is that it was conducted by a multidisciplinary team from the disciplines of nursing, medicine and pharmacy and librarian on the team. The review has been conducted systematically and rigorously guided by recommended practice for undertaking systematic reviews. In addition to peer reviewed publications, grey literature was sourced and included. Given the breadth of questions addressed, the review offers a comprehensive report addressing the aim and objectives as agreed. Therefore, the nature of this systematic review, to our knowledge is unique in both scope and focus.

This systematic review also has limitations. The review was conducted over a period of 11 weeks which presented time constraints. Because of time constraints, it was not feasible to conduct a quality assessment of papers reviewed nor did we grade the evidence to determine strength of recommendations in papers.   However, we did report on quality assessment methods used by authors as well as the grading of evidence where applicable. From this, we can conclude that the methodological quality of studies included in papers is generally high.

Conclusion

This report of a systematic review of international research into interventions focused on tackling delayed discharge and (re)admission has found mixed evidence of success. Systems and interventions were varied and

multifaceted however there were particular components of all interventions that positively affected patient outcomes in relation to discharge identified. These components broadly agree with the results of a review of the grey literature in the Irish context. Considering the projected higher use of healthcare services associated with age and chronic diseases (HSE, 2010; TILDA 2013), the summary of results from the research review are presented in Table 5.

Table 5 Summary of Results emerging from the systematic literature review.

	Recommendations	Interventions category	Components associated with (re)admission avoidance
R1	**Integrated systems that span hospital activities, post-discharge facilities and home based services**	• Pre discharge • Transitional care • Post discharge • Primary Care • Home care	• Hospital initiated Discharge Planning and Home support • Care co-ordination between hospital and post-discharge service providers • Medication reconciliation and Review • Post discharge assessment. • Shared electronic health records. • Close collaboration and integration of Geriatric Care at the hospital/ community interface.
R2	**Multidisciplinary / interdisciplinary approaches to assessment and provision of services.**	• Pre discharge • Transitional Care • Ambulatory Care • Primary Care • Clinical/ medical	• In hospital and outreach specialized multidisciplinary team (MDT) approaches to assessment, diagnosis and care. • Acute Elderly Units • Intermediate care facilities with Comprehensive Geriatric Assessment and Rehabilitation • MDT Case management approaches for specific conditions • MDT Community rehabilitation services for complex conditions. • Case management for specific health conditions i.e. COPD; Heart Failure.
R3	**Personalised / Individualised services related to need**	• Pre Discharge • Transitional Care • Ambulatory Care • Post Discharge • Primary care • Home Care • Hospital at home	• In-hospital individual medication reconciliation and review. • Individualised discharge planning. • Patient education • Individualised comprehensive geriatric assessment and care planning. • Patient self-management education, counselling, and training programmes • Individual home visits • Individualise care planning • Outreach nursing and specialist care for certain medical conditions
R4	**Hospital initiated discharge support and specialist follow-up.**	• Pre Discharge • Transitional Care • Post Discharge • Primary Care • Home based Care	• Dedicated personnel to manage and co-ordinate the transition of patients from hospital to discharge destination and follow-up. • Pre-discharge home assessment visits. • Geriatric management supported by post discharge home care for older adults. • Pharmacist involvement in medication reconciliation in hospital and in community care. • Geriatric nurse specialists / advanced nurse practitioners for follow-up of older adults with complex needs. • Multi-component outreach health and social care programmes for adults with complex needs. • Specific disease management programmes with specialist outreach programmes for e.g. COPD, heart failure, diabetes.

1 This summary of results reflect the complexity of care and patient needs, the diversity in care contexts and the multiplicity of components that emerged from our systematic review of the literature.

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Appendix 1: Final Search Strings

Search terms for discharge hospital (re)admission avoidance within the PICOS Framework

Population	Individuals of all ages from childhood (excluding neonate) through to the elderly within the context of acute hospital settings i.e. in-patient, intra-hospital, inter-hospital transition/discharge, discharged into community/home/other health service setting, or hospital (re)admission avoidance from the community/ home/other health service setting.
Intervention	Discharge N3[11] Search terms in title/abstract using Boolean phrase OR for each string as follows: "bed occupancy" or "bed block*" or "bed use" or "bed utilization" or "bed utilisation" or utilization or utilisation or delayed "long stay" or "length of stay" or early "patient flow" or destination or transition* or transfer or "patient journey" "intermediate care" or "step down" or "step-down" or aftercare or "after care" or "follow up" or follow-up homecare or "home care" or "home health care" or nursing "residential care" or community or "continuity of care" or "long term care" or "primary care" or "integrated care" or "community care" readmission or rehospital* or admission or "admission avoidance" or readmit* or hospital or "emergency admission"

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[11] A proximity search was applied to the concept 'discharge' using the proximity operator **N** (Near) and the number 3 in order to retrieve papers that had the search terms in each string within three words of the word 'discharge'.

	"estimated date" or plan* or assess* or ready or readiness or instruction or timing or structured model or intervention or systems or policy or policies or protocol or computer* or technolog* or email or mobile or automated The above search was combined with the following Subject Headings (applicable only to CINAHL & MEDLINE) using Boolean phrase OR CINAHL: "After Care" or "Patient Discharge" or "Discharge Planning" or "Early Patient Discharge" or "Transfer, Discharge" MEDLINE: "Patient Discharge" OR "Patient Discharge Summaries" Admiss* or Admit* or Reamiss* or Readmit* N3 Search terms in title/abstract using Boolean phrase OR for each string as follows: "hospital avoidance" or avoid* or prevent* or unplanned or reduc* "bed occupancy" or "bed block*" or "bed use" or "bed utilization" or "bed utilisation" or utilization or utilization or delayed "patient flow" or destination or transition* or transfer or "patient journey" or wait* "intermediate care" or "step down" or "step-down" or aftercare or "after care" or "follow up" or follow-up or homecare or "home care" or "home health care" or nursing or "residential care" or community or "continuity of care" or "long term care" or "primary care" or "integrated care" model or intervention or systems or policy or policies or protocol or computer* or technolog* or email or mobile or automated The above search was combined with the following Subject Headings (applicable only to CINAHL & MEDLINE) using Boolean phrase OR CINAHL: "Patient Admission" or "Readmission" MEDLINE: "Patient Admission" or "Readmission"
Comparison	Standard care/no intervention/another intervention
Outcomes	Service oriented: discharge rates; discharge timing; length of stay, bed utilization, bed occupancy; readmission rates; resource utilization; costs to health service providers, costs to social care providers. Patient outcomes: patient safety, mortality; health status/morbidity, patient satisfaction, quality of life
Studies	meta-analyses, meta-syntheses, meta-reviews, systematic reviews, and randomized controlled trials.

Appendix 2: Details of Included Empirical Studies

Appendix 2a: Clinical/Medical Interventions

Source and Type of Evidence	Aim	Q.1. Definitions Q.2. Model/system/ policy/intervention Q.3. Main components of Q2	Q.4. Population group & size Q.5. Health condition/problem Q.6. Healthcare context/setting addressed Q.7. Healthcare professionals/personnel involved	Q.8 & 9 Outcomes assessed & Effects on outcomes Q.10. Components of model/system/policy/ intervention associated with <u>improved</u> outcomes	Q.11. Resource implications (e.g. cost, personnel) Q.12. Enablers Q.13. Barriers	Additional Comments e.g. explanatory notes; key recommendations/messages Reported quality stated by authors.
Abdelaal et al. (2013) Canada Syst. Rev. & Meta-analysis (n= 13) – 5 RCTs, 8 observational	To "evaluate outcomes of same-day discharge (SDD) following Jesudason versus overnight hospitalization (ON)." (p. 99)	1 Rehospitalization was defined as "repeat hospital admission within 30 days of intervention for any reason related to the index procedure." (p. 101) 2 Same-day discharge (SDD) 3 Patient education	4 Older adults – Mean age 62 (n= 111,830) 5 Heart conditions (stable/unstable angina, acute coronary syndrome(ACS)) 6 Surgical to ward/home 7 Multidisciplinary team (MDT) (physician, nurse, administration)	8 & 9 **Rehospitalisations:** RCTs - Slightly higher in SDD (4% vs 3.6%; OR: 1.10) Observational – Lower in SDD (1% vs 1.4%; OR: 0.34) **Total complications:** RCTs - Higher in SDD (6.5% vs 5.5%; OR: 1.20) Observational – Lower in SDD (1% vs 2.4%; OR: 0.4) Results were not statistically significant. 10 NR	11 NR 12 NR 13 Safety concerns; insufficient time for patient education; cost disincentive to change practice (US); patient reluctance to accept SDD	Review reported "many carefully selected and risk-stratified groups of patients undergoing elective or ad hoc PCI for low–intermediate risk ACS have been managed successfully with an SDD strategy." (p. 108) However, due to the low event rate, data heterogeneity, and wide confidence intervals on pooled data, a statistically significant hazard or benefit of SDD could not be determined. **Recommend:** An adequately powered multicenter randomised trial comparing SDD with ON requires a very large sample size (>17,000 patients). "Until such a trial is completed, SDD after uncomplicated PCI seems a reasonable approach in selected patients." (p. 111) Further studies to include patient satisfaction, quality of life, and cost. **Limitations:** Many small, single-centre observational studies

						included in review, as well as the influence of one large multicentre study (> 100, 000 patients) "Patients in RCTs discharged the same day as their PCI had a similar risk profile to those hospitalised overnight. By contrast, patients in observational studies who were discharged home the same day of their PCI were a highly selected population." (p. 109)
Sales et al. (2014) USA RCT	To "evaluate the effectiveness of using trained volunteer staff in reducing 30-day readmissions of congestive heart failure (CHF) patients" (p. e 15).	1 NR 2 Intervention – education and follow up. 3 dietary and pharmacologic education by a trained volunteer, follow-up telephone calls within 48 hours, and weekly calls for a month, to reinforce instructions and promote compliance e.g. diet, weights, medication.	4 Patients >18 years old admitted to New York Methodist Hospital with a primary diagnosis of CHF 5 Coronary heart failure 6 Large New York hospital. 7 Trained volunteer staff – premedical students (n=6).	8 & 9 Primary outcomes were 30-day readmission rates for CHF and worsening New York Heart Association (NYHA) functional classification; composite and all-cause mortality were secondary outcomes. Decrease in readmissions in the community among intervention group (P< .05). 10 NR	11 Utilizing trained volunteer staff to improve patient education and engagement might be a low-cost intervention to reduce CHF readmissions. 12 NR 13 NR	Recommendations: further research needed regarding improved patient satisfaction and engagement, sustainability of benefits following interventions, and costs .
Davidson et al. (2010) Australia RCT	"To assess the impact of a nurse-coordinated multidisciplinary, cardiac rehabilitation program to decrease hospitalizations, increase functional capacity, and meet the needs of patients with heart failure" (p393).	1 NR 2 Multidisciplinary cardiac rehabilitation program. 3 12 week individualised multi-disciplinary programme included exercise component, determined by individual's functional ability and social circumstances. Control group received only an information session and follow up care.	4 Adult patients (n=105), divided into intervention and control groups. 5 Heart failure, NYHA class I–IV 6 Teaching hospital 7 Nurse, cardiac rehabilitation coordinator, cardiologist, GP.	8 & 9 Outcome measures: primary endpoints of the study were to decrease admission to hospital, both all-cause and cardiovascular admission. Secondary endpoints included health-related quality of life and 6-min walk distance. Patients who had the intervention less likely to be admitted to hospital, either for any cause (P = 0.01) or for a major acute coronary event (P = 0.001). Lower mortality rate in intervention group at 12 months, (P = 0.03). Quality of life scores improved at 3 months compared with baseline for	11 NR 12 Subsidised transportation was provided to many participants to enable them to attend the program 13 Refusal to participate in the intervention was identified as a barrier.	Study closed before obtained calculated sample size. However, strong effect shown in findings from existing sample. Multidisciplinary HF rehabilitation program, utilising individualised exercise programme, and coordinated by a specialist HF nurse appears to significantly decrease readmission rates, improve functional status at 3 months, and increase exercise tolerance A potential advantage of this approach is the use of a group-based model, which may increase

				intervention group (P < 0.0001), and control group (P <0.01). Improvement in 6-min walking times at 3 months in intervention group (P = 0.01). 10 NR		organizational efficiency.
De Souza et al. (2013) RCT	"To evaluate the effect of azathioprine (AZA) compared with mesalazine on incidence of re-hospitalizations" (p 716).	1 NR (2014) pre-discharge package discharge-planning intervention 2 Administration of azathioprine (AZA), compared with mesalazine. 3 AZA (2–3 mg/kg per day) or mesalazine (3.2 g per day) therapy. On admission supportive care with fluid replacement, no oral intake, nasogastric tube, and IV hydrocortisone 100 mg every 8 hours for a period of 72 hours. low-fiber diet and were converted to oral corticosteroid therapy prednisone 40 mg at 8 AM for 10 days. The dose was then tapered by 5 mg per week until its complete discontinuation by about the 8th week. Patient recorsing of informatio0n e.g. timing od medication, abdominal pain, adverse effects, etc.	4 Adults aged 18 to 65 years (n=72) 5 sub-occlusive ileo-cecal CD 6 Inflammatory Bowel Diseases Centre in a University Hospital 7 NR	8 & 9 Primary end point was the re-hospitalization proportion due to all causes, as well as for surgical procedures during this period evaluated between the groups. Treatment with AZA significantly reduced the proportion of all-cause re-hospitalization and hospitalizations for surgical procedures when compared with MSZ treatment 10 Use of AZA associated with reduced readmissions.	11 long-term use of AZA in ileocecal CD patients recovering from a sub-occlusion episode can reduce healthcare costs. 12 a significant factor in improving the results of CD treatment is the optimal outpatient control of patients, 13 NR	

Greening et al. (2014) UK RCT	"To investigate whether an early rehabilitation intervention initiated during acute admission for exacerbations of chronic respiratory disease reduces the risk of readmission over 12 months and ameliorates the negative effects of the episode on physical performance and health status" (p 1).	1 NR 2 early rehabilitation intervention 3 Early rehabilitation involved six week intervention, started within 48 hours of admission. prescribed, progressive aerobic, resistance, and Neuro-muscular electrical stimulation training. Patients also received post discharge training, and a self-management and education package.	4 Adult patients aged between 45 and 93 (n=389). 5 Exacerbations of chronic respiratory conditions, mostly COPD 6 acute cardiorespiratory unit in a teaching hospital and an acute medical unit in an affiliated teaching district general hospital 7 Physiotherapy team, and pulmonary rehabilitation team comprising physiotherapists and nurses.	8 & 9 primary outcome was readmission rate at 12 months. Secondary outcomes included number of hospital days, mortality, physical performance, and health status. 60% overall were readmitted at least once in the following year (62% in the intervention group and 58% in the control group) and no significant difference between groups was found Significant recovery in physical performance and health status was seen after discharge in both groups, with no significant difference between groups at one year Mortality at 12 months was higher in the intervention group 10 NR	11 NR 12 NR 13 Reduced uptake may have been a mediating factor explaining the lack of reduction in the rate of admission to hospital and the increased mortality in the intervention group.	Early rehabilitation during hospital admission for chronic respiratory disease did not reduce the risk of subsequent readmission Results suggest that beyond current standard physiotherapy practice, progressive exercise rehabilitation should not be started during the early stages of the acute illness.
Jennings et al. (2014) USA RCT	To examine "whether a pre-discharge screening and educational tool, administered to patients with COPD, reduces readmissions and emergency department (ED) visits" (p3).	1 NR 2 pre-discharge bundle intervention 3 Intervention involved smoking cessation counseling, screening for gastroesophageal reflux disease and depression or anxiety, standardized inhaler teaching, and a 48-hour post-discharge phone call. Control group reeved usual care.	4 Adult patients (n=172) 5 COPD 6 Acute hospital 7 Primary team.	8 & 9 primary endpoint was the difference in the composite risk of hospitalizations or ED visits for AECOPD between the 2 groups in the 30 days following discharge. A secondary endpoint included 90-day readmission rate The risk of ED visits or hospitalizations within 30 days was not different between the groups (risk difference = -3.43%, 95% confidence interval = -15.68%−8.82%; p= 0.58). Overall, the time to readmission in 30 days and 90 days was similar between groups (log-rank test p= 0.71 and p= 0.88, respectively). 10 NR	11 Intervention reported not to be very resource intensive, but ineffective. Authors suggest successful interventions may need to be more resource intensive. 12 NR 13 NR	Authors suggest a more comprehensive, resource-intensive and costlier approach may be necessary for successful reduction of readmissions.

Bonnet-Zamponi (2013) France RCT	"To assess the effect of an intervention on drug-related problem (DRP; adverse drug reactions, adherence problems, underuse)-related readmission rates in older adults" (p. 1)	1 NR 2. the OMAGE discharge plan: "Discharge-planning intervention combining chronic drug review, education, and enhanced transition-of-care communication" (p. 1) 3. Focus on three risk factors of preventable readmissions: depression, malnutrition, and DRPs. Patient education on disease self-management (safety skills, alert signs, deciding health priorities, patient empowerment). Enhanced transition-of-care communication.	4. Adults ≥70 yrs (n=665) 5.Drug-related problems of inpatients with multiple chronic conditions 6. Six acute geriatric units 7.Four specific intervention-dedicated geriatricians (IDGs), GPs, and "expert committee" of three independent geriatricians to adjudicate whether readmissions were drug related (p. 4)	8 and 9. **Chronic drug prescriptions at discharge:** No significant differences between CG and IG (p. 5) **Readmission Adjudications** No significant differences in drug-related readmissions between IG and CC (p. 5) ADRs contributed to 38.7% CG and 17.3 IG readmissions (but this was not significant). **Cost of ADR-Related Readmissions:** No significant differences (with the cost per CG participant estimated at 953.5 euro, and the cost per IG participant estimated to be 392 Euro per participant (p. 5). **Subgroup Analysis:** "Three subgroups of participants benefited most from the OMAGE intervention, with an effect on ED visits and emergency readmissions persisting at 6 months: participants with four or more multiple chronic conditions….participants taking a diuretic at admission or at discharge….participants who wanted to be involved in medical decision-making at admission" (p.6) 10. NR	11. See Q8 and 9 (cost of ADR-Related Readmissions). 12. NR 13. NR	Only confidence intervals were given for the subgroup analysis, and no p values. Although not significant, "the intervention was associated… with 14.3% fewer DRP-related admissions at 6 months (P =.54) and 39.7% fewer ADR-related admissions (P= .12)" (p. 6) Noted that the small sample size could have contributed to the lack of significant findings ("In total, the sample size of the current study has a power of 33% to demonstrate a significant difference between 40.4% and 34.7%")(p. 7). Authors highlight that study shows the high rate of DRP-related readmissions
Bradbum et al. (2012) UK RCT	"To explore variation in outcome and costs between participating hospitals in RATPAC trial" (p. 1)	1."successfully discharged": "the patient had to 1. have either left the hospital or be awaiting transport home with a discharge decision have been made at 4h after initial presentation and 2. Suffer no major adverse event…during the following 3 months." (p. 2) 2.RATPAC (Randomised Assessment of Treatment using Panel Assay of Cardiac markers) 3.point-of-care panel of CK-	4. Adults > 25 yrs (n=2243) 5. acute chest pain due to suspected myocardial infarction 6.Six hospitals in the UK, varying in size and facilities (Barnsley, Derriford, Edinburgh, Frenchay, Leeds, and Leicester) 7. Medical staff and physicians	8 and 9. **Proportion of patients successfully discharged:** Point-of-care panel assessment was associated with an overall modest increase in successful discharge rats (OR = 3.81, P <.01). Substantial increases in rates at Barnsley (OR=6.97(4.18 to 11.63), P<.01) and Edinburgh(OR=11.7(6.23 to 11.68), P<.01). Modest increases at Derriford(OR=2.48(1.37 to 4.49), P<.01) and Frenchay (OR=7.3(3.35 to 14.75), P<.01). No increases at Leeds or Leicester. **Mean costs per patient between**	11. Costs per patient varied between hospitals, and authors suggest this" may depend on local protocols, staff practices and available facilities" (p.1) Cost differences ranged from £214.49 less to £646.57 more 12. NR	No P values were given for length of hospital stay comparisons. Authors suggest reasons for variation in both outcomes and cost variation across hospitals: "differences in the facilities available, local protocols, existing guidelines for chest pain, existing troponin assays or staff using the point-of-care tests" (p. 4). "a statistically significant

| | | MB(as a mass assay), myoglobin and troponin at baseline and 90 min using the Seimens Stratus CS analyser | | **hospitals:** Only the difference at Edinburgh was statistically significant (costing £646.57 more in point-of-care group, P<.05). "The difference between the mean costs at each centre are reported with a 95% CI. This difference ranged from £214.49 less…..tDavidson o £646.57 more" (p. 3), with weak evidence of heterogeneity between centres….suggests that the effect of point-of-care panel assessment on means cost per patient varied between hospitals" (p. 3)
Health utility (using EQ-FD):
Length of initial hospital stay and total inpatient days over 3 months:
Point-of-care associated with fewer patients being in hospital up to 24 h at Barnsley and Edinburgh.
Derrisford: the difference in proportion in hospital was only apparent between 4 and 8 h.
Frenchay: diference marked up to 12 h, but after 12h the proportion of patients was greater in point-of-care group.
Leeds: difference between 6 and 24h.
Leicester: slightly fewer patients from 12 – 36 h.

10. NR | 13. NR | result for a specific hospital (such as the comparison of mean costs per patient at Edinburgh) is one of many hypothesis tests and thus carries a risk of being a spurious false-positive finding" (p. 4).

"Overall, the present analysis suggests that the intervention would be more Kiley to have an impact at hospitals where it is more distinct from standard care, where it helps to address specific service targets and where it is used by decision-making clinicians" (p. 4).

Power was determined on all centres (rather than on an individual basis) so the study lacks power in detecting differences in each centre (p. 5). |
| Miller et al. (2013) USA

RCT | To "determine the effect of stress cardiac magnetic resonance (CMR) imaging in an observation unit (OU) on revascularization, hospital readmission, and recurrent cardiac testing in intermediate-risk patients with possible acute | 1 Hospital readmission: "an overnight stay or placement into observation or inpatient status for >8 h, for all causes, after the index visit" (p. 788)

Index visit length of stay: "the time elapsed between randomisation and discharge from the facility." (p. 789)

2 Observation Unit care (OU) with stress cardiac magnetic resonance (CMR)

3 Management; stress CMR exams | 4 Adults - range 35-91 yrs; (n= 105)

5 Symptoms of acute coronary syndrome (ACS)/chest pain

6 Observation unit or inpatient setting/ED

7 Emergency physician; care providers | 8 & 9 **LOS:** Significantly reduced in OU CMR group compared to usual care group (21 hr s vs 26 hrs; P< 0.001).
Rehospitalisation: Significantly reduced in OU CMR group compared to usual care group (8% vs 23%; P= 0.03)

10 NR | 11 NR

12 NR

13 NR | Authors found that the "OU CMR care pathway, in elevated-risk participants, is an efficient alternative to inpatient care and can shorten hospital length of stay and reduce hospital readmissions." (p. 791)

Another study (Miller et al. 2011) reported that OU CMR care reduced cost over the course of 1 year compared with an inpatient care strategy.

Limitations: Single-centre design

Study needs to be replicated |

	coronary syndromes (ACS)." (p. 785)					across multiple centres to ensure external validity of the findings.
Challand et al. (2012) UK RCT	To determine whether "intraoperative GDT would reduce the time to surgical readiness for discharge (RfD) of patients having major elective colorectal surgery", and whether less marked effect would occur in aerobically fit patients (p53).	1 NR 2 standard fluid regimen with or without ODM-guided intraoperative GDT. 3 NR	4 Patients having major open or laparoscopic colorectal surgery (n=179), divided between aerobically fit (n=123) and unfit (n=56), based on exercise test. 5 Colorectal surgery. 6 Operating theatre and colorectal surgery ward. 7 Surgeon and anaesthetist.	8 & 9 primary outcome measure=surgical RfD based on predefined criteria, that is, tolerance of oral diet, mobilization and self-support at an appropriate level, adequate pain control with simple oral analgesics, return of adequate lower gastrointestinal function, and adequate stoma care, where applicable. Secondary outcomes included actual length of stay (LOS), critical care admission, 30 and 90 day mortality, and 30 day hospital readmission rates. GDT patients received an average of 1360 ml of additional intraoperative colloid. Times to RfD and LOS were longer in GDT than control patients but did not reach statistical significance (P=0.09). Fit GDT patients had an increased RfD and LOS (P=0.01) compared with controls. **10** NR	11 NR 12 NR 13 NR	Recommendations: Future studies should consider methods of defining the 'high-risk surgical patient' with regard to nature of planned surgical procedures, and functional capacity, and evaluation of the effects of GDT with consideration of these factors.
Jesudason et al. (2012) Australia RCT	"To investigate whether a physiotherapy service to an EECU altered the rate of hospital admission, rate of re-presentation to the ED, visits to the community healthcare practitioners, return to usual	1 NR 2. Physiotherapy intervention service to an EECU 3. "Interventions included education, advice, mobility review, provision of mobility aids, exercise prescription and organisation of appropriate community equipment/resources" (p. 2).	4. adults $\geq$ 18 yrs (mean age of 70 yrs) (N=186) 5. patients referred for physiotherapy assessment/intervention (most commonly mobility issues) 6. EECU (emergency extended care unit) physiotherapy service at Royal Adelaide Hospital (public hospital) 7.Physiotherapists, with a range of experience; nursing and	8 & 9. **Rate of hospital admission**: No significant differences. **Rate of re-presentation to the ED**: No significant differences. **Use of community healthcare resources:** No significant differences **Return to usual work/home/leisure activities:** No significant differences **Patient satisfaction:** No significant differences. 10. NR	11. Findings suggest that a physiotherapy service does not reduce healthcare sector costs (p. 4). 12. NR 13. NR	Authors suggest that the lack of reduction in admission rates could have been due to the fact that hospital admission reasons were "multifactorial and complex. Physiotherapy intervention, which was predominantly aimed at only one factor leading to hospital admission (ie, poor mobility), may therefore have been rendered ineffective…It is possible that a physiotherapy service may

| | work/home/leisure activities and patient satisfaction" (p.1). | | medical staff | | | reduce the rate of hospital admission if it were provided to EECU patients only after they have been deemed ready for discharge for all medical reasons and mobility is the only factor preventing discharge" (p. 4).

Study powered to detect a min. 15% difference rate only

Outcome measures chosen based on justifying funding (not measuring the actual effectiveness of physiotherapy) |

Appendix 2b: Pre-Discharge Interventions

Source and Type of Evidence	Aim	Q.1. Definitions Q.2. Model/system/ policy/intervention Q.3. Main components of Q2	Q.4. Population group & size Q.5. Health condition/problem Q.6. Healthcare context/setting addressed Q.7. Healthcare professionals/personnel involved	Q.8 & 9 Outcomes assessed & Effects on outcomes Q.10. Components of model/system/policy/ intervention associated with <u>improved</u> outcomes	Q.11. Resource implications (e.g. cost, personnel) Q.12. Enablers Q.13. Barriers	Additional Comments e.g. explanatory notes; key recommendations/messagesRe ported quality stated by authors.
Fox et al. (2013) Canada Syst. Rev. & Meta-Analysis (n= 9) - 7 RCTs, 1 Pseudo-RCT, 1 Quasi-experimental study	To compare the effectiveness of early discharge planning to usual care in reducing clinical outcomes (LOS & readmissions)	1 Early discharge planning (EDP): "interventions initiated during the acute phase of an illness or injury to facilitate transition of care back to the community as soon as the acute event is stabilized." (p. 2) 2 Early discharge planning (EDP) 3 Clinical pathway (early ambulation); pathway documentation (patient & family); patient education; orthopedic consultation; comprehensive physical, cognitive, and psychosocial nursing assessment; family, patient, and healthcare team meeting; transfer to home health care or to interdisciplinary outpatient care program; follow-up visits or telephone calls after discharge.	4 Older adults ≥ 65 (n= 1736) 5 Cardiovascular illness (e.g. congestive heart failure; myocardial infarction) or surgical management of hip fracture. 6 Medical unit; orthopaedic unit; intensive care unit 7 Multidisiplinary team (MDT) /Gerontological clinical nurse specialists with MDT assistance/geriatrician / advanced practice nurses with physicians, nurses & discharger planners/ geriatrician. Note 5 studies = MDTs	8 & 9 **LOS:** No significant difference (n= 7) **Readmissions:** Significantly fewer within one or twelve months of discharge in EDP group (equates to 22% reduction; P= 0.0003, n= 7) **Readmission LOS:** Significantly lower LOS of almost 2.5 days (P= 0.004; n= 3) in EDP group. **Mortality:** No significant difference (n= 5) **Narrative analysis only:** Significantly higher scores in overall **quality of life** and general health domain at two weeks and at three months after discharge (n= 2) in EDP group. No differences in **patient satisfaction** (n= 2) 10 NR	11 NR 12 NR 13 NR	Limitations noted regarding drawing conclusions about risk of bias because of small number of studies with few details on study methods. Future research: "examine the effectiveness of early discharge planning on caregiver satisfaction and quality of life as well as community healthcare provider satisfaction." (p. 7-8) Concluded that EDP with older adults admitted to hospital improves system level outcomes after index hospital discharge. . .

Goldman et al (2014) USA RCT	"To examine whether a peri-discharge, nurse-led intervention decreased emergency department (ED) visits or readmissions among ethnically and linguistically diverse older patients admitted to a safety-net hospital" (p472).	1 NR 2 Nurse led discharge support intervention 3 In-hospital, one-on-one self-management education by nurse, telephone follow up.	4 Adults 55 years + who spoke English, Spanish or Chinese (n=700). 5 NR 6 Urban acute care public hospital 7 Language-concordant nurses, and a nurse practitioner.	8 & 9 **ED visits or readmissions**: No significant difference between intervention and usual care groups at 30, 90 or 180 days. **Mortality:** No significant difference between groups 10 NR	11 NR 12 NR 13 NR	
Lin et al. (2014) Australia RCT	To "determine whether a brief **pa**tient-**d**irected **d**ischarge **le**tter (PADDLE), delivered during a brief discussion with the treating physician would improve patient understanding at the time of hospital discharge and would be feasible for busy clinicians to administer." (p. 852)	1 NR 2 Patient-directed discharge letter (PADDLE) 3 Education (brief discussion) at discharge with letter on discharge instructions.	4 Older adults – mean age 63 yrs (n= 67) 5 Patients from cardiology (n= 48), respiratory (n= 14), and endocrinology (n= 4) wards. 6 Acute hospital (medical) to home 7 Clinician (hospital and community physician); research nurse	8 & 9 **Patient knowledge/understanding:** Increased regarding tests (P < 0.001) and post-discharge recommendations (P < 0.001) but no significant differences between groups at 3 & 6 months post discharge. **Patient Satisfaction:** No change in patients' self-ratings of satisfaction or level of knowledge, which remained high in both groups. 10 NR	11 NR 12 Clinicians considered that "completing and administering the PADDLE letter was feasible and acceptable within their daily work load." (p. 854) Inexpensive to produce. 13 NR	**Context:** Information for continuity of care is often missing at the time of discharge. Study demonstrates that a "brief patient-directed discharge letter (PADDLE) discussed with the patient on the day of discharge improved immediate understanding of their hospitalisation and discharge recommendations." (p. 855) Immediate understanding not sustained at 3 and 6 months (long time to retain information, especially for older patients) **Limitations:** Study not powered to evaluate readmission rates. Sample size small due to limited time period. Generalisation of results limited as study conducted at single site. **Recommendation:** Future versions of the letter "may include less detail on tests and results, and more focus on the post-

						discharge recommendations as this will most strongly influence readmission rate." (p. 856). Integration of this brief intervention into routine discharge practice.
Webster et al. (2011) Australia RCT	To "assess the effect of a protocol driven, nurse-initiated discharge process on discharge time, patient satisfaction and adverse events in a 23-hr post-surgical ward." (p. 1173)	1NR 2 Protocol driven, nurse-initiated discharge process 3 Completion of surgery summaries and discharge prescriptions; patient discharged when discharge criteria (i.e. Modified Post Anaesthetic Discharge Scoring System (MPADSS) which includes stable vital signs, ability to ambulate safely, minimal nausea or vomiting, minimal pain and bleeding) met, without review.	4 Adults – mean age 49 yrs (n= 131) 5 Patients undergoing a surgical procedure (e.g. ENT, orthopaedic, maxillofacial) 6 A 23-hr post-surgical unit 7 Surgeon; unit nursing staff; research nurses; doctor	8 & 9 **Discharge by 0900:** 82 patients (62.6%) discharged by 0900h. 78.9% from protocol group discharged on time; 50% from usual care (significant difference; P= 0.001) **Length of time to discharge:** Average LOS was 16.5 hrs; did not differ by group (P=0.81) **Admission to hospital:** Majority discharged home (93% vs 95.9%; protocol vs usual care). 4 patients from protocol group and 2 from usual care group admitted to inpatient bed. **Readmission:** No significant difference (n= 3; P= 0.43) **Patient satisfaction:** High but no significant difference between groups (96.2 vs 94.6; P= 0.40) 10 NR	11 NR 12 NR 13 NR	Study demonstrates that protocol initiated discharge increases the proportion of patients discharged by 0900 h and that patient and staff satisfaction are not compromised. Most common reason for delay in discharge was waiting for a medical review (mostly in usual care) followed by patients not meeting the discharge criteria. **Strength:** Study adequately powered to show a statistical difference in the primary outcome, the proportion of patients discharged by 0900. **Limitations:** Although response rate was high, high quality data for the outcome 'readmission to hospital' was not obtained. Contamination between groups noted (i.e. medical staff wrote in the notes of patients in the usual care group that they may be discharged without an AM review). **Recommendation:** Future research to include an economic evaluation and a more detailed follow-up plan, to ensure safety of the process.

Dawes et al. (2007) Scotland Randomised comparison and economic evaluation	"To determine the effect on quality of life and cost effectiveness of specialist nurse early supported discharge for women undergoing major abdominal and/ or pelvic surgery for benign gynaecological disease compared with routine care." (p262).	1 NR 2 Early supported discharge intervention by specialist nurse. 3. Daily assessment of women; Individualised discharge plan .	4 Adult women (n=111) 5 Benign gynaecological disease. 6 Gynaecology surgery service of university hospital in the NHS Trust. 7 Specialist gynaecology nurse.	8 & 9 **Readmission:** No significant differences **Length of hospital stay**: significantly reduced post-operatively, in intervention group 4.71 S.D. (1.64) vs 6.06 S.D. (1.41) in routine care (p = 0.001). **Information on discharge support:** Improved following intervention **Complications:** No significant differences. **Quality of life:** Significant improvement in some domains in intervention group. **Patient Satisfaction**: improved following intervention. **Costs**: Discharge group associated with much lower total costs to the NHS due to reduced length of stay. Savings made offset cost of specialist nurse. 10 NR	11 NR 12 NR 13 NR	Recommendations: Discharge at 48 h after major abdominal and pelvic surgery is acceptable, and cost effective compared with routine practice. Study demonstrates effectiveness of specialist nurses in providing health information.
Wong et al. (2005) China RCT	To compare "the outcomes of diabetic patients undergoing either nurse-led early discharge or routine care." (p. 391)	1 Transitional care: "goals are to control symptoms, prevent complications and promote a lifestyle that will delay disease progression." (p. 400) 2 Nurse-led early discharge programme 3 Education (self-management skills); discharge plan; self-monitoring; follow-up calls by DNS until protocol met (diet, exercise, medication-taking, self-monitoring)	4 Adults ≥ 18yrs (mean age - 62yrs; n= 101) 5 Patients with diabetes mellitus who needed glycaemic control 6 Medical department of acute hospital to home 7 Diabetes nurse specialist (DNS), Physician, endocrinologist, dieticians	8 & 9 **Readmission:** No significant difference between groups at 12 (P= 0.111) or 24 weeks (P=0.610) **ED attendance:** No significant difference between groups at 12 (P= 0.052) or 24 weeks (P=0.233) **LOS:** Significantly reduced in intervention group (2.2 vs 5.9 days; P< 0.001) **Monitoring adherence:** Significantly higher score at 12 (P< 0.001) and 24 weeks (P< 0.001) in intervention group. **Exercise adherence:** Significantly higher score at 12 (P= 0.001) and 24 weeks (P< 0.001) in intervention group. **Diet adherence:** No significant difference between groups at 12 (P= 0.633) or 24 weeks (P=0.686) **Medication adherence:** No significant difference between groups at 12 (P= 0.448) or 24 weeks (P=0.404) **Cost:** Cost saving of HK$11,888 for each patient discharged early. **Patient satisfaction:** No significant difference between groups (P= 0.528). Both had high levels of satisfaction. 10 NR	11 NR 12 Practical and cost-effective 13 NR	Early discharge and telephone follow-up by a specialist nurse is a feasible approach to care for appropriately selected patients with diabetes. Early discharge programme integrates treatment with the real life environments of patients with diabetes. No limitations reported. Intervention empowers patients to assume responsibility for their own health. Noted that "telephone-based follow-up forms an essential part of the intervention plan" (p. 400)

Gillespie et al. (2009) Sweden RCT	To "investigate the effectiveness of interventions performed by ward-based pharmacists in reducing morbidity and use of hospital care among older patients." (p. 894)	1 NR 2 Pharmacist intervention 3 Medication list compilation; drug review (e.g. adherence, safety); advisory role to patients physician (e.g. drug selection, dosages, monitoring needs); education; monitoring; discharge counselling; advisory role to primary care physician (e.g. rationale for changes, therapeutic goals, monitoring needs); home management; follow-up call.	4 Older adults ≥ 80 yrs (n= 368) 5 Drug related problems (e.g. adherence, adverse drug reactions) 6 Acute medicine wards/ED 7 Ward-based pharmacists, hospital and primary care physicians, nurses	8 & 9 **Hospitalisations/Readmissions:** 118 patients (32.1%) died before end of the 12 month follow-up. Intervention group - 16% reduction in all visits to the hospital (ED visits plus readmissions) and 47% reduction in visits to the ED. No significant differences between groups in the number of patients readmitted to hospital or the total number of readmissions. **Drug-related readmissions**: Of 54 drug-related readmissions, 9 were in the intervention group, and 45 in the control group. **Cost of hospital care:** Secondary health care was $400 (US) lower per patient in the intervention group vs the control group. ED visits and readmissions decreased by $100 and $300, respectively, in the intervention group. Cost savings balanced against the cost of the intervention ($170) was $230 per patient. 10 NR	11 NR 12 Individualised patient counselling during the hospital stay, the follow-up telephone call 2 months after discharge, and communication with practitioners in primary care reported as important factors in reducing hospital visits. 13 NR as evidence but authors noted that pharmacists should work with other professions and that this is easier to accomplish in hospital setting than in community or primary care.	On a population basis, this study suggests that the addition of pharmacists to health care teams would lead to major reductions in morbidity and health care costs. Authors suggest that for pharmacists to make a difference in patient care and medication management that "physicians, pharmacists, and nurses should work together as a team, which is usually easier to accomplish in a hospital setting than in community or primary care." (p. 898) Most important aspect is for pharmacist to meet the patient. **Limitations:** Number of patients could have been higher to compensate for high mortality rate. The study did not have sufficient power to detect a reduction in readmissions alone. Limited information about the extent of visits to primary care facilities (minimal impact on costs).

Appendix 2c: Transitional Care Interventions

Source and Type of Evidence	Aim	Q.1. Definitions Q.2. Model/system/ policy/intervention Q.3. Main components of Q2	Q.4. Population group & size Q.5. Health condition/problem Q.6. Healthcare context/setting addressed Q.7. Healthcare professionals/personnel involved	Q.8 & 9 Outcomes assessed & Effects on outcomes Q.10. Components of model/system/policy/ intervention associated with <u>improved</u> outcomes	Q.11. Resource implications (e.g. cost, personnel) Q.12. Enablers Q.13. Barriers	Additional Comments e.g. explanatory notes; key recommendations/messages Reported quality stated by authors.
Verhaegh et al. (2014) Netherlands Syst. Rev. & Meta-analysis (n= 26) – All RCTs	To "identify and summarize the effectiveness of transitional care interventions on the rates of readmission for patients discharged from a hospital to their home." (p. 1532)	1 Transitional care: "the main goal of transitional care interventions is to prevent repeated and avoidable readmissions and negative health outcomes after a hospital discharge." (p. 1532) 2 Transitional care interventions 3 In-hospital (assessment at admission, self-management education); provider continuity (care coordination by nurse); postdischarge follow-up (communication between hospital and primary care provider); home visits; telephone follow-up calls.	4 Adults ≥18 (n= 7932) 5 Chronically ill (e.g. heart failure, COPD, asthma or conditions treated by general internal or surgical medicine) 6 Hospital (medical/surgical) to home 7 Nurse (Registered Nurse (RN) or Advance Practice Nurse (APN)), primary care provider	8 & 9 **Overall readmission rates:** Short-term (30 days or less) – Not effective Intermediate-term (31-180 days) – 5% absolute risk reduction Long-term (181-365 days) - 13% absolute risk reduction **Subgroup readmission rates:** **High-intensity:** Short-term – 5% absolute risk reduction Intermediate-term - 7% absolute risk reduction Long-term - 13% absolute risk reduction **Low-intensity:** Significantly associated only with reduced long-term readmission. **Patients > 60 yrs:** Intermediate-term - 5% lower rate of readmission Long-term - 8% lower rate of readmission 10 Care coordination by nurse (P= 0.04), communication between hospital and primary care provider (P= 0.03), and a home visit within three days of discharge (P< 0.001) were significantly associated with reduced rates of short-term readmission.	11 NR 12 NR 13 NR	This study suggests that to reduce short-term readmissions, transitional care interventions should be of high intensity and should consist of at least care coordination by a nurse, communication between the hospital and primary care provider, and a home visit within three days of discharge. Future studies need to consider "the early effects of transitional care by examining the rates of readmission in the short-term and including more information on the cost-effectiveness of these interventions." (p. 1537) Stronger primary care structure needed to improve health system performance. The ideal content of transitional care programs still remains unclear. **Quality**: Risk of bias in studies assessed guided by Cochrane collaboration Tool. 78% reported on allocation procedures; 62% undertook intention to treat analysis; 28% conducted power analysis. Found no evidence of publication bias

Allen et al. (2014) AU Syst Rev (n=12) – all RCTs	To assess transitional care compared with standard hospital discharge for older people with chronic illnesses.	1 Transitional Care: "interventions that promote safe & timely transfer between levels of care and across care settings… includes pre hospital discharge activities and immediate post hospital discharge follow-up at the next location of care …considered a part of integrated care, which occurs over longer duration of care episodes"… (p.2 sourced from previous literature) . 2 Discharge planning protocol - hospital based (n=5);/primary care involvement with GP & nurses (n=3) /discharge case management (n=1) / self-management & transitional coaching (n=1) / in-patient geriatric evaluation, co-management & transitional care (n=2). 3 "Discharge assessment & care planning, communication between providers, preparation of the person & carer for the care transition, reconciliation of medications at transition, community-based follow-up, and patient education about self-management (p. 4)	4 Older Adults aged 60y > (n =5,269). 5 Chronic illness (types NR). 6 Acute hospital (medical/surgical) to home inclusive of follow-up in the community. 7 ANPs for hospital based intervention (ANP GP & Primary Care nurses for primary care involvement. Ward staff (geriatrician, nurse & physical therapist) for patient geriatric evaluation, co-management & transitional. Older adult & family involvement in Self-management intervention NR for discharge case management/ / self-management & transitional coaching.	8 & 9 **Re-hospitalisations**: reduced in ANP hospital based discharge planning 6-52 wks follow up (n=4/5) & Self-management 4-24 wks follow-up & geriatric evaluation 12-26 wks follow up. No significant effects from primary care involvement with GP & nurses & discharge case management. **LOS**: lower in ANP hospital based discharge planning & discharge care management. **Healthcare Costs:** lower in ANP hospital based discharge planning (hospital & community costs) & Self-management (hospital costs) & Discharge Case Management (hospital but not community costs). **Functional Status:** no change in ANP hospital based discharge planning **Quality of Life**: Improved in ANP hospital based discharge planning **Patient Satisfaction:** Improved satisfaction with discharge planning from primary care involvement with GP . 10 NR	11 See No. 8 & 9 on costs 12 NR 13 NR	Gaps in the evidence on transitional care noted regarding " timeliness, equity, efficiencies for community providers, effectiveness/symptom management, and domains of person and family centred care (p. 1). **Quality**: Assessment for bias yielded mixed results with 40% of studies having insufficient information to judge risk of bias.
Lehnbom et al. (2014) Australia Syst. Rev. (n= 83) – 30 RCTs, 25 prospective observational, 8 prospective controlled, 3	"To evaluate how effective medication reconciliation and review are in improving clinical outcomes in hospitals, the community, and	1 NR 2 Medication reconciliation and medication review. 3 **Medication reconciliation:** Discharge counselling and education, interview, patient visits, follow-up phone call, process of documentation of	4 Age range NR (n= 65769) 5 Unintentional medication discrepancies /Adverse drug events (ADE) 6 **Medication reconciliation:** Hospital (n= 33); community (n= 4); RACF (n = 3) **Medication review:** Hospital	8 & 9 **Medication reconciliation:** **Readmission/LOS:** No significant difference (**Hospital**); Significantly decreased at 7 (P= 0.01) and 14 days (P= 0.04; **Community**, n= 1); significantly shorter LOS (P= 0.026) and fewer ED visits/readmissions (P = 0.035; **RACF**, n= 2) **Medication review:** **Readmission/LOS:** Significantly lower at	11 NR 12 NR 13 NR	Limited evidence of the potential of unintentional medication discrepancies to cause harm. Hence, actual impact of interventions on health outcomes is not clear. Also, impact of interventions on clinical outcomes not clear. "Future studies should focus on utilizing more effective measures

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retrospective cohort, 3 cross-sectional analysis, 2 prospective cohort, 2 prospective randomised comparative, 2 retrospective observational , 2 non-randomised cohort, 2 quasi-experimental, 1 retrospective electronic record review, 1 chart review, 1 longitudinal, 1 before-and-after	residential aged care facilities (RACF)." (p. 1299)	current patient medications for comparison with medication orders at each point of care transition. **Medication review:** medication counselling, medication therapy management, ward rounds by pharmacist, interview, questionnaire, community pharmacist visits, follow-up phone call, case management, process of evaluation of current medication treatment (e.g. dosage adjustments, drug addition and discontinuation)	(n= 14); community (n= 20); RACF (n= 9) 7 Health care provider: Pharmacist (n= 78), nurse (n= 2), consultant (n= 1), general practitioner assistant (n= 1), and multidisciplinary team (geriatrician, social worker, and nurse; n= 1)	12 months (50.7% vs 59.2%; P= 0.027) and lower drug-related readmissions (n= 2), patients with ADE had 1.4 day longer LOS (n= 1), No significant difference (**Hospital**, n= 7); Significantly lower (n= 5), increase by 30% (n= 1), No significant difference (**Community**, n= 6) **Medication reconciliation** identified unintentional medication discrepancies in 3.4% to 98.2% of patients. **Medication reviews** identified medication-related problems or possible adverse drug reactions in 17.2% to 94% of patients. 10 NR		to determine the impact of medication reconciliation on health outcomes by considering hospital readmissions, number of visits to primary care physicians or general practitioners, and morbidity." (p. 1304) **Limitations**: Many studies included in this review were observational studies without control groups. This absence of robust study designs limited the ability of these studies to draw clear conclusions. No quality assessment performed.
Trabanejad et al. (2014) Iran. Syst. Rev. (n=6) – ALL Quasi-experimental /clinical trials.	To assess "the impact of liaison nurse in nursing care of patient after ICU discharge on patient's outcomes, compared with patients that are not taken care of by liaison nurses" (p.202). .	1 NR 2 Liaison Nursing Service 3 Patient assessment; Patient & family emotional support; discharge planning; Maintaining relationships between ICU & wards; Critical care transfer to wards; Training and clinical support of the ward staff.	4 Adults (5 studies) & children/youths (1 study) (n = 3421) 5 NR 6 Intensive care unit transfer to medical/surgical wards 7. Nurses	8 & 9 **Timing of Discharge**: 3 time less probability of 2 hr delay from ICU & 2.5 times less probability of 4 hr of more delay (n=1). **Readmission to ICU**: Reduced from 5.4% to 4.7% (n=1) **LOS** (Hospital): No effect (n=1) **Transfer to Higher Level Care**: Reduced (n =1, P =0.028) **Self-care abilities**: Increased by 13% (n=1) **Prevention of Complicators**: Positive effect (n=1, P =0.028).	11 NR 12 NR 13 NR although noted that Liaison Nurses did not work night shifts or weekends.	Outcomes varied across studies. Noted that none of the studies made a single conclusion about the impact of the liaison on one type of outcome. However, overall, 4 of the 6 studies were found to have significantly positive effects on outcomes measured. **Quality**: Studies assessed using Critical Appraisal Skills Programme (CASP) specific to RCTs. Randomization applied to all groups (procedures not resported). Power calculation adequate (n=3) or not available (n=3).
Prieto-Centurion et al (2013) USA Syst. Rev (n=5 RCT)	To identify interventions that could reduce the risk of rehospitalisation	1 NR 2 Discharge Planning pre discharge (n1) / Disease Education (n=3)/ Health Counselling (n=4)/ Inhaler use Training ((n=5) / Action plan	4. Adults >65 (n=1393) 5. Chronic obstructive pulmonary disease (COPD) 6. Primary and Acute	8 & 9 **Rehospitalisation's** decrease in all-cause rehospitalisation over 12 months in the intervention group versus comparator group (mean number of hospitalizations per patient, 1.0 vs. 1.8;	11. NR 12. NR	No specific intervention or bundle of interventions could be identified as effective in reducing the rate of re-hospitalizations in this population **Quality:** Risk of bias assessed

	in patients initially hospitalized with COPD exacerbations (p. 418)	(n=5)/ Medication (n=3)/ Smoking Cessation counselling (n=3)/ Assessment of co-morbidities(n=1)/ Referral to rehab (n=1)/ Exercise Programme (n=3)/ Referral to social services (n=2)/ Communication with patients Primary Care Provider (PCP) (n=4)/ Transition Navigator (n=2) Home Visits (n=4)/ Follow up Telephone (n=4)/ Patient Hotline (n=5). 3 pre-discharge interventions, post-discharge interventions, or bridging interventions (spanning the pre- and post-discharge periods)	7. NR	**P = 0.01 (**n=2) **Mortality:** higher risk of mortality in the intervention group (17 vs. 7%, P = **0.003**) (n=1). 10.NR .	13 Most of focused on post discharge interventions	using the Cochrane Effective Practice and Organization of Care (EPOC) Group's criteria[12]. Sufficient information for assessment in 4 studies with risk of bias found to be low in all 4 except blinding of participants and personnel.
Feltner et al. (2014) USA Syst. Rev. & Meta-analysis (n= 47) - All RCTs. **Note:** 1 trial compared home-visiting program with telemonitoring	"To assess the efficacy, comparative effectiveness, and harms of transitional care interventions to reduce readmission and mortality rates for adults hospitalised with heart failure (HF)" (p. 774)	1 Transitional care interventions: "Interventions designed to prevent readmissions among populations transitioning from one care setting to another" (p. 774) 2 Transitional Care Interventions: Home-visiting programs (n= 14); structured telephone support STS (n= 13, described in 15 papers); telemonitoring (n= 8); outpatient clinic-based (n= 7); primarily educational (n= 4); "Other" (n= 2). 3 **Shared features:** Patient or caregiver education; self-management; medication	4 Adults (n= 8675) - Mean age: 70 yrs (range 59-82) 5 Heart failure 6 From hospital/academic medical centre to home 7 Home-visiting programs: Clinician (nurse or pharmacist) Structured telephone support: NR Telemonitoring: NR Outpatient clinic-based: MDT (physician, cardiologist, dietician, pharmacist), or Nurse Primarily educational: Various personnel (only nurse-led reported)	8 & 9 **All-cause readmissions (30 days):** Only 1 home-visiting trial (high intensity) reported a lower risk of readmission. 5 other trials reported no reduction in 30 day readmission rates (1 medium intensity home-visiting trial, 1 STS, 2 telemonitoring, and 1 "other" (cognitive training)) **All-cause readmissions (3-6 months):** Home-visiting programs (n= 9) and MDS-HF clinics (n= 2) reduced all-cause readmissions over 3 to 6 months (high strength of evidence (SOE)). STS, telemonitoring (moderate SOE for both), and nurse-led clinics (low SOE) not effective in reducing risk.Insufficient evidence for primarily educational interventions **HF-specific readmissions:** Home-visiting	11 NR 12 NR 13 NR	**Main finding:** Home-visiting programs and MDS-HF clinic interventions currently have the best evidence for reducing all-cause readmissions and mortality up to 6 months. **Clarifications:** Interventions in "primarily educational" category "do not feature telemonitoring, home visits, or STS and are not delivered primarily through a clinic-based intervention. Follow-up telephone calls may occur to ascertain outcomes (e.g., readmission rates) but not to monitor patients' physiologic data." (p. 775) "other" interventions defined as "unique interventions or interventions that do not fit into any of the other categories (e.g., individual peer support for

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[12] AOPC Criteria are: 1) random sequence allocation, (2) concealed allocation, (3) masking of participants and personnel, (4) masking of outcome assessment, (5) incomplete outcome data, (6) selective reporting, and (7) other bias. Each of these domains was graded for bias as as high, low, or unclear.

		reconciliation; coordination among health professionals involved in transition. **Specific features:** Home-visiting programs: physical therapy. Structured telephone support STS: telephone technology (e.g. decision-support software). Telemonitoring: Remote monitoring of physiologic data (e.g. ECG, blood pressure) via technology to monitoring center. Outpatient clinic-based: 3 types (multidisciplinary HF (MDS-HF), nurse-led HF, or primary care), may offer telephone support (e.g. patient hotline) outside clinic hours. Primarily educational: delivered either in person, by interactive CD-ROM, or by video. "Other": inividual peer support; cognitive training.		programs and STS interventions both reduced the risk (moderate and high SOE, respectively). Telemonitoring did not reduce the risk for HF-specific readmissions (moderate SOE). Insufficient evidence for MDS-HF and nurse-led HF clinic, or primarily educational interventions. **Composite outcome (all-cause readmission or death):** Home-visiting programs reduced composite outcome over 3 to 6 months (moderate SOE). STS, MDS-HF clinics, and primarily educational interventions not effective in reducing risk. Insufficient evidence for nurse-led clinic interventions. **Mortality:** Home-visiting programs, MDS-HF clinics and STS interventions reduced mortality (moderate SOE). Telemonitoring, nurse-led clinics, and primarily educational interventions did not reduce mortality (low SOE). Insufficient evidence for primary care interventions and cognitive training programs. 10 NR, but home-visiting and MDS-HF clinic interventions reported best evidence in reducing all-cause readmissions and mortality up to 6 months		patients with HF)." (p. 775) **Limitations:** Few trials reported 30-day readmission rates. Usual care was heterogeneous and sometimes not adequately described. Included trials commonly excluded persons with end-stage renal or severe cardiovascular disease; thus, results may not be applicable to persons with high levels of coexisting illness. **Recommendation:** The interventions that reduced all-cause readmission and mortality (Home-visiting programs and MDS-HF clinics), and interventions that reduced HF-specific readmission and mortality (STS) should receive the greatest consideration by systems or providers seeking to implement transitional care interventions for persons with HF. **Quality**: Studies rated as having low, medium, high, or unclear risk of bias using AHRQ Methods Guide for Comparative Effectiveness Reviews to rate. Many included trials reported to have methodological weaknesses thereby introducing bias.
Guerin et al. (2013) Australia Syst. Rev. (n=12) i.e. 5 RCTs, 4 before and after studies, & 3 controlled trials.	"To identify and critically appraise the relevant literature detailing methods of community services' involvement in	1 NR 2 Four models of discharge: Virtual Interface Model (n=6); In-reach Interface Model (n=2); Out-reach Interface Model (n=2); Independent Interface Model (n=2). 3 Interventions/ components of	4 Adults > 65 yrs (n=8440). 5 Complex chronic conditions or frailty 6 Transitioning from acute - medical/surgical/ED hospital to community setting 7 Multi-disciplinary hospital	8 & 9 Mixed results. **Readmission rates**: No significant differences (n=3) **Length of stay:** reduced (n=4) or no difference (n=3). **Service costs**: reduced (n=4) or no difference (n=2). **Length of hospital stay:** no difference	11 NR 12 NR 13 NR	Some details inconsistently reported. Noted that "further research is required to identify appropriate population groups for various discharge models and to select suitable outcome measures to determine the effectiveness of these models" (p. e1). **Quality:** Assessed using the The

	the discharge of older adults across the hospital-community interface, …to identify the most effective methods of community service involvement in the discharge process of older adults" (p. e2).	models included: liaison of nurses with community services; coordination of care by specialist hospital teams; liaison of hospital pharmacist with community pharmacist; involvement of community services in assessing and supporting patients prior to and during discharge; and home visits by hospital staff following discharge.	team/ nurses/ pharmacists/ doctors/ community health care staff/ social services staff / allied health professionals / general practitioners	(n=1), or fewer days utilisation of hospital beds on readmission(n=1) 10 NR		design-generic McMaster qualitative and quantitative critical appraisal tools with a scoring system devised. Quality of included studies varied. Problems related to inadequate description of subjects (n=4), sample sizes not justifies (n=5), insufficient detail on psychometric properties of outcome measures (n=5) and on avoiding contamination and cointervention (n=6).
Rennke et al. (2013) USA Syst. Rev. (n= 47) - 28 RCTs, 19 Controlled Clinical Trials (non-randomised)	Evaluate the "effectiveness of hospital-initiated care transition strategies aimed at preventing clinical adverse events (AEs), emergency department (ED) visits, and readmissions after discharge in general medical patients." (p. 433)	1 Transitional care strategy: "1 or a group of interventions initiated before hospital discharge with the aim of ensuring the safe and effective transition of patients from the acute inpatient setting to home." (p. 433) 2 Three categories of transitional care strategies: 1) Predischarge 2) Postdischarge and 3) Bridging (including both pre- and postdischarge components. 3 Predischarge: Risk assessment for adverse events (AE); patient/caregiver education; individualised patient record; Outpatient provider facilitation; dedicated transition provider; medication reconciliation. Postdischarge: Patient outreach (follow-up telephone calls, home visits); Clinical follow-up facilitation (ambulatory provider follow-up); medication reconciliation. Bridging: Inclusion of at least 1 pre- and 1 postdischarge	4 Majority - Older adults (Age NR) (n= 29133) 5 Clinical adverse events (AE) (adverse drug events; falls; post-discharge infection; post-discharge adverse events) 6 Acute hospital (medical/surgical/ED) to home/community setting 7 Clinical pharmacist/nurse	8 & 9 **Readmission:** Statistically significant reductions in 30-day readmission rates/ED visits (n= 8; 4 RCTs, 4 CCTs). Six of the 8 studies used a bridging intervention with dedicated provider. No statistically significant reductions in 30-day readmission rates/ED visits (n= 14; 8 RCTs, 6 CCTs). Four of the 14 studies used a bridging intervention with dedicated provider. Statistically significant reduction in readmission rates/ED visits from 45 days to 1 year after index discharge (n= 7). Four of the 7 studies used a bridging intervention with dedicated provider.No significant reduction in readmission rates/ED visits from 45 days to 1 year after index discharge (n= 19) **Adverse events (AE):** Statistically significant reduction in postdischarge AE rates (n= 3). No significant reduction in postdischarge AE rates (n= 6). 10 Bridging intervention with a dedicated transition provider (strength of evidence low)	11 Cost (implied) 12 NR 13 Cost (implied)	Among these, only the CTI has been implemented in multiple settings and patient populations. Few studies specifically targeted AEs after discharge, and the studies identified provided little information about implementation factors, intervention context, or cost. No conclusions could be reached on methods to prevent postdischarge AEs due to scant evidence. The strategies hospitals should implement to improve patient safety at hospital discharge remain unclear. Clinical pharmacist led medication safety seemed to be a promising approach, indicating a need for larger trials with an explicit plan to measure clinically significant AEs." **Quality**: Assessed using Cochrane collaboration's EPOC criteria. Strength of evidence assessed using AHRQ criteria. Most of the studies were rated as having fair methodological quality and low strength of evidence

		component.				
Prvu Bettger et al. (2012) US Syst. Rev. (n= 44) 36 RCTs, 6 prospective trials, 1 retrospective, 1 time series	To "describe transitional care interventions and evidence of benefit or harm in patients hospitalised for acute stroke or myocardial infarction (MI)." (p. 407)	1 Transitional care: "time-limited service to prevent discontinuous care and adverse outcomes, including re-hospitalisations" (p. 407) 2 Transitional care: 4 types – 1) hospital-initiated support (n= 14), 2) patient & family education (n= 7), 3) community-based support (n= 20), 4) chronic disease management (n= 3) 3 Education; counselling; monitoring (home or telephone follow-up); goal setting; care coordination; and risk-factor management.	4 Adults ≥ 1yrs (n= 15454) 5 Acute stroke (n= 27) or Myocardial infarction (n= 17) 6 Acute hospital/inpatient rehabilitation to home 7 Registered nurse, advanced practice nurse, social worker, physical therapist, occupational therapist, physician, or multidisciplinary team (MDT).	8 & 9 **System level:** Only hospital-initiated support in relation to stroke reported significantly fewer hospital days (n= 8; moderate strength of evidence (SOE)). No reduction in rehospitalisation, cost-neutral. **Patient level:** No important differences reported in stroke studies for mortality and basic activities of daily living. Hospital-initiated support in relation to MI reported reduced mortality in patients (n= 6; low SOE). 10 NR	11 NR 12 Financial incentive 13 Applicability (specifically for US health system reported from this review)	Applicability to U.S. clinical practice was limited. Recommended that a consensus needed on a unified taxonomy that defines the constituent components for transitional care services and their evaluation. Authors did not identify any interventions that followed patients across several settings. Research proposed in this area. **Quality**: Assessed individual studies using AHRQ criteria.with summary ratings of good, fair or poor.Few studies had good quality designs due to inadequate sample sizes, heterogeneity of outcome measures, lack of definition for the usual care group, and fair (68%) or poor study quality. Few studies were designed with a single primary end point (several outcome measures that were reported simultaneously). Strength of evidence was : low- to moderate for the effectiveness of hospital-initiated transitional care.
Naylor et al (2011) USA Syst. Rev (n=21) All Randomised Clinical Trials (conducted in the USA) **Particular focus on 9 intervention studies**	To identify and synthesize available evidence regarding Transitional Care for Adult, Chronically ill populations.	1 Transitional care : a broad range of time-limited services designed to ensure health care continuity, avoid preventable poor outcomes among at-risk populations, and promote the safe and timely transfer of patients from one level of care to another or from one type of setting to another (p.747) 2. Discharge Planning / Follow-up / Home Visits	4 Adults >32 yrs. (range: n=88-1396). Total NR 5 With the exception of one study all studies targeted High Risk Older Patients ;Chronically ill with conditions (congestive heart failure, asthma, diabetes, or depression) 6 Hospital and Primary Care 7 Designated Nurse (most	8 & 9 Six of the nine studies that demonstrated a positive effect on at least one measure of readmissions included in-person home visits (p752) **All cause Readmissions:** Reductions in all 9 studies **(p ≤ 0:05).** **Time to first readmission:** Reductions in 3 studies **(p ≤ 0:05).** **Length of readmission stay** Reductions in 4 studies **(p ≤ 0:05).**	11 Two studies estimated a mean total cost savings of nearly $3,000 per Medicare beneficiary at six months and $5,000 at twelve months, respectively. 12 A focus on patient self-management.	The review sought to inform implementation of the Affordable Care Act in USA. A key aim of the Affordable Care Act is to reduce avoidable hospital readmissions Therefore the reviewers focused with particular interest on nine interventions that reported a statistically significant positive effect on at least one measure of readmissions (p750) Details about the degree to which these interventions incorporated self- management support, medication management,

		Case management. 3 Comprehensive Discharge Planning & Follow-up with Home Visits (n=4) & without home visits (n=3). Case management (n=4) Coaching (n=2); Education (n=2); Peer support (n=2); Tele-health facilitation (n=1); Mobile Crisis (n=1); Post Discharge Geriatric Assessment (n=1); Intensive Primary Care (n=1). Interaction with post -acute outpatient providers (n=7) Referrals for support/ resources (n=5) Use of Health IT (n=1) Initiated in advance of hospital discharge (n=14)	frequently), Advanced-Practice registered Nurse as clinical manager or leader or Social Worker, Peer Mentor or Personnel with experience in conducting clinical drug trials. .	10: In-person home visits. Multi-component interventions i.e. (comprehensive discharge planning with follow-up interventions that incorporate patient and caregiver goal setting, individualized care planning, educational and behavioural strategies, and clinical management) Daily home videophone or telephone monitoring and transmission of physiologic measurements, self-care instruction, and symptom management	Proactive connection of acute care providers with primary care. Nurses as the clinical leader or manager of care. (p.752) 13 NR	and use of health information technology may have been underreported in the articles and therefore, in this synthesis (p749) Costs not included in economic analyses were medications, supplies, and out-of-pocket patient expenses. **Quality:** Methods of quality appraisal or related results were not reported.
Linertová et al, (2011). Spain Syst. Rev (n=32) 25 RCTs 7 non-RCTs.	To identify interventions that effectively reduce the risk of hospital readmission for elderly people (at least 75 years old) and to assess the role of home Follow-up.	1 The index hospital admission is defined as the first stay of the patient, regardless of its length and whether it is planned or unplanned. Readmission is the next subsequent admission, urgent or unplanned, of a patient to any hospital within the same area and within a defined reference period 2 In-hospital geriatric evaluation and discharge management (n=17) Geriatric assessment with home follow-up (n=15). 3. **In Hospital:** Geriatric / multidisciplinary care teams – assessment, communication, discharge planning during the hospital stay and comprehensive discharge planning (All).	4. Adults > 65 yrs (n=4454) 5. NR 6. Hospital and Primary Care 7. Multidisciplinary Geriatiric Team (physicians, nurses, social workers, case managers, physical Therapy; GP)	8 & 9 **Reduces Readmission** Pharmaceutical counselling and medication discharge summaries with home visits of a pharmacist (In 3 months after discharge: 3 vs. 15; $P < 0.05$). Geriatric assessment followed by home care provided by a hospital-based multidisciplinary outreach team (In 1 month after discharge: 61 (16.5) vs. 82 (22.2); $P < 0.05$) Nurse-conducted home visit and telephone follow-up for 6 months after discharge (In 6 months after discharge: 22 vs. 46.7; $P < 0.01$) Home intervention team (In 6 weeks: 4 (14) vs. 9 (38); $P < 0.01$† In 12 weeks: 9 (31) vs. 14 (40); $P < 0.05$) In-hospital visits, home visits and	11 NR 12 High degree of collaboration and communication between patients, caregivers, geriatricians, general practitioners, social community services and other agents (p.1174) Patient education on specific issues, close follow-up, home monitoring, adjustment of medication and regular communication with clinical	Focused exclusively on readmission outcomes 'usual care' (almost never described in Detail - variable). Intermediate care at a community hospital as an alternative to prolonged general hospital care, the intervention produced important differences in the number of patients readmitted in the 6 months after discharge. However, the outcome variable was the number of readmissions for the same disease, which makes it difficult to compare these data with other studies (p. 1170). **Quality**: Assessed using the SIGN tool. 14 studies met all/most criteria, 13 met some of the criteria & 3 met few/no criteria.

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		Included Geriatric Team care plan (n=10) Geriatric-based wards – early rehabilitation (n=4), Included pharmaceutical care review (n=3). In-hospital daily visits by care coordinators and pharmacists, post-discharge phone call (n=1) GP's re-discharge visit (n=1) Special medical unit designed to help older persons maintain independence in self-care activities (n=1) Joint health/social care rehabilitation unit (n=1) **Post Discharge** Follow – up in collaboration with the patient's GP or the intermediate care services (n=11) Transitional care service – chronic disease management model (n=1) Intermediate care at a community hospital (n=1) Care plan after discharge (n=7), Home rehabilitation (n=6) Cooperation with patients' general practitioners (n=7) Phone calls (n=3) Coordination of post discharge care services (n=5) Patient education (n=6).		telephone follow-up by a transition coach1 month after discharge: 8.3 vs. 11.9; $P < 0.05$; In 3 months: 16.7 vs. 22.5; $P < 0.05$). Comprehensive discharge planning and home follow-up (In 6 months after discharge: 49 vs. 107; $P < 0.001$) 10 Interventions that incorporate geriatric management supported with home care post discharge are more likely to reduce or prevent hospital readmissions (p.1174)	experts(p.1174) Effective patient targeting Intensity & duration of the intervention 13 NR	

Englander et al. (2014) USA Cluster RCT	"To evaluate the impact of a multicomponent transitional care improvement program on 30-day readmissions, emergency department (ED) use, transitional care quality, and mortality" (p1460).	1 NR 2 multicomponent transitional care improvement program "C-train" 3 (1) transitional nurse coaching and education, including home visits for highest risk patients; (2) pharmacy care, including provision of 30 days of medications after discharge for those without prescription drug coverage; (3) post-hospital primary care linkages; (4) systems integration and continuous quality improvement	4 Hospitalized low-income adults admitted to general medicine or cardiology who were uninsured or had public insurance (n=382) 5 Medical or cardiac problems 6 Urban academic medical centre in Portland, Oregon 7 inpatient nurses, treating physicians, patient care managers, social workers,	8 & 9 **Readmission**: No significant difference in 30-day readmission or ED visits between groups. **Transitional care quality:** Intervention was associated with significant improvements **Mortality**: Reduced within 30 day discharge period. 10 NR	11 NR 12 NR 13 NR	Noted that a different or more intensive intervention may be needed to reduce readmissions Generalizability of findings limited due to being a single centre study and socially disadvantaged group. Sampled possibly underpowered to detect small but clinically significant reductions in re-admissions. .**Quality/Limitations:** Acknowledged that sample may have been underpowered to detect smaller yet clinically relevant reductions in readmission rates.
Herfjord et al. (2014) Norway RCT	"to evaluate efficacy and safety of this model of intermediate care with early transfer, compared to usual hospital treatment" (p2).	1 "Intermediate care is a broad term describing health care services designed to provide adequate care closer to home, while preventing hospital admissions, facilitating early discharge and supporting patients with long-term condition" (p2). 2 rapid transfer to intermediate care unit 3. Comprehensive geriatric Assessment; Early mobilisation. Nutrition status evaluated.	4 Adults over 70 years, living at home before admission to hospital (n=376). 5 NR 6 Nursing home and 2 hospitals 7 physician (consultant in geriatrics or junior doctor), nurse, physiotherapist and health care worker	**8 & 9** **Functional outcome** **Quality of life.** At the same time, investigators attempted to evaluate costs for the two alternative treatment options. There was no significant differences between groups in number of days living at home (p = 0.80) or days in hospital (p = 0.748). Intervention group patients spent less time in nursing home (p = 0.046), and more lived at home without home care services (p = 0.007) 10 NR	11 NR 12 NR 13 NR	Intermediate care did not significantly improve proportion of living at home but reduced demand for nursing home care and home care services. **Limitations:** Calculation of sample size was not based on the re-defined primary outcomes of days living home but rather the original primary outcomes of functional outcome, quality of life and costs,
Wong et al. (2014) China RCT	"to examine the overall effects of a transitional care programme for discharged medical patients and the differential effects of	1 NR 2 Four week post discharge intervention- telephone calls with or without home visits. 3 Based on Wong's 4 Cs model (comprehensiveness, continuity, collaboration,	4 Discharged pts (N=610), divided into home visits with call (n=196), calls only group (n=204), or control group (n=210). 5 primary diagnosis related to respiratory, diabetic, cardiac and renal conditions,	8 & 9 Readmission rates. Secondary outcomes: quality of life, self-efficacy and satisfaction. Home visit group and the call group had lower readmission rates than the control group. Bundled interventions involving both home visits and calls appear to be more effective in reducing readmissions.	11 Use of skill mix including support workers may be beneficial due to demands for resources. 12 NR	Recommendations: Bundled interventions and use of skill mix to deliver interventions is advised. **Limitations:** Noted that findings not generalizable, missing values were replaced by group means and was reported as an unsophisticated approach. Outcomes only assed and not

	telephone calls only" (p91).	coordination). Included pre-discharge assessment and 4-week post-discharge follow-up Home group received two home visits and two phone calls, on alternate weeks, while call only group received only calls. Control group received two placebo calls.	6 Medical units in regional hospital in Hong Kong 7 Nurse case manager (n=1), nursing students (n= unspecified)	Significant improvement in quality of life, self-efficacy and satisfaction in intention to treat, and per protocol analysis for study groups. A mixed skills model involving different types of professionals appears to have a positive impact. 10 Noted that it was easy to establish which component made the most impact.	13 NR	process.
Farris et al (2014) USA RCT	"to determine if a pharmacist case manager (PCM) providing a faxed discharge medication care plan from a tertiary care institution to primary care could improve medication appropriateness and reduce adverse events, rehospitalization and emergency department visits" (p e1).	1 NR 2 Iowa Continuity of Care Study 3 Admission history, medication reconciliation, patient education, discharge medication list and medication recommendations for both groups. Intervention group also given faxed medication care plan to their usual physician and pharmacy, and telephone call made 3–5 days post-discharge.	4 Adults patients (n=945). 5 Cardiovascular conditions, asthma, COPD. 6 general medicine, family medicine, cardiology or orthopaedics settings in a university hospital and clinics. 7 Pharmacist	8 & 9 **Medication appropriateness index (MAI)**: no statistically significant differences. **Adverse events**: no statistically significant differences. **Adverse drug events:** no statistically significant differences **Post-discharge healthcare utilization:** Almost one-third of all participants had any type of healthcare utilization within 30 days post-discharge, and 15% of all participants had a 30-day readmission. No statistically significant differences between study groups. 10 NR	11 NR 12 NR 13 barriers to adherence with intervention recommendations included cost and patient concerns	**Quality/Limitations:** The extent to which community physicians used discharge medication care plan information was not determined which creates a missing link in the process of care in the study.
Wong et al. (2012) China RCT	To evaluate the "cost-effectiveness of a health-social partnership transitional program for post discharge medical patients" (p. e1).	1 NR 2 Health-social partnership transitional care model 3 NR	4. Medical patients discharged from hospital 5. NR 6 Acute regional hospital in Hong Kong. 7 NR	8 & 9 Higher readmission rates for study group than control group within 28 days and 84 days but no difference between groups in length of stay at readmission, at either point in time. Study group had significantly higher utility values than the control group at 28 (p < 0.001) and 84 days (p = 0.002), and a significantly higher QALYs gain (p < 0.001) over time at 28 and 84 days when compared with the control group. 10 NR	11 Program is effective in reducing costs, and economic evaluation enables informed efficient use of scarce resources. 12 NR 13 NR	No data for after 84 days, so sustainability of programme's cost effectiveness not established.

Gould (2011) USA RCT	Examine a DNI aimed at promoting self-regulation of care at home: "To compare patients with CVD undergoing interventional revascularization procedures who receive usual care and those who receive DNI on medication adherence, patient satisfaction, use of urgent care, and illness perception" (p. 4)	1.Discharge nursing intervention (DNI): "provides nursing consultation to help patients interpret discharge instructions and guidelines for self-regulation of their illness." (p. 3) Common Sense Model of illness perception: "incorporates elements of traditional health belief models and expands to include cognitive and emotional responses involved in the coordination of complex behaviors" (p. 3) 2. DNI based on the Common Sense Model of illness 3. Written discharge materials (including medication review materials, a medication pocket card, and suggested Internet sites), telephone follow-up by an expert cardio-vascular nurse. Intervention offered at discharge and continued within 24 hours of discharge. (p. 4)	4. Adults 30yrs – 80 yrs (n= 129) 5. Cardiovascular disease: Specifically, patients undergoing interventional revascularization procedures 6.Academic medical centre that serves as both a city and community care centre 7.Nursing personnel and expert cardio-vascular nurses	8 and 9. **Medication adherence**: A)Medications currently prescribed: No significant differences B)What percentage of aspirin and/or clopidogren they took as prescribed: No significant differences C)Morisky Adherence (forgetting or omitting medication): no significant differences (High in both groups) **Patient satisfaction:** A) Would they return: no significant differences B) Would they refer fam/friends: no significant differences (High in both groups) **Utilization of urgent care**: A) Call to physician: No significant differences B) Call to hospital: No significant differences C) Visits to ER: No significant differences (Low in both groups) **Illness perception:** * A) Timeline (acute/chronic) component: experimental group scored significantly higher ($P < .01$) B) No other significant differences found (other measures were: personal control, cure control, illness coherence, time cyclical, consequence, emotional representation) 10.NR	11."Redesign of discharge processes may be accomplished by reengineering existing resources rather than adding new or costly interventions" (p. 8) 12.NR 13. NR	Implications of accepting conditions as long-term: "Studies also report that perceiving cardiac disease as chronic may be instrumental in engaging individuals in making lifestyle changes", better diet, exercise self-efficacy, and long-term adherence to medication (p. 7) Limitations: short duration of study (1-3 days post-procedure), self-report, lack of diversity of study sample Suggested study replication in different settings and populations, as well as in "settings without advanced practice nurses and/or Magnet Hospital status, streamlined discharge instructions, electronic medical records and prescription services" (p. 8)

Zhao & Wong (2009) China RCT	To "test the effects of a post-discharge transitional care programme among patients with coronary heart disease." (p. 2444)	1 Transitional care programme: "provide coordinated care with continuity of support to improve participants' self-management knowledge and skills." (p. 2446) 2 Post-discharge transitional care programme (TCP) 3 Pre-discharge assessment, adherence (diet, medications, exercise, and health-related lifestyle), structured home visits, education, counselling, telephone follow-ups within four weeks after discharge (TCP in this study referred to as the four Cs "comprehensiveness, continuity, coordination and collaboration." (p. 2446))	4 Older adults ≥ 60 yrs (n= 200) 5 Coronary heart disease (CHD); confirmed diagnosis of angina or myocardial infarction 6 Acute hospital to home 7 Nurse-led programme; cardiac physician; cardiac nurse; community nurse; nurse academics	8 & 9 **Readmission:** No significant differences. Significant differences in clinic visits (higher in intervention group; P< 0.05) **Level of understanding (diet, medication, exercise, lifestyle):** Significantly greater in intervention group vs control group at 2 days, 4 weeks, and 12 weeks (P< 0.05) **Levels of adherence (diet, medication, exercise, lifestyle):** Generally, significantly greater in intervention group vs control group at 2 days, 4 weeks, and 12 weeks (P< 0.05) 10 Mediated by the design of the TCP: continuous coaching and support promotes more active role of self-management in patient.	11 NR 12 Intervention structured and protocol-driven: helps facilitation. 13 Competition for resources between acute and community care settings (**specific to China**)	**Context:** Comprehensive discharge planning and extended care after hospital discharge are poorly developed in China. This study has constructed a transitional care model for patients with coronary heart disease in the context of the Chinese population which is effective in enhancing healthy lifestyle among these patients. Intervention programme was effective in increasing participants' understanding and adherence in terms of diet, medication, exercise and health-related lifestyle. **Limitations:** Cannot be generalised to other places. Outcomes relied on self-reporting: no mechanism for validation available. Clinical data of level of cardiovascular risk not collected. **Recommendation:** Transitional health care is new to China. This study provides a structured protocol for future testing and to develop accessible health care services.

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Appendix 2d: Post-Discharge Support Interventions

Source and Type of Evidence	Aim	Q.1. Definitions Q.2. Model/system/ policy/intervention Q.3. Main components of Q2	Q.4. Population group & size Q.5. Health condition/problem Q.6. Healthcare context/setting addressed Q.7. Healthcare professionals/personnel involved	Q.8 & 9 Outcomes assessed & Effects on outcomes Q.10. Components of model/system/policy/ intervention associated with <u>improved</u> outcomes	Q.11. Resource implications (e.g. cost, personnel) Q.12. Enablers Q.13. Barriers	Additional Comments e.g. explanatory notes; key recommendations/messagesRe ported quality stated by authors.
Adib-Hajbaghery et al. (2013) Iran. Syst. Rev. (N= 21) i.e. 15 RCTs, 4 quasi-experimental.	"to determine the effect of post-discharge follow-up on readmission of patients with heart failure (HF)" (p. 255).	1 NR 2 Patient Education/ Home Visits 3 Pre-discharge education/Home visits/ Follow-ups by telephone/mailing/Internet.	4 Adults (n = 4419) 5 Heart failure 6 Home follow up for most studies 7 Nurses/Pharmacists (NR for most studies)	8 & 9. **Readmission**: Significant reduction in 15/20 studies varying from 10% to 33%. 10 **Pre-discharge patient education**, home visits, & telephone follow up	11 Not in results but noted in Discussion that: "patient education before hospital discharge could be a simple and low cost method for reducing readmissions of patients with HF" (p.260). . 12 NR 13 NR	No reference made on the quality of studies included
Bahr et al (2014) Syst. Rev. (n=19) i.e 10 RCTs, 4 quasi-experimental & 5 descriptive/ cohort	To assess " the impact of a postdischarge telephone call on patient outcomes" (p84).	1 NR 2 Post discharge phone calls. 3 Assessment & Advice; Education; Medication counselling.	4 Adults 18 yrs < (n=6090). 5 NR 6 Medical / surgical units 7 Registered Nurses /Students/Pharmacists/ Telephone services.	8 & 9 Noted that "Evidence is inconclusive for use of phone calls to decrease readmission, emergency department use, patient satisfaction, scheduled and unscheduled follow-up, and physical and emotional well-being" p.96). Improvements noted in some studies re: Patient Satisfaction; Medical Compliance; Medication Adverse Events; Follow-Up Attendance. 10 NR	11 NR 12 NR 13 NR	Noted that RNs were the professionals involved in most studies. Recommended that persons at high risk need to be targeted in future research

Huntly et al. (2013) UK Syst. Rev. & Meta-analysis (n= 11) - All RCTs.	To evaluate "the effectiveness of case management in reducing the risk of unplanned hospital admissions in older people." (p. 266)	1 NR on case management Unplanned hospital admission: "admission or readmission with an overnight stay that was not previously planned or scheduled or 'elective'." (p. 267) 2 Case management (CM) - (1) Initiated in or after discharge from hospital (n= 6) (2) in the community (n= 5) 3 (1) Hospital and home visits; geriatric assessment; follow-up telephone calls; liaison with service providers; treatment plans; 24-hour telephone service (2) Initial and follow-up assessments; care plans; home visits; follow-up telephone calls; frequent monitoring of symptoms; adherence; transitional care; coordination of health care professionals; support for self-management; support for care givers and enhanced access to community services.	4 Older adults (CM in hospital or on discharge) - mean age 78 yrs (n= 2505) Older adults (CM based in the community) - mean age 79 yrs (n= 1706) 5 NR (unplanned hospital admission) 6 Initiated either in or after discharge from acute care hospitals/ED, or in the community. 7 (1) Advanced Practice Nurse (APN); geriatric health professionals; physician; district nurse. (2) Geriatric health professionals; trained "guided care" nurses; primary care physician; nurse community manager; home visitors (intervention municipality employees); GP; caregivers.	8 & 9 **Unplanned admissions (CM in hospital or on discharge, n= 6):** Two individual trials reported a significant decrease in unplanned admissions (one at 6 months, one at 18 months). Three trials suitable for meta-analysis, two of which reported a reduction in unplanned admissions. Overall, no statistically significant reduction in unplanned admissions reported. Significantly reduced length of stay reported in three trials (33.5 vs 42.7 days, P< 0.05; 3 vs 5.2 days, P< 0.05; 1.53 vs 4.09 days, P< 0.05). Significant difference in number of days until first admission (382 vs 348 days, P< 0.011; n= 1) **Unplanned admissions (CM based in the community, n= 5):** Individual trials reported no reduced admissions. Three trials suitable for meta-analysis. Overall, no statistically significant reduction in unplanned admissions reported. Other outcomes: Significant reduction reported in admissions to ED (6 vs 17, n= 1; P< 0.025)) Cost (n= 5): Significantly reduced costs ($3630 vs $6661 per patient, P= 0.001, n= 1) Other 4 studies reported favourable cost–outcomes for case management. 10 NR	11 NR 12 NR 13 NR	This systematic review and meta-analysis of RCTs is the first to be conducted to the authors' knowledge which focuses on the effectiveness of case management for reducing unplanned hospital admissions in the general older population. **Main finding:** Review provides evidence that case management does not reduce unplanned hospital admissions in older people compared with usual care (n= 9). **Limitations:** Included a range of case management interventions, which added heterogeneity. One trial, which showed a significanteduction in hospital readmissions, recruited >50% electively admitted patients. This may have affected the rate of readmission. **Recommendation:** Authors suggest that "case management works best as part of a wider programme of care, where multiple strategies are employed to integrate care." (p. 274-5) It is important to note that the clinicians in the hospital received extra training and undertook comprehensive geriatric assessment in both intervention and control groups. This may have influenced outcomes by affecting care in the control group, biasing the result towards the null.

Rousseaux et al. (2009) France Syst. Rev. (n= 11) - All RCTs	Evaluate effects of Early Supported Discharge (ESD) on "various outcome parameters in stroke patients." (p. 224)	1 NR 2 Early Supported Discharge (ESD): Three Types of services; Type 1 - coordination and performance by the ESD team; Type 2 - coordination by the ESD team; Type 3 - no involvement of the ESD team outside the hospital. 3 Systematic evaluation, home visit, discharge planning (technical aids, rehabilitation) and discharge meeting with patient/family/carer/mobile team, follow-up visits, education meeting.	4 Older adults ≥ 66 and ≤ 78 (n= 1636) 5 Stroke patients 6 Stroke Unit (SU) to home/rehabilitation unit 7 Mobile team: physician, physiotherapist, occupational therapist, and nurse. Also potentially a speech therapist, social worker and a secretary.	8 & 9 **Readmissions:** No significant difference (n= 3); One study suggested lower rates in ESD group (data: NR) **Resource use:** ESD reduced duration of initial inpatient hospitalization up tot 8 days. ESD significantly reduced LOS in SU (n= 9; range 3-15 days). Cost of care (n= 4) 9 to 20% lower in ESD groups. **Patient outcomes:** Decrease in risk of death or institutionalisation and risk of death or dependency. Participation in iADL increased in patients having undergone ESD (n= 9) and depended on ESD quality (i.e. Type 1) **Satisfaction:** Mixed. Greater effect of ESD on patient satisfaction with hospital care but not with home rehabilitation (n= 1). Positive effect on overall patient satisfaction (n= 1). No effect on patient satisfaction (n= 1). No effect on carer satisfaction (n= 2). **Other outcomes reported:** stroke recurrence (NS, n= 1), functional parameters (NS, n= 6), motor activities (NS, n= 7), subjective health status (Long lasting effect on subjective health status, n= 2; NS, n= 8), cost (ESD groups had lower initial hospital costs, higher homecare cost). Overall cost decreased by 10-20% (n= 6), or 35% (n= 1). 10 Depended on quality of home care (ESD Type 1 - most beneficial)	11 NR 12 NR 13 NR	Quality of included studies not reported. Noted that "Study does not take account of the differences between the conventional health systems which are being compared with ESD. ...the Norwegian and Swedish systems involve both relatively intense community rehabilitation care (including physiotherapy, occupational therapy and speech therapy) and social care. ...explain why some studies did not show any (or only minor) differences between ESD and standard care. In contrast, systems in the UK, Canada and Australia often provide less support for rehabilitation at home and thus comparative studies could more easily favour ESD". (p. 228) Variability in the inclusion criteria (some trials excluded patients with severe disorders while others included these patients). Noted that ESD not appropriate solution for severe stroke patients.
Thomas et al. (2014) UK Syst. Rev. & Meta-analysis (n= 20) – All RCTs	To "evaluate the effectiveness of interventions led by hospital or community pharmacists in reducing unplanned hospital admissions for older people." (p. 174)	1 Unplanned, emergency or unscheduled hospital admissions: "admission or readmission that was not previously planned or scheduled or 'elective'." (p. 175) 2 Pharmacist-led interventions 3 **Hospital setting (n= 10):** Patient medication review with	4 Older adults > 60 yrs (n= 9858) 5 Older people with various conditions (e.g. COPD, hypertension, pneumonia, diabetes; n= 16); older people with heart failure (n= 4) 6 Hospital (n= 10) or community (pharmacy (n= 4), primary care physician office (n= 1), home (n=	8 & 9 **Unplanned admissions: Older people with various conditions – Hospital setting** –No effect on the number of unplanned admissions with inpatient intervention only (n= 4, pooled RR: 0.91), inpatient intervention with follow-up (n= 3, pooled RR: 1.01) or all hospital interventions (n= 7, RR: 0.97). **Community setting –** No reduction in unplanned hospital admissions (n = 9, pooled RR: 1.07), even when study of high risk bias was removed (n = 8,	11 NR 12 NR 13 NR	Key features of the UK government strategy include the role of the pharmacist in the prevention, identification and reporting of medication errors. **Main finding:** No evidence of an effect on unplanned admissions from pharmacist-led interventions for the older population, whether carried out by hospital or community pharmacists, with the

		recommendations (n= 10); patient education and counselling (n= 8); telephone or home monitoring (n= 6) **Communnity setting (n= 10):** In pharmacy, compliance and patient review (n= 4); In primary care physician office, medication assessment with recommendations (n= 1); In home, home visits, medication review, compliance, patient education and counselling (n= 5).	5)) 7 All pharmacist-led, with primary care physician (GP)	pooled RR: 1.08). Also, no effect on unplanned admissions at 3 (n= 3), 6 (n= 6) and 12 months (n= 6). **Older people with heart failure - Hospital setting** – Significant reduction (25%) in unplanned admissions (n= 3, pooled RR: 0.75), and absolute risk reduction of 19 cases per 100. **Community setting –** No reduction in unplanned admissions (n= 1, RR: 3.16) 10 Education about heart failure prior to hospital discharge with continuing follow-up post discharge (n= 3; NOTE - trials were of different intensities and follow-ups)		possible exception of heart failure. "25% reduction in unplanned admissions from the three RCTs for older people with heart failure is promising" (p. 186); however, these trials were heterogeneous in intensity and duration of follow-up, and one trial had a high risk of bias. Further high-quality evaluations are therefore recommended **Strengths:** Comprehensive search strategy employed without limitations and robust reviewing. Focused on RCTs. **Limitations:** All 20 trials were at a high risk of performance bias because the nature of the intervention meant that personnel and participants could not be blinded. Publication bias: the identification of both positive and negative trials made it unlikely that further high-quality trials remained unpublished. **Important note:** "Reducing hospital admissions or readmissions is not usually the main focus of the role of a pharmacist. Previous research shown that the most frequent benefits resulting from pharmacist reviews are the recommendation of monitoring, removing unnecessary drugs from repeat prescriptions and providing advice on compliance and the prevention of potential adverse effects." (p. 185-6)

Dhalla et al (2014) Canada Randomised clinical trial	"To determine whether a virtual ward—a model of care that uses some of the systems of a hospital ward to provide interprofessional care for community-dwelling patients—can reduce the risk of readmission in patients at high risk of readmission or death when being discharged from hospital" (1305).	1 NR 2 Virtual ward model of care 3 Intervention group: Care coordination and direct care via a combination of telephone, home visits, or clinic visits for several weeks after hospital discharge. individualized management plans. Control group: only had typed, structured discharge summary, prescription if necessary, counseling from physician, home care as needed, and recommendation or appointments for follow-up as required.	4 (n=1923), divided between intervention group (n=963) and control group (n=960). 5 NR 6 general internal medicine ward 7 Inter-professional team including care coordinators (similar to case managers), a part-time pharmacist, a part-time nurse or nurse practitioner, a full-time physician, and a clerical assistant.	8 & 9 The primary outcome was a composite of hospital readmission or death within 30 days of discharge. Secondary outcomes included nursing home admission and emergency department visits, each of the components of the primary outcome at 30 days, as well as each of the outcomes (including the composite primary outcome) at 90 days, 6 months, and 1 year. No statistically significant between-group differences in the primary or secondary outcomes at any time point. 10 NR	11 Due to the per-patient costs of this intervention virtual ward models of care structured as per this study unlikely to be an efficient use of health care resources. 12 NR 13 NR	
Li et al (2014) China RCT	"To test the effectiveness of post-discharge nurse led telephone support on patients with peritoneal dialysis" (p278).	1 2 Telephone support and care. 3 Intervention included comprehensive discharge planning protocol including holistic assessment of needs (Omaha system), and individualised education programme developed for pre-discharge education, and education over 6 weeks post discharge, via weekly phone calls. Control group received usual care i.e. routine education, printed education materials, access to telephone hotline, and reminder to attend outpatient appointment. Outcomes measured at baseline i.e. discharge, 6 weeks and 12 weeks.	4 Adult patients aged 22 to 76 years (n=135), divided between intervention group (n=69) and controls (n=66). 5 End stage renal failure, on peritoneal dialysis. 6 Renal units of regional hospitals (n=2). 7 Doctor for discharge education of control group. Nurse case manager for intervention group.	8 & 9 Outcome measures: Quality of life (measured by Kidney Disease Quality of Life Short Form), blood chemistry, management of complications, and utilisation of health services i.e. readmissions or clinic visits. **Statistically significant difference between groups in 84 day readmissions** More significant improvement among intervention group participants than control group in relation to sleep, staff encouragement, patient satisfaction and pain at T2, but no difference between groups at T3, No significant differences between intervention and control groups in relation to blood chemistry, complication management, other aspects of quality of life, number of clinic visits or readmissions. Non- significant reduction in readmission rates in relation to intention to treats results. 10 NR	11 12 13	Nurse led telephone support effective in supporting dialysis patients during transition from hospital to home, and can be beneficial in terms of quality of life.

Meisinger et al. (2013) Germany RCT	"To evaluate the effects of a nurse-based case management for elderly patients discharged after an AMI from a tertiary care hospital" (p. e1).	1 "Readmission was defined as admission to any hospital after discharge from the index hospital" (p4). 2 KORINNA ("Coronary infarction follow-up in the elderly") is a single-centre randomized two-armed parallel group trial. case-management intervention consisted of a nurse-based follow-up for one year 3 Follow up included home visits and telephone calls, to detect problems or risks and give advice.	4 329 patients (intervention group: n=161; control group: n=168). 5 Myocardial infarction 47.1% had either diabetes or chronic heart failure as a major comorbidity 6 Home based secondary prevention following discharge from tertiary hospital. 7 Nurses (n= unspecified) trained by the study physician.	8 & 9 Primary study endpoint was time to first unplanned readmission or death. nurse-based management among elderly patients with AMI had no significant influence on the rate of first unplanned readmissions or death during a one-year follow-up. 10 NR	11 Cost components included labor costs, travel expenses, telephone costs etc. In order to calculate quality-adjusted life years. Results of same published elsewhere. 12 NR 13 NR	Recommendation: long-term influence should be investigated by further studies
Gould (2011) USA RCT	Examine a DNI aimed at promoting self-regulation of care at home: "To compare patients with CVD undergoing interventional revascularization procedures who receive usual care and those who receive DNI on medication adherence, patient satisfaction, use of urgent care, and illness perception" (p. 4)	1.NR Common Sense Model of illness perception: "incorporates elements of traditional health belief models and expands to include cognitive and emotional responses involved in the coordination of complex behaviors" (p. 3) 2. DNI based on the Common Sense Model of illness 3. Written discharge materials (including medication review materials, a medication pocket card, and suggested Internet sites), telephone follow-up by an expert cardio-vascular nurse. Intervention offered at discharge and continued within 24 hours of discharge. (p. 4)	4. Adults 30yrs – 80 yrs (n= 129) 5. Cardiovascular disease: Specifically, patients undergoing interventional revascularization procedures 6.Academic medical centre that serves as both a city and community care centre 7.Nursing personnel and expert cardio-vascular nurses	8 and 9. **Medication adherence**: A)Medications currently prescribed: No significant differences B)What percentage of aspirin and/or clopidogren they took as prescribed: No significant differences C)Morisky Adherence (forgetting or omitting medication): no significant differences (High in both groups) **Patient satisfaction:** A) Would they return: no significant differences B) Would they refer fam/friends: no significant differences (High in both groups) **Utilization of urgent care**: A) Call to physician: No significant differences B) Call to hospital: No significant differences C) Visits to ER: No significant differences	11."Redesign of discharge processes may be accomplished by reengineering existing resources rather than adding new or costly interventions" (p. 8) 12.NR 13. NR	Implications of accepting conditions as long-term: "Studies also report that perceiving cardiac disease as chronic may be instrumental in engaging individuals in making lifestyle changes", better diet, exercise self-efficacy, and long-term adherence to medication (p. 7) Limitations: short duration of study (1-3 days post-procedure), self-report, lack of diversity of study sample Suggested study replication in different settings and populations, as well as in "settings without advanced practice nurses and/or Magnet Hospital status, streamlined discharge instructions, electronic medical records and

				(Low in both groups) **Illness perception:** * A) Timeline (acute/chronic) component: experimental group scored significantly higher (P < .01) B) No other significant differences found (other measures were: personal control, cure control, illness coherence, time cyclical, consequence, emotional representation) 10.NR		prescription services" (p. 8)
Rice et al. (2010) USA RCT	To "determine whether a simplified disease management program reduces hospital admissions and emergency department (ED) visits due to chronic obstructive pulmonary disease (COPD)." (p. 890)	1 NR 2 Disease management program 3 Education, optimisation of evidence based medications, information and support from case managers, counselling, institution of self-management principles, follow-up calls.	4 Older adults – mean age 69.9 yrs (n= 743) 5 Chronic obstructive pulmonary disease (COPD) 6 Acute hospital/ED to home 7 Respiratory therapist case manager	8 & 9 **Hospitalisations and ED visits:** Statistically significant reduction of 41% in intervention group (P< 0.001) After 1 year of follow-up, the average number of COPD-related hospitalisations per patient was 30% lower in disease management than usual care, and the average number of COPD-related ED visits was 50% lower. Percentage of patients who experienced at least one COPD-related hospitalisation was 23.2% in the usual care group and 16.7% in the disease management group (P= 0.03); for COPD-related ED visits, the percentages were 22.9% and 13.7%, respectively (P= 0.001). Intervention group spent 36% less time in hospital for all causes (1.7 vs 2.8 days; P= 0.03) and less time in the ICU (0.1 vs 0.4 days; P= 0.08) 10 Relative contribution of individual components of the intervention could not be determined.	11 NR 12 NR 13 NR	This multicenter, randomised trial showed that a simple disease management program across a variety of health care delivery settings reduced hospitalizations and emergency department visits for chronic obstructive pulmonary disease. **Limitations:** Patients were almost exclusively male; study restricted to relatively high-risk patients, and it is uncertain whether the same intervention would be effective in patients with milder disease; because the trial lasted for only 1 year, longer-term risks and benefits remain unknown; study was substantially larger than other trials, but it lacked sufficient power to detect a mortality effect. No cost benefit analysis was reported. This intervention shows potential for reducing health care costs in addition to improving quality. **Recommendation:** Confirmatory studies need to be performed in other settings.

Appendix 2e: Primary Care Interventions

Source and Type of Evidence	Aim	Q.1. Definitions Q.2. Model/system/ policy/intervention Q.3. Main components of Q2	Q.4. Population group & size Q.5. Health condition/problem Q.6. Healthcare context/setting addressed Q.7. Healthcare professionals/personnel involved	Q.8 & 9 Outcomes assessed & Effects on outcomes Q.10. Components of model/system/policy/ intervention associated with <u>improved</u> outcomes	Q.11. Resource implications (e.g. cost, personnel) Q.12. Enablers Q.13. Barriers	Additional Comments e.g. explanatory notes; key recommendations/messagesReported quality stated by authors.
Ontario Health Technical Advisory Committee (2009) Canada Evidence-based analysis RCTs (n=8)	To determine the effectiveness of specialized multidisciplinary Community Based care in the management of heart failure (HF).	1. NR 2 Specialized, multidisciplinary, community-based care (SMCCC) 3 Disease specific education (n=8) Medication education / titration (n=5) Diet counselling (n=7) Physical activity counselling (n=4) Lifestyle counselling (n=4) Self-care behaviours (n=6) Self-care tools (n=4) diary Evidence Based Guidelines (n=2) Regular follow-up (n=5) Decision support component (all) Self-management component (n=7)	4 adults >65 (n=2692) 5 Heart Failure 6 Community Based 7 Nurses specialist in HF Management and Cardiology physicians	8& 9 **All-cause mortality** statistically significant RRR of 29% with moderate heterogeneity (I2 of 38%) (n=8) **All cause hospitalization** : Statistically <u>insignificant</u> **HF specific mortality:** insignificant **HF specific hospitalization** Pooled results <u>insignificant</u> (n=6) **ER Visits** 77% (59/76) of the SMCCC group and 84% (63/75) of the usual care group were either readmitted or had an ER visit within the 1 year of follow-up (P=0.029). (n=1) **10** NR	11 NR 12 NR 13 NR	The evidence supports that SMCCC is effective when compared to usual care provided by either a primary care practitioner or a cardiologist. It does not, however, suggest an optimal model of care or discern what the effective program components are (P.8).

Crocker et al. (2012) USA Syst. Rev. (n= 3) - All RCTs	To investigate "the impact of primary care– based telephone follow-up on post-discharge emergency department visits and hospital readmissions." (p. 915)	1 NR 2 Primary care-based telephone follow-up call intervention. 3 Needs assessment, discharge diagnosis, education, medication reconciliation, assist in (re)scheduling appointments, assess barriers to keeping appointments.	4 Adults – Average age 52-65 (n= 1765) 5 NR 6 Primary/ambulatory 7 Primary care providers: Nurses or case managers supervised by physicians	8 & 9 **Non-elective readmissions:** No significant effect (n= 3) **ED visit rate:** No significant effect (n= 2) **Patient engagement:** Significant increase in office contact (n= 1) **(**0.53/patient/ vs 0.48; *P* = .005); and office visits (n= 2) (0.30/patient vs 0.26; *P* = .02) and (No follow-up within 21 d - 14.9% vs 40.8%; ***P* = .005)** 10 Early post discharge contact provides opportunities to address informational needs of patients.	11 **Noted:** "Determining who among the primary care team (eg, nurse, physician, medical assistant, health coach, case manager, or pharmacist) is most Effective in administering the post-discharge telephone follow-up could hold significant workflow and financial implications. (p. 919) 12 NR 13 NR	**Note:** "Understanding the risk profile of patients who benefit most from telephone follow-up may help transitional care teams better allocate resources to the highest risk group." Comparison of telephone follow-up on outcomes among studies difficult because groups within each study may not hold similar risk profiles for readmission. **Note:** "Each study used unique discharge planning and office follow-up methods in intervention, which may have confounded the effect of the telephone follow-up." (p. 918) High-quality studies still needed to evaluate the effect of a primary care-based telephone follow-up intervention. Addition to the telephone follow-up
Ryan et al. (2014) USA Syst. Rev (n= 17) 13 Observational & 4 Experimental Studies **NOTE** - the 4 Experimental studies only apply to this review.	To summarize interventions aiming to reduce hospitalizations" (p.e1628). .	1.Preventable hospitalisations: readmissions or ambulatory care sensitive conditions or investigator criteria. 2 Primary care (PC) programmes: Case management CM/ Special Needs SN programme/ Integrated System IS/ Ambulatory care -AC. 3 Assigned primary care providers; Early screening, diagnosis & treatment; Unified Integrated co-ordination across primary & specialist services; Participation & advocacy/shared decision-making; 24/7 home care .g.	4 Children (n=139,117) 5 Medical complexity e.g. cerebral palsy, spina bifida, neurological disorders 6 Primary/ambulatory 7 Multiple primary care providers – nurses, physicians, allied HCP (See No. 3)	8 & 8: **Reduced avoidable hospitalizations:** CM (CI: 0.06-1.01); SC median reductions in admission rates x40% hospital days x 17.6& (P <.003); IS Reduction in annual hospitalization rates from 58% to 43.2% (P <.01); AC Reduction in annual hospitalizations for from 2796 to 1622 from previous 10 years (R2 = 0.82, P <.001) & decreased LOS (R2 = 0.83, P <.001). No effect on acute admissions (R2 = 0.08, P = .45). 10 Noted that interventions not designed to identify effective components.	11 Increased reimbursement for physicians, hospital & long-term care Expansion of funding needed (re AC); 12 Practice level redesign emphasising chronic care management; building organizational capacity; population based management; multi-disciplinary team approach. 13 Patient & Family	Definitions related to how preventable hospitalisations were defined by researchers in each study, most of which were 'readmissions'. Enablers (see 12) proposed as a recommendation. . Noted that most studies has design flaws resulting in medium risks of bias at least.

					e.g. non-adherence to treatments; discharge advice Health Care: lack of parent input to programme designs; lack of home visits; inadequate care planning; lack of practice level capability.	
Stall et al, (2014) Canada Syst. Rev (n=9) 8 Observational 1 RCT	To describe the effect of home-based primary care for homebound older adults on individual, caregiver, and systems outcomes. (p. 2243)	1. NR 2. Interdisciplinary / Inter-professional Care Teams with a Primary Care Provider. / Comprehensive and ongoing primary care in the home. 3. Individualised Care Plan (n=9) Comprehensive Geriatric Assessment (n=4); Regular Inter-professional Care Meetings ((n=6); After hours Urgent Telephone Service (n=4).	4. Adults > 65 (n=46,154) 5. NR 6. Home Based / Primary Care 7. Primary Care Provider (Medical Doctor/ Nurse Practitioners/ Physician Assistant / Social Worker/ OT, Physiotherapist)	8 & 9 **ED Visits** reductions in emergency encounters of 48% **(p < .01)** **Hospital Admissions** substantial reductions (23% (**P < .001),** 7% (**P = .004**), 43.7% (**P =001)**,30 and 84% **(P < .01).** 22% reduction **(P = .03)** in hospitalizations in a subgroup of severely disabled individuals. **Bed Days** reductions in inpatient days: 37.4% **(P = .04),** 49.9% **(P = .001)**,30 69% (no P-value reported),31 and 62% and 59% (no P-values reported). **Long term Care Admissions** reductions of 10% (no P-value reported), **20% (P = .001),** and 25% (no P-value reported **10 NR**	11. Four studies included financial analyses, two reported substantial cost savings but two reported higher costs per patient after enrolment in the program. In discussion : A recent independent financial analysis of an HBPC program demonstrated substantial economic benefits (p.2248). 12. Adherence to the core program components (see 3) 13. NR	Overall, the results are significant and highlight that HBPC for homebound older adults can positively affect several important individual, caregiver, and system outcomes (p.2248)

| Holland et al (2005)

UK

Syst Rev (n=30)
All RCT | To determine the impact of multidisciplinary interventions on hospital admission and mortality in heart failure. | 1.NR

2: Home Based MTD Interventions

3.
Home visits (n=12)
Home physiological monitoring or tele-video link (n=3);
Telephone follow up with no home visits (n=12);
Hospital or clinic interventions alone (n=3).

3 one to one patient education concerning heart failure, medication, and diet and exercise advice; and symptom monitoring and self management advice. | 4. Adults (n=8158)

5. Heart Failure Diagnosis

6. Primary Care

7. NR | 8 & 9

Reduction in proportion of patients with one or more hospital admission (all cause):
Meta- analysis: significant reduction in all cause admission (RR 0.87, 95% (CI) 0.79 to 0.95, *p = 0.002).*

Home Visit interventions reduced all cause admission to
Hospital (RR 0.80, 95% CI 0.71 to 0.89, *p, 0.0001).*

Telephone-type borderline significance (relative risk 0.86, 95% CI 0.73 to 1.02, p = 0.09).

Hospital based interventions had ***no effect***

Mortality: Meta-analysis showed a significant decrease in all cause mortality (relative risk 0.79, 95% CI 0.69 to 0.92, **p = 0.002).**

Heart failure hospital admission:
Meta-analysis showed a significant reduction in heart failure admission (RR 0.70 (95% CI 0.61 to 0.81, **p ,0.0001**).

Home and interventions, (RR of 0.62 95% CI 0.51 to 0.74, p , **0.001**) and

Telephone-type interventions (RR 0.70 (95% CI 0.57 to 0.85, **p , 0.001**)
Other interventions -No significant effect

In-patient days: significant decrease in overall mean inpatient days of 1.9 days in favour of the intervention (95% C.I. 0.71 to 3.1, **p = 0.002**)

10 NR | 11 NR

12: Multidisciplinary High intensity interventions

13 more generic interventions | Note:

It should be noted that 11 trials incorporated interventions that appeared to be of high intensity (p905) |
| Carroll et al. (2007) | "to determine if a | 1 NR | | | | |

USA RCT	community-based collaborative peer advisor/advanced practice nurse intervention increased participation in cardiac rehabilitation programs and reduced hospital readmissions after MI and CABS and determine whether the type of cardiovascular event influenced rehospitalisation" (p 313).	2 12 week community intervention involving home visit and telephone calls Participation in a cardiac rehabilitation program and re-hospitalisations were collected at 6 weeks and 3, 6, and 12 months by telephone interview 3 Home visit within 72 hours; telephone calls from an advanced practice nurse at 2, 6, and 10 weeks; telephone calls from a peer advisor every 12 weeks. Telephone interviews to examine participation in cardiac rehabilitation program and re-hospitalizations at 6 weeks and 3, 6, and 12 months. Included support and Encouragement, listening, peer advisors reinterpreting symptoms, promoting exercise , managing energy, and education regarding cardiac diseases.	4 Single, widowed or divorced older adults (n=247). 4 groups: standard care for MI, standard care for CABS, standards care and treatment intervention for MI, standard care and treatment intervention for CABS 5 Myocardial infarction (MI, n=91) or coronary artery bypass surgery (CABS, n=154). 6 Academic medical centres (n=5). 7 Community-based collaborative peer advisor, advanced practice nurse.	8 & 9 Outcomes: Number of participants in cardiac rehabilitation programs. Number of re-hospitalisations in treatment vs standard care groups. No statistical differences, although there were fewer re-hospitalisations between 3 and 6 months after MI and CABS in the treatment group compared with the standard of care group. Overall, the evidence from this study suggests that a community-based collaborative peer advisor/advanced practice nurse intervention can play a role in promoting active participation in cardiac rehabilitation programs and fewer rehospitalizations in unpartnered older adults after MI and CABS. 10 NR	11 NR 12 NR 13 NR	Recommendations: Study findings suggest need for early identification of cardiovascular symptoms, healthy eating, and activity progression to prevent cardiovascular re-hospitalisation.
Lainscak et al. (2013) Slovenia RCT	"To test whether coordination of discharge from hospital reduces hospitalizations in patients with chronic obstructive pulmonary disease (COPD)" (p1)	1 NR 2 Discharge coordination intervention 3 Assessment of patients' circumstances and homecare needs. Patient and carers involved in planning.	4 Adults (n=253), divided between intervention (n=118) and control i.e. usual care (n=135). 5 Acute COPD exacerbation 6 Specialist pulmonary hospital. 7 community care/home care nurse, general practitioner, social care worker, physiotherapist and other professionals involved in home care services.	8 & 9 Primary end-point of the study was the number of patients hospitalized because of worsening COPD. Key secondary end-points were time-to-COPD hospitalization, all-cause mortality, all-cause hospitalization, days alive and out of hospital, and health-related quality of life. During a follow-up of 180 days, fewer patients receiving intervention were hospitalized for COPD (14% versus 31%, P ¼ .002) or for any cause (31% versus 44%, P ¼ .033). In time-to-event analysis, intervention was associated with lower rates of COPD	11 Authors state that discharge planning and transitional care are necessary for good functioning of health system, with reduced costs. 12 NR 13 NR	discharge coordinator intervention reduced both COPD hospitalizations and all-cause hospitalizations.

				hospitalizations (P ¼ .001). 10 NR		
Chow et al. (2008) China RCT – secondary analysis.	"To examine community nursing services for patients with cardiovascular diseases, chronic respiratory diseases and other general medical conditions, making the transition from hospital to home" (p 260).	1 "NR 2 Home visits by community nurses 3 first home visit within 48 hours of hospital discharge. health assessment	4 Adult patients who had been readmitted and were at risk of further readmissions (n=46), from previous study group. 5 cardiovascular diseases, chronic respiratory diseases and other general medical conditions 6 Medical unit of three regional hospitals. 7 community nurses, nurse coordinator involved coding of records.	8 & 9 Outcome measures are self-reported health status and hospital readmission rates. Significant differences in self reported health of respiratory and cardiovascular group following community nursing services compared with before same. Hospital readmission rate- no significant difference. 10 NR	11 Community nurses are valuable resources. Advanced practice nurses (APN) improve patient outcomes, while controlling healthcare costs. 12 NR 13 Some social factors, such as family support and age, are predictors of the likelihood of readmission	Comprehensive home based intervention involving case management and continuous monitoring beneficial for health and well-being of patients. Positive, patient-centred, caring and appropriate client–practitioner relationship needed with nurse to promote wellbeing of patients.
Delgado-Passler & McCaffrey (2006) USA Lit. Rev. (n= 5) – 3 RCTs, 1 prospective randomised trial, 1 retrospective non-randomised trial	"To examine Advanced Practice Nurse (APN) directed vs Registered Nurse (RN) directed telemanagement programs on clinical outcomes for heart failure patients" (p. 154)	1 NR 2 Advanced Practice Nurse (APN)-directed telemanagement (n= 3) or Registered Nurse (RN)-directed telemanagement (n= 2) 3 APN – Patient assessment, patient/carer education, weekly meetings (APN + cardiologist), transtelephonic home monitoring, telephonic case management (initial and follow-up calls), home visits, availability of dietitians and social workers. RN – Telephonic case	4 Older adults; mean age range of 63-73 yrs (NR for 1 study) (n= 2591) 5 Heart failure (n= 5) 1 RCT also focused on elders with medical and surgical conditions at high risk of readmission 6 Home/Primary care 7 Advanced Practice Nurse, cardiologist, physician, dietitian, social worker. Registered Nurse, physician	8 & 9 **APN-directed telemanagement (n= 3) - Readmission:** All 3 studies reported significant decrease (13 vs 24, P< 0.001; 20.3% vs 37.1%, P< 0.001; No data, P< 0.05) **LOS:** 2 studies reported significant decrease (49.5 vs 105 days, P< 0.001; 1.53 vs 4.09 days, P< 0.001) **Mortality rate:** 1 study reported significant decrease by 36% (P< 0.05) **Cost:** 2 studies reported significant decrease ($65,023 vs $177,365, P< 0.02; $0.6 million vs $1.2 million (Medicare reimbursements), P< 0.001) **RN-directed telemanagement (n= 2) – Readmission:** Significant decrease by 47.8% (n= 1, P= 0.01). Other study NS. **LOS:** 1 study reported significant decrease (No data, P= 0.03). **Cost:** 1 study reported significant	11 APNs considered more costly than RNs, but could be off-set by cost savings as APNs shown to prevent readmission to acute care facilities. 12 NR 13 NR	APN-directed telemanagement programs have the potential to improve the quality of care given to heart failure patients while reducing the cost to the institution, the patient, and the healthcare system. (Note: based on a small number of studies; n= 3) **Noted:** One RN-directed telemanagement program reported decrease in readmission rates. However, the study also identified that ED visits increased among the intervention group. Study did not indicate the number of ED visits or if these were included in the final cost analysis, so these results should be viewed with caution. **Future research** to include "using

| | | management (initial and follow-up calls), decision-supported software program (diet, medication, and lifestyle education), patient/carer education, coordination of primary care. | | decrease (45.5%, P= 0.04). **Mortality rate:** Reported in 1 study as NS (11%).

10 In contrast to RNs, APNs were "able to make decisions about care and better collaborate with physicians to provide individualised program protocols that meet each patient's needs. The APN's specialised assessment skills are advantageous in helping facilitate improved heart failure management." (p. 159)

Suggested as reducing readmission was the inclusion of a dietitian and social worker: "helped focus on specific educational needs of the patient." (p. 157)

Transtelephonic home monitoring device provided rapid and accurate monitoring of patients with heart failure directly to APN. APN can check monitoring alarms and adjust medication therapy, resulting in increased effectiveness compared to RN care. | | APNs in managing other chronic illnesses and their effects" (p. 159)

Studies that examine quality of life and functional status of patients with heart failure before and after implementing an APN-directed telemanagement program also recommended. |

Appendix 2f: Ambulatory/ Assessment Unit Interventions

Source and Type of Evidence	Aim	Q.1. Definitions Q.2. Model/system/ policy/intervention Q.3. Main components of Q2	Q.4. Population group & size Q.5. Health condition/problem Q.6. Healthcare context/setting addressed Q.7. Healthcare professionals/personnel involved	Q.8 & 9 Outcomes assessed & Effects on outcomes Q.10. Components of model/system/policy/ intervention associated with <u>improved</u> outcomes	Q.11. Resource implications (e.g. cost, personnel) Q.12. Enablers Q.13. Barriers	Additional Comments e.g. explanatory notes; key recommendations/messagesReported quality stated by authors.
Fox et al. (2012) Canada Syst. Rev. & Meta-analysis (n= 13) – 9 RCTs, 4 Quasi-experimental trials	"To compare the effectiveness of acute geriatric unit care, based on all or part of the Acute Care for Elders (ACE) model and introduced in the acute phase of illness or injury, with that of usual care." (p. 2237)	1 Early discharge planning: "activities to facilitate return to the community" 2 Acute geriatric unit care using one or more ACE components. 3 Patient-centered care, frequent medical review, early rehabilitation, early discharge planning, prepared environment.	4 Older adults ≥ 65 (Average age of 81; n= 6839) 5 Acutely ill (e.g. neurological, cardiovascular) or injured (e.g. fracture) 6 Acute care geriatric and non-geriatric hospital units (medical/surgical) to home/nursing home 7 Inter-disciplinary team: Physicians, nurses, physical therapists, social workers, geriatricians, occupational therapists.	8 & 9 **Eleven meta-analyses performed:** **Readmissions:** No significant difference between groups (n= 5) **LOS:** Significantly shorter in intervention group ($P= 0.03$; n= 4) **Discharge destination:** Patients 1.05 times more likely to be discharged home ($P= 0.01$; n= 9) and significantly less likely to be discharged to a nursing home ($P= 0.04$; n= 3) in intervention group **Iatrogenic complications:** Significantly fewer falls ($P= 0.02$; n= 2) and non-significantly fewer pressure ulcers ($P= 0.06$; n= 2) in intervention group. Significantly less occurrence of delirium in intervention group ($P= 0.001$; n= 3) **Functional decline:** Significantly less likely (13%) to experience functional decline between baseline 2-week prehospital admission and discharge ($P= 0.01$; n= 6) in intervention group. No significant difference in functional decline between baseline hospital admission and discharge ($P= 0.16$; n= 4) **Mortality:** No significant difference (n= 11) **Costs:** Significantly less in intervention group ($P= 0.02$; n= 4) following sensitivity analysis. 10 "Patient-centered care, frequent medical review, early rehabilitation, and early discharge planning were provided in more than half the studies and may represent the optimal ACE components for positive outcome achievement." (p. 2243) Interdisciplinary team work.	11 "By changing reimbursement or charge rates and by establishing targets for cost and resource efficiency for older people's care, funders can create the external and substantive structural incentives needed to move ACE into the 'mainstream of hospital care'." (p. 2243) 12 NR 13 Anticipated cost savings of approx. $246 (US dollars) per hospital stay, and more than a half-day shorter hospital stay could address the "cost-ineffectiveness and cost-prohibitiveness barriers to adopting the ACE model." (p. 2243)	Review had little missing data (six study authors provided unpublished data), minimizing publication bias. Although randomization was used in most studies, six had postrandomization exclusions or did not report related information, which may have contributed to an overestimation of effect sizes. Heterogeneity was low in the majority of meta-analyses, supporting validity of the results. No subgroup meta-analyses (medical vs surgical) performed due to results compilation and potential bias with small and uneven distribution of groups. Study highlighted the limited number of studies examining the effectiveness of acute geriatric unit care. Future research suggested to compare ACE components between surgical and medical patients; include admission through avenues other than ED; accurately determine the effectiveness of the full ACE model in subgroup meta-analysis.

Thomas et al. (2013) UK Syst. Rev. & Meta-analysis (n= 10) – All RCTs	To "evaluate the effectiveness of specialist clinics in reducing unplanned hospital admissions in people with heart failure." (p. 233)	1 NR Unplanned, emergency or unscheduled hospital admission: "admission or readmission with an overnight stay that was not previously planned or scheduled or 'elective'." (p. 233) 2 Specialist clinics 3 Education (e.g signs & symptoms, self-monitoring, diet and exercise); clinical monitoring; optimisation of treatment and referrals for diagnostic tests and treatments; tele-monitoring; telephone call follow-up.	4 Older adults - mean age range 56 to 80.3 yrs (n= 2780) 5 Heart failure/chronic heart failure 6 Hospital outpatient department/day hospital 7 Specialist nurse-led or multidisciplinary team (MDT) always consisting of specialist nurses and cardiologists with some studies using additional specialists such as a general practitioner (GP), physician, dietician, physiotherapists, psychologist or social workers.	8 & 9 **Unplanned admissions:** Studies assessed according to duration of follow-up. **3 month follow-up (n= 1):** No unplanned readmissions within 30 days of discharge. Significant reduction in the number of unplanned admissions after 3 months (RR 0.10). **6 month follow-up (n= 3):** non-significant reduction in the number of unplanned admissions (pooled RR 0.83) **12 month follow-up (n= 5):** Significant reduction in the risk (49%) and in the rate (65%) of unplanned admissions (pooled RR 0.51). **18 month follow-up (n= 1):** No evidence of an effect of either the basic (RR 1.01) or intensive interventions (RR 1.10) vs the control or for the two intervention groups combined (RR 1.04). **Intensity of follow-up visits:** Studies reportinga decreasing intensity of follow-up (n= 3; see comments for definition) showed a significant 58% reduction in unplanned admissions (pooled RR 0.42). No significant reduction reported for trials with intensive (n= 3), tailored (n= 2) or regular (n= 2) follow-up of patients throughout the follow-up periods. **Intervention began before patient discharge (n= 3):** Significant reduction in unplanned admissions (n= 2; pooled RR 0.26) when remaining contamination bias study was removed. **Other outcomes:** Mortality – Significantly lower (n= 2); non-significantly lower (n= 2); no difference (n= 6). Reported benefits on longer time to first readmission or death, a reduction in all cause admissions and improved survival (n= 1) and quality of life (n= 2). No improvement in quality of life or survival rates (n= 1).	11 NR 12 NR 13 NR	**Main finding:** Management conducted over a period of 12 months or which provided more intensive monitoring of patients within the first 2 months with one visit every 3 months thereafter (i.e. decreasing intensity of follow-up) had a significant reduction in the number of unplanned admissions. There may be a potential benefit from beginning this type of intervention before hospital discharge, although this was limited by the number of studies and sample size. **Strengths:** Comprehensive search strategy employed without limitations and robust reviewing. Focused on RCTs. **Limitations:** Narrow focus of the research question and, therefore, studies of specialist clinics focusing on other important outcomes (e.g. quality of life, self-care behaviour) which did not include unplanned admissions were excluded. The quality of the studies had an overall moderate risk of bias (e.g. studies that did not include all eligible patients (i.e. selection bias), and studies where there was possible contamination of the usual care group). **Cost saving potential:** Potential savings in readmission costs could be £11 million (does not take into account the cost of delivering any new services) based on the reported RR at 12 months from this review and the average cost of a non-elective inpatient admission for HF (NHS in England), **Level of Contact definition:**

| | | | | 10 Management conducted over a period of 12 months or utilising decreasing intensity of follow-up (Intensive monitoring first 2 months, reduced to one visit every 3 months) | | Level of contact grouped into the following categories: "(1) intensive follow-up where appointments were scheduled every 4–6 weeks, (2) decreasing intensity where appointments were scheduled every 1–2 weeks for the first 2 months and then reduced to once every 3 months, (3) regular follow-up where appointments were scheduled once every 3–4 months, and (4) tailored follow-up where appointments were scheduled depending on patient need without any further detail provided." (p. 235)

Recommendation: "Specialist clinics for patients with heart failure can reduce the risk of unplanned admissions; these were most effective when there was a high intensity of clinic appointments close to the time of discharge which then reduced over the follow-up period." (p. 233) |
| Ahmed & Pearce (2010) USA

Syst. Rev. (n= 20) – 5 RCTs, 3 Lit. reviews, 5 descriptive, 1 nonrandomized case-control design, 1 cohort study, 2 interventional studies, 2 surveys, 1 case study. | "To determine whether ACE units contribute to positive patient care outcomes for acutely hospitalized older adults compared to traditional medical care." (p. 219) | 1 NR

2 Acute Care for the Elderly (ACE) paradigm of care.

3 Specialized environment, patient-centered care, medical review, and interdisciplinary team plans of care. | 4 Older adults ≥ 65 (n= only reported for 1 study (n= 1531))

5 Acutely ill (types NR)

6 Acute hospital to community care units/home

7 Inter-disciplinary team: Geriatricians, nurse case managers, nurses, nutritionist, social workers, physical therapists, occupational therapist, and pharmacist. | 8 & 9 **Hospital readmission:** Significantly reduced for ACE units (n= 5); Neutral findings (n= 2).
LOS/Hospital Costs: Reduced LOS on average by 1 day (n= 5); Neutral findings (n= 1).
Costs, despite higher initial costs, statistically significant and demonstrably less when compared to usual care (n= 2).
Nursing home placement: Statistically significant reduction (14% vs 22%) in discharge to long-term care placement for ACE units (n= 3)
Functional decline: Significantly less functional decline in activities of daily living for intervention (n= 4); Neutral findings (n= 1).
Delirium: Statistically significant reductions in delirium for intervention (n= 2); Inconclusive (n= 1)
Polypharmacy: Intervention had lower | 11 NR

12 NR

13 NR | **Important:** Scarcity in duplicated results and lack of heterogeneity in outcome variables and operational definitions within these studies.

Although there is a need for replication in future research to confirm or dismiss significant findings, the literature presents "compelling evidence that warrants further investigation of ACE as a valuable alternative paradigm of acute geriatric care." (p. 219) |

				mean number of drugs when compared to patients on medical wards (n= 1; 4.8 vs 5.2); Neutral findings (n= 2). **Patient/provider satisfaction:** Superior overall satisfaction with care compared to prior hospitalization experiences (RCT, n= 1; 40% vs 26%, P <0.001). Additionally, all included studies that specified satisfaction scores for patients, caregivers, and families identified ACE as superior compared to usual care. 10 NR		
Conroy et al. (2011) UK Syst. Rev. (n= 5) – 4 RCTs, 1 Pseudo-RCT.	"To examine the evidence for services for older patients who developed a crisis and attended hospital, but who were assessed, treated and discharged, either immediately, or within a short-time period (up to 72 h) from an AMU or ED" (p. 437) Concept coined - 'interface geriatrics'	1 NR specific to Discharge 2 Comprehensive geriatric assessment (CGA): geriatrician-led in OPD (n= 2) nurse-led, geriatrician-supported (n= 2) 3 Geriatrician-led: home-based physio & occupational therapy assessment; Nurse-led: weekly MDT supported by geriatricians, liaison with emergency staff, referral to community services, and short-term case management.	4 Older adults ≥ 65 (n= 1899) 5 Care of frail older patients discharged rapidly (<72 h) 6 Acute hospital (ED) to home. 7 Geriatrician and/or nurse.	8 & 9 **Readmissions:** No significant difference (n= 4). **Functional Status:** Improved, although doubtful clinical importance (n= 1). **Quality of Life:** Improvement in physical component & mental component but not clinically meaningful (n=1) **Cognition:** No improvement (n= 1). **Institutionalisation:** Nurse led (n=2) or Geriatrician led (n=1) - no significant effect **Mortality:** No difference (n= 4) 10 NR	11 NR 12 NR 13 NR	Quality of Studies compromised due to small number of trials evaluated and high Heterogeneity. Geriatrician-led service was focused on a single clinical syndrome (falls), while nurse-led service was not condition specific.
Doran et al (2013) USA Syst Rev (n=13) 3 from same RCT; 3 Retrospective cohort design & 7 pre- post	To search for studies of medical respite programs' effectiveness in improving outcomes for homeless patients	1 NR 2 Care for Homeless Program / Project/ Respite Care/ Ambulatory. 3 24- hour Nursing Supervision / Care on Site (n=8) / Meals &	4 Adults > 18 yrs. (n= 12,122). 5 Multiple Chronic Conditions, Mental illness, Substance abuse. 6 Primary / Ambulatory Care (e.g. Special Unit, Chronic Nursing Beds/ Homeless	8 & 9 **Hospitalizations:** Reduction 29% (95% CI 10%–44%, **p=.005**) **Hospital days:** Reduction 29% (95% CI 8%–45%, **p=.01);** (3.4 vs. 8.1, **p=.002)**	11. Intervention group had average annual cost savings of $6,307. One study estimated that respite care cost lightly less than half the cost of one hospital day.(p. 519)	

comparisons		Medication Assistance (n=5) Multidisciplinary Care (n=4) Case Management (n=2)/ Social Services / Housing (n=2) Psychiatric services (n=1).	Infirmary) 7 Community Providers Multidisciplinary Health Team (physicians, nurses, social workers, case managers, physical therapy).	**ED visits:** reduction 24% (95% CI 3%–40%, **p=.03**) **Housing** Fewer future days of homelessness e.g. 27% housed at intake vs. 82% housed at discharge 44% discharged to "improved Accommodation. 10 Intensive Case management and Assistance with Housing.	Reduced ED visits, Nursing Home stays, and Jail stays also Contributed. 12 NR 13 Respite Care Centres are small and run by community organizations such as homeless shelters / Clients at risk of leaving against medical advice (p. 521)	
Ogilvie (2005) Syst Rev 1 RCT, 23 observational or cross-sectional studies, and 1 qualitative study	To synthesise published evidence of the impacts of introducing hospital based alternatives to acute paediatric admission.	1 NR 2 Alternative service provided in hospitals 3 Acute assessment units based in a paediatric department (hereafter referred to as paediatric assessment units: (n=13 Acute assessment units based in an accident and emergency department (A&E assessment units:((n= 9) studies) Acute assessment clinics (n=3).	4 Children (n-NR) 5 acute medical problems 6 Hospital 7 NR	8 & 9 **Discharge:** 40% of children referred as emergencies to **Paed assessment** units were discharged without requiring inpatient Admission (n=10) 62% to 99%,were discharged from **A&E Assessment Units** without admission (n=8). **Unscheduled returns** Between 0.4% and 7% of discharged Children from **Paeds assessment** units returned unexpectedly to hospital (n=five). 0.4% and 1.7%, respectively, of patients discharged from the **A&E Assessment Units** returned for readmission within 72 hours (n=2) **Parents satisfaction** 10 NR	11 One RCT Found no significant difference in indirect costs, but children who were managed initially in the acute assessment unit spent fewer days in hospital, had fewer days of intravenous therapy, and incurred lower room and therapy/ancillary charges. 12 NR 13 Children's use of emergency hospital services may be affected by socio-spatial factors such as deprivation and proximity to hospital (p141)	Note: In summary of key findings: Many of the studies identified were of uncertain quality or were open to significant potential bias. The available evidence suggests that about 40% of children attending acute assessment units in paediatric departments, and over 60% of those attending acute assessment units in A&E departments, do not require inpatient admission. (p140)

Scott et al. (2009) Australia Syst. Rev. (n= 9); 7 retrospective and 2 prospective before-after analyses.	"To assess the effectiveness of acute medical units (AMUs) in hospitals" (p. 397)	1 NR 2 Acute Medical Unit (AMU) 3 Rapid assessment, diagnosis and treatment; standardized admission and discharge processes; optimisation of bed management using care pathways; smoother patient flows; improved rostering and use of shifts.	4 Age group (NR) (n= 248016) 5 Acute medical illness (type - NR) 6 Acute medical unit to inpatient bed/critical care unit 7 Units supervised by consultants; also generalist physicians and multidisciplinary team (nurses, junior medical staff, allied health, pharmacists, clerical staff, wardsmen) that assess and manage medical illness and functional disability.	8 & 9 **Readmission rates:** Decreased from 13.3 to 6% following AMU (n= 1) **LOS:** Significant reduction (range 1-2.5 days; n= 4, P<0.001) **Waiting times in ED:** Decreased by 30% following AMU (n= 1; P<0.001) number of patients decreased from 14 to 2 over 4 years (n= 1; P< 0.001) **Discharge disposition:** **P**atients discharged directly home at 24 h increased from 21 to 29% (n= 1; P< 0.005),4% to between 15 and 29% (n= 1; P< 0.001) and at 48 h increased from 31 to 40% (n= 1; P= 0.04) Increase from 27 to 56% in the proportion of patients being cared for by the appropriate speciality. **Mortality:** Reduction in all-cause hospital mortality over (1) 5 years from 12.6% to 7.0% (n= 1; P< 0.001); and (2) 4 years from 7.2 to 5.9% (n= 1; P= 0.04). **Bed cost and resource utilization:** Saving of 4039 bed-days over 12 month period yielding estimated benefit of €1 714 152, after excluding patients with length of stay of >30 days (n= 1) **Patient/staff satisfaction:**52% of patients, 91% of nurses and 93% of medical staff perceived the AMU as better than the traditional care model (n= 1); nursing staff (response rate = 64%) reported more time for health promotion (P< 0.01), but felt more stress in dealing with a concentration of acutely ill patients (P< 0.05) 10 More appropriate and rapid assessment, diagnosis and treatment (reduced LOS); improved rostering (staff satisfaction)	11 NR 12 NR 13 Difficulties recruiting nurses and allied health staff with appropriate levels of acute assessment skills.	"AMUs staffed by multidisciplinary teams led by acute medicine physicians have the potential to improve the quality and the safety of care of a significant proportion of acutely ill medical patients presenting to hospital." (p. 406) Differences between AMUs both at the local level and between national jurisdictions, and thus the current analysis of a relatively small number of units does not allow identification of differences in operational methods that impact on outcomes. Because of study heterogeneity with respect to periods of observation and outcome measure, no formal meta-analysis performed.

Crotty et al. (2008) Australia RCT	"to assess the effect of home versus day rehabilitation on patient outcomes" (p628).	1 NR 2 Rehabilitation programmes – one hospital day unit, one home-based. 3 Day hospital intervention: Interdisciplinary programme, three to five times per week for 4–6 weeks of high intensity rehabilitation in individual or group sessions. Each visit lasted 3 hours. Education session available for carers. Home based rehabilitation; one-on-one programme by interdisciplinary team, 3 to 5 sessions per week.	4 Adults > 60 years 5 Stroke 6 Public hospitals (n=3) in southern Adelaide, Australia. 7 Interdisciplinary team, including occupational therapist.	8 & 9 Outcomes: Primary outcome: functional ability in ADLs, measured by change in the Assessment of Motor and Process Skills (AMPS) score at 3 months. Other outcomes: hospital readmission, transfer to residential care, quality of life, carer stress /quality of life, at 3 months. Place of residence, hospital re-admissions and mortality at 6 months. Carers of patients in day hospital had more stress than those for patients in home rehabilitation, as per Caregiver Strain Index (CSI) scores (P = 0.047). Patients in day hospital had twice the risk of readmission compared to those in home rehabilitation, at 3 and 6 months. 10 NR	11 Did not include information on costs but the day hospital programme utilised more resources due to length of stay and number of therapy sessions, while resulting in more readmissions and no difference in other patient outcomes. 12 NR 13 Access to on-site medical professionals and proximity to ED (as in day hospital programme) promoted readmissions.	Recommendations: based on findings in relation to increased readmissions following hospital day rehabilitation programmes, health services should prioritise access to home rehabilitation in favour of day hospital programmes.
Edmans et al. (2013) UK RCT	"To evaluate the effect of specialist geriatric medical management on the outcomes of at risk older people discharged from acute medical assessment units" (p e1).	1 hospital presentations, defined as the total number of inpatient admissions, attendances to accident and emergency/ acute medical unit without admission, and day cases 2 Specialist geriatric assessment at discharge from acute assessment units 3. Assessment by geriatricians prior to discharge. Care coordinated by geriatricians e.g. review of medication, further assessment, intermediate care, advanced care planning, liaison with other services e.g. community services.	4 Older adults (70 years +) 5 At risk of deterioration? 6 Acute medical assessment unit. 7 Medical consultant and team, multidisciplinary team – nurse, physiotherapist, occupational therapist. GPs	8 &9 primary outcome: days spent at home or other normal place of residence in the 90 day follow up period. Secondary outcomes: mortality, institutionalisation, dependency, mental wellbeing, quality of life, and health and social care resource use, at 90 days. No significant difference in time at home within 90 day follow-up period, or for any secondary outcome. More than half of participants spent all of 90 day follow-up period at home, i.e. 57% of controls and 52% of intervention group. Overall 54% of participants had at least one hospital presentation during the study, with a slightly increased number among intervention group (P=0.05). 10 NR	11 NR 12 NR 13 NR	Specialist geriatric input between acute and community settings, alone, insufficient and unlikely to cause measurable benefits to patient outcomes. More effective methods needed to identify patients most likely to benefit from such interventions.

Rosted et al. (2013) Denmark RCT	To "examine the effect of a two-stage nursing assessment and intervention to address older adults' uncompensated problems and thus intend to prevent readmission and functional decline" (p477).	1 NR 2 standardized nursing assessment to identify problems and problem solving intervention conducted post discharge and at follow-up. Standardized Evaluation and Intervention for Seniors At Risk (SEISAR) assessment and intervention tool developed by McCusker et al. Standardized nursing assessment with checklist of 10 medical, social, emotional and physical items. problem solving intervention, in which a plan was made to resolve the problems together with the older person. The plan could include professional information given by the research nurse, referrals to the geriatric outpatient clinic, recommendations to the community health center and general practitioner (GP) and arrangements with relatives and was routinely sent to the community health center.	4 Patients 70þ years who were at increased risk of functional decline and readmission and who were discharged home within 3 days of admittance to the ED (n= 271). 5 NR 6 ED of a university hospital 7 Research nurses (n=3), all aged-care nursing specialists.	8 & 9 Primary outcome measures were mortality, acute readmission to hospital including the ED and permanent admission to nursing home within 30 or 180 days of discharge from the ED. Secondary outcome measures were physical and emotional status, health related quality of life and assistance from community services. No effect was found on readmission to hospital, admission to nursing home, functional decline or death but the intervention group was less likely to be at risk of depression after 180 days 10 NR	11 NR 12 NR 13 NR	Recommendations: Further research is needed into effectiveness of this method, particularly whether it would have had a positive effect on older persons with an ISAR score of 2. We further recommend that qualitative studies investigate the older persons' experiences with follow-ups after ED stays.

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Appendix 2g: Hospital at Home Interventions

Source and Type of Evidence	Aim	Q.1. Definitions Q.2. Model/system/policy/intervention Q.3. Main components of Q2	Q.4. Population group & size Q.5. Health condition/problem Q.6. Healthcare context/setting addressed Q.7. Healthcare professionals/personnel involved	Q.8 & 9 Outcomes assessed & Effects on outcomes Q.10. Components of model/system/policy/ intervention associated with <u>improved</u> outcomes	Q.11. Resource implications (e.g. cost, personnel) Q.12. Enablers Q.13. Barriers	Additional Comments e.g. explanatory notes; key recommendations/messagesReported quality stated by authors.
Jeppesen et al (2012) Australia, Cochrane Syst. Rev (n=8)	To evaluate the efficacy of hospital at home compared with standard hospital inpatient care for acute exacerbations of COPD (p.6)	1 Inpatient hospital readmission rate (after discharge from inpatient or home care) 2 All patients provided with the treatment as deemed appropriate at the time of initial assessment on presentation to the emergency department. 3. All home support patients would have regular scheduled visits by the nurse as well as additional visits as requested by the patient or deemed appropriate by the nurse or the medical team. All home support patients should be visited by the respiratory nurse until discharged from care.	4 Adults n= 870 5 Acute Exacerbations of COPD 6 At Home 7 specialist respiratory nurse (under guidance of the hospital medical team).	8 & 9 Primary: Readmission/ Mortality Secondary: Carer satisfaction/ HRQL. **Readmission Rate:** a significant reduction in readmission rates for hospital at home compared with hospital inpatient care of acute exacerbations of COPD (risk ratio (RR)0.76; 95% confidence interval (CI) from 0.59 to 0.99; P=0.04). **Mortality:** Observed a trend towards lower mortality in the hospital at home group, but the pooled effect estimate did not reach statistical significance (RR 0.65, 95% CI 0.40 to 1.04, P = 0.07). 10 NR	11 Three studies report direct costs associated with supplying the care and do not account for possible saving related to prevention of exacerbations, reduction in absence from work. Two studies reported a significant reduction in direct costs for hospital at home One study showed a trend towards lower cost for hospital at home, but the difference did not reach statistical significance (P = 0.38) 12 NR 13 NR	Treatment of acute exacerbations of COPD in hospital at home may lead to fewer readmissions in comparison with conventional hospital treatment (moderate quality evidence). Moreover, hospital at home schemes for treatment of acute exacerbation of COPD demonstrate a statistically insignificant trend towards reduced mortality over two to six months when compared with conventional treatment in hospital (moderate quality evidence). Available data from individual studies suggest hospital at home schemes may be associated with cost savings in comparison to inpatient care, but current evidence is found to be of very low quality (p12) Due to the world wide variability of healthcare systems, the applicability of the presented results may be context dependent. (P12).

Parab et al 2013 Australia Cochrane Syst. Rev (n=7) 5 RCT's 1 Quasi RCT 1 Prospective RCT (Pilot)	To evaluate specialist home-based nursing services for children with acute and chronic illnesses	1 NR 2 Home and outpatient care 3 Stress point intervention (n=1) Home and outpatient care for education and treatment (n=3) Hospital at Home'(n=1) At home, chemotherapy (n=1) Home oxygen therapy (n=1)	4 Children (0-18yrs) (n= 840) 5 Multiple acute & chronic illnesses (e.g Diabetes, cancer, haematological disorders) 6 Home / Primary Care 7 NR	8 & 9 **Utilisation of emergency departments (EDs)** (no data) **Hospital admissions** No significant differences readmissions over 90 days **LOS: H**ospital in the home' treatment group spent significantly less time in a hospital bed (55.2 hours) than those in the hospital group (96.9 hours) (P = 0.001) (n=1). However children receiving home care used more diabetes nursing hours during the 24-month period, 58.9 hours per child compared with 17.3 hours for standard care (P value and significance not stated), **Parental, child and referrer satisfaction:** Improved ability to cope with stress point intervention **(**6.1% versus 6.8% (P < 0.02) (n=1) **Physical health:** improvement with home care intervention for Diabetes 6.1% versus 6.8% (P < 0.02) (n=1) **QOL: H**ome care group had greater satisfaction in family functioning (P < 0.001); greater parental ability to cope (P < 0.001); greater family ability to cope (P < 0.001); a greater ability in personal and social care coping (P < 0.01); and a greater perception of helpfulness from healthcare providers and institutional sources (P < 0.001) (n=1). Better parental satisfaction (n=3) **Mental Health** significant improvement in the child's psychological Adjustment at 6 months (P < 0.05) n=1) 10 NR	11: Cost effectiveness was not comprehensively addressed by any of the included studies (p. 14) 2 studies suggested that the financial cost to the hospital of providing the home-based care programme may cost more than the hospital-based care, but suggested that there are substantial cost savings for the family (p. 14) 12 Perception that children receiving the 'Hospital at Home' service recovered more quickly in their own environment and that there was less social disruption and financial burden for the family. 13 NR	**Note** There is insufficient evidence to support the effectiveness of specialist paediatric nurse home visiting for acute and chronic illnesses in reducing hospital admissions and Emergency Department utilisation. However, there is suggestive evidence that home care programmes may lead to greater parent satisfaction, improved quality of life and a reduction in the length of hospital stay. The cost effectiveness of these programmes is still to be determined (p. 14)

| Utens et al. (2012) Netherlands RCT | To "determine the effectiveness of early assisted discharge for chronic obstructive pulmonary disease (COPD) exacerbations, with home care provided by generic community nurses, compared with usual hospital care." (p. 1) | 1 NR

2 Early assisted discharge hospital-at-home scheme

3 Discharge after 3 days; home visits by 'generic' community nurse; symptom review; counselling; medication compliance; 24hr telephone access to hospital ward for 4 days. | 4 Adults ≥ 40 yrs (n= 139)

5 Chronic obstructive pulmonary disease (COPD) exacerbations.

6 Acute hospital to home/community based home care organisations

7 Hospital respiratory physician; 'generic' community nurses; general practitioner | 8 & 9 **Readmissions:** No difference in number of readmissions per patient between the groups, or in the total number of readmissions in each group. No difference in time to first readmission between the two groups (P= 0.461) Readmission rate was 25%.
Health status: measurements not significant between groups at 4 days (P= 0.078) or 3 months (P= 0.858)
Quality of life:
Mean change in Health Related Quality of Life scores at end of treatment was significantly greater in the usual hospital care group (P= 0.024). This difference disappeared at 3 months.

10 NR | 11 NR

12 NR

13 NR | **Context:** Hospitalisations are the main cost driver in COPD, and put pressure on scarce hospital beds.

No significant short-term or long-term differences in outcomes between early discharge and usual hospital care, except for generic health-related quality of life at the end of treatment.

Limitations: Slight reduction in power due to small sample size. Study would need > 500 patients to be an equivalence trial (determine if both groups were equally effective – not feasible). Patients and healthcare staff could not be blinded to the allocated group.

Recommendation: Early assisted discharge with home visits by community nurses is a feasible and an alternative to usual hospital care for selected patients with an acute exacerbation of their COPD.

Social environment is an important factor when deciding for admission and (early) discharge.

Future studies should focus on determining which treatments can be safely provided at home, which treatments require the supervision of generic or specialised nurses, and which criteria should be applied for selecting eligible patients. |

Appendix 2h: Home Based Interventions

Source and Type of Evidence	Aim	Q.1. Definitions Q.2. Model/system/ policy/intervention Q.3. Main components of Q2	Q.4. Population group & size Q.5. Health condition/problem Q.6. Healthcare context/setting addressed Q.7. Healthcare professionals/personnel involved	Q.8 & 9 Outcomes assessed & Effects on outcomes Q.10. Components of model/system/policy/ intervention associated with <u>improved</u> outcomes	Q.11. Resource implications (e.g. cost, personnel) Q.12. Enablers Q.13. Barriers	Additional Comments e.g. explanatory notes; key recommendations/messagesReported quality stated by authors.
O'Connor et al (2014) USA Syst. Rev (n=7) – all descriptive/cohort studies	To "provide a critique and synthesis of published empirical evidence related to frontloading and visit intensity among home health beneficiaries. (p.161)	1 30-day hospital readmissions; unplanned and possibly preventable hospital readmission. Frontloading: providing 60% of planned visits within first 2 weeks of the home health episode (p.169) 2 Comprehensive Community Wide Effort Strategy (n=1) Home Health Visits (n=2) Discipline-specific visits (n= 3) Patient- provider agency (n=1). 3 Home health agencies (e.g. red flag teaching, Medication reconciliation/ assessment/ self-management) / skilled nursing visits/ Discipline-specific home visits	4. Adults (n=78,233) 5.Heart failure/ Diabetes/ Medicare certified, Total Hip Replacement (some NR) 6.Primary / Home 7. Nurses, physical therapy, occupational therapy, speech-language pathology, medical social worker, home health aide	8. & 9: Frontloading reduced the need for rehospitalisation among skilled / among home health patients & patients with heart failure. **Satisfaction rates** higher with frontloaded nursing visits (4.94 vs. 4.69, p = **.02).** **Re-hospitalisations:** Fewer within one 60-day home health episode (15.8 vs. 39.4%, $p < .001$); Fewer visits overall (9.5 vs 15.5 $p < .001$), **LOS:** shorter (27.5 vs. 49.3 days, $p < .001$) THR patients were more likely to be discharged from home health with goals met than CHF patients (82 vs. 44%, $p < .001$) 10. Visit intensity rate: number of visits per day	11. NR 12 Home health agencies participating in the quality improvement organization demonstration 13 Visit intensity varied with patient condition and with type of provider. Not effective for some home health populations e.g. diabetes	Only two frontloading Studies Neither employed random selection. Noted that no one intervention identified as being most effective.

Reilly et al (2015) UK Cochrane Syst. Rev (n=13) All RCT's	To evaluate the effectiveness of **case management** approaches to home support for people with dementia, from the perspective of the different people involved (patients, carers, and staff)	1 NR 2 Telephone-based care consultation delivered within a partnership between a managed care health system and an Alzheimer's Association (n=1). Collaborative care management delivered by a team led by their primary care physician and a geriatric nurse practitioner (n=1) Education & Support & Advice(n=4). Early Home Support Programme (n=2)/ Flexible, stepped-care model (n=1) /Dementia Family Care Co-ordinator (n=2)/Individualised Care Package (n-=1)/Chronic Care Model (n=1) 3 Participant information and education; carer education; provision of emotional/ therapeutic support. **Early Home Support** Programme: occupational therapy, physical therapy, social work, nursing, respiratory therapy, in-home respite, and out-of-home respite, homemaking, personal care assistance, volunteer service and psychiatric consultation. **Dementia Family Care** : advocacy comprehensive support, continuous and systematic counselling, annual training courses follow-up calls, in-home visits, assistance with arrangements for social and healthcare services and 24-hour-per-day availability by mobile telephone.	4 Adults (n=9615) 5 Patients with Dementia 6 Variety of settings, including primary care and dementia resource centres. 7 primary care physician/ a Geriatric nurse practitioner/ Specialist / Advanced Nurse/ OT/ psychiatrists	8 & 9 **Hospital Admission** There was **no difference** in the number of people admitted to hospital at six (n=4), 12 (n=5) and 18 months (n=5). The risk of hospitalisation **for the carers** in the intervention group was significantly lower than in the control group (OR 0.51, 95% CI 0.33 to 0.81, n = 412, P **= 0.005) (n=1)** **Institutionalisation:** (MD -7.70, 95% CI -9.38 to - 6.02, n = 88, **P < 0.0001).** (N=1) **Homecare use at 12 months** significantly greater (OR 2.28, 95% CI 2.03 to 2.56, n = 5376, I² = 30%, **P < 0.0001).** **Respite Care at 12 mts**: significant increase (OR 2.24, 95% CI 1.98 to 2.53, n = 5301, **P < 0.00001).** 10 NR	11 Case management reduced the total cost of services at 12 months (SMD -0.07, 95% CI -0.12 to -0.02, n = 5276, 2 RCTs, P = 0.01) **(n=1)** However the expenditure in the pooled case management groups was significantly lower than in the control group for the total three years in one study in the US (p36) 12 NR 13 NR	Note: No significant effects were present in favour of case management in the following outcomes **in the short term:** time to institutionalisation; number of people admitted to hospital; mortality; participant quality of life; cognition; depression; behaviour; function; carer quality of life; carer distress; mood; and social support. Case management was significantly more effective at reducing hospitalisations and emergency department visits for carers during one three-year study (p.36). Although use of many of the community-based services was significantly higher in the intervention group, it was not always Clear whether the case manager reviewed the care package and whether service packages changed in a timely manner to reflect the changing needs of the person with dementia The core tasks of assessment, care planning and implementation/ management were common to all but one trial, but there was considerable variation in their delivery. (p.36).

Wong et al, (2012) Australia Cochrane Syst. Rev (n=9) All RCT's (parallel design)	To evaluate the effectiveness of outreach respiratory health care worker programmes for COPD patients	1 NR 2 Supervised, home based intervention 3 Home care outreach nursing (all)	4 Adults (n= 1498) 5 COPD 6: Primary Care 7: Respiratory nurses	8&9 **Hospital Admissions:** no statistically significant difference in the number . **Emergency department:** insufficient data was available to perform pooled analysis **GP visits:** reported no change . **HR QL:** statistically significant improvement (mean difference -2.61, 95% CI -4.82 to -0.40) (n=4) **Carers outcomes:** no data **Patient related:** no significant difference **Mortality: Decrease** not statistically significant. 10 NR	11 NR in discussion The home care intervention may incur substantially higher health care costs than standard outpatient care for COPD (p.12) 12 Greater surveillance of deteriorations. 13 NR	**NOTE** Some studies showed a non-significant increase in hospitalisations. effect on hospitalisations was heterogeneous no firm conclusions drawn (p.12)
Levine et al. (2012) USA RCT	"To assess the efficacy of a home care program designed to improve access to medical care for older adults with multiple chronic conditions who are at risk for hospitalization" (p e1).	1 NR 2 Home care intervention (Choices for Healthy Aging [CHA]), based on home-based palliative care program model 3 Early identification and treatment / patient-specific health education /self-management or caregiver management of the disease, /advance care planning. Included home care visit for assessment, planning and evaluation. Follow up visits by nurse and doctor/medication reconciliation. Referrals by social worker. Visits by physician available 24/7.	4 Older adults at risk of hospitalization (n=298). 5 NR 6 Home care 7 interdisciplinary team, with core team members consisting of a physician, nurse practitioner, nurse care manager, and a social worker.	8 & 9 Outcomes measured: satisfaction with care, hospitalisations or service use, and costs of medical care. The intervention group were significantly more satisfied with care than usual care recipients (P = .014). Intervention patients were less likely to be admitted to the hospital than usual care patients (P = .02). There were no differences in costs between the home care and usual care groups. 10 NR	11 NR 12 NR 13 NR	Recommendations: Additional research is needed to determine better methods to identify high-risk patients efficiently to improve clinical and service outcomes and reduce the cost of care.

Bouman et al (2008) Netherlands RCT	"to describe the effects on health care use and associated cost. of a home visiting program for older people with poor health" (p291).	1 NR 2 Home visiting program 3 Home visits (n=8) from home care nurse over 18-months. Included geriatric assessment and referral to services as needed. Control group had only usual care.	4 Adults, aged 70–84 years (n= 330) living in community who were already receiving home care nursing prior to intervention, divided between intervention group (n = 160) and controls (n=170). 5 Health status moderate to good. 6 Home setting 7 Trained home care nurses (n=3) and public health nurse (n=1)	8 & 9 Main outcomes: admission to hospital/ nursing home/home, contacts with medical specialists/GPs/paramedics, hours of home care help. Inpatient and outpatient health care use similar for both groups. Slightly more participant in intervention group admitted to hospital, but slightly shorter length of stay. More use of aids and in-home modifications in intervention group. No differences between groups in health care cost. 10 NR	11 No difference in total cost or health scores between groups. 12 More frequent visits and better coordination of care may promote effectiveness of program. 13 nurses involved were not part of a multidisciplinary team, therefore limited medical input.	Authors conclude that these visits not beneficial for this population of patients.
Latour et al. (2006) Netherlands RCT	"to determine the impact of post-discharge, nurse-led, home-based case management intervention on the number of emergency readmissions, level of care utilization, quality of life, and psychological functioning" (p421).	1 NR 2 Nurse-led, home-based case management intervention in patient's home. 3 First home visits within 3 to 10 working days of discharge. Questionnaires and INTERMED scales to measure health status and functional ability. Promoted self-management. Interventions varied slightly depending on patients' specific needs.	4 Adults > 18 years (n=147), divided between intervention or usual care. 5 Problems related to internal medicine, gastroenterology, pulmonology, and cardiology. 6 Patients' homes. 7 Trained nurse specialist case manager, GP.	8 & 9 Outcomes: number of emergency readmissions, level of care utilization, quality of life, and psychological functioning No difference between groups in readmission, care utilization, quality of life, or psychological functioning. Controls group participants moved sooner to non-independent living accommodation than patients in, home-based case management group. 10 NR	11 NR 12 NR 13 NR	Disease-management appears insufficient for complex patients. Case-management interventions should be embedded in primary care to promote effectiveness.
Aguado et al. (2010) Spain RCT	To "evaluate the effectiveness of a single home-based educational intervention for patients	1 NR 2 Educational intervention 3 Home visit 1 week after discharge: self-management, education session on habits,	4 Older adults – mean age 77.6 yrs (n= 106) 5 Heart failure (HF) 6 Home	8 & 9 Statistically significant reduction in number of visits to the ED (42 vs 64; P= 0.001) and hospitalizations (19 vs 94; P= 0.003) in the intervention group compared with control. Non-significant decrease (14 vs 31; P= 0.448) in mortality.	11 NR 12 NR 13 NR	**Recommendation:** "a single educational home visit by a nursing staff member 1 week after hospital discharge reduces emergency visits and unplanned readmissions, lowers total healthcare costs, and shows a

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| | admitted with heart failure." (p. S14) | preventive activities. Telephone follow-up, medical review at 6 and 12 months. | 7 Physician, nurse | Significant decrease in mean total cost per person for intervention group (€671,56 vs €2,154.24; P< 0.001). Patients perceived health improved at 24 months but no significant difference between groups reported.

10 Applying the intervention during 1st week after discharge: faster assessment lead to admission avoidance. | | trend toward improvement in quality of life." (p. S21)

Performing the intervention during the first week after the hospital discharge allowed the detection of early decompensation, which occurs in up to 40% of the patients at 7 to 14 days after hospital discharge. Authors hypothesized that this may have led to a faster medical assessment, and thus avoided readmission.

Limitations: Single-centre study with small sample size. Sources of bias - Completion of health questionnaires by interview and then by phone. 69 patients (65%) were lost to follow-up at 24 months – difficult to obtain significant results. Family members allowed to answer questions on patients behalf. Assumed that the main cost of HF derived from hospitalisation. |

Appendix 2i: Tele-healthcare/ Electronic Interventions

Source and Type of Evidence	Aim	Q.1. Definitions Q.2. Model/system/ policy/intervention Q.3. Main components of Q2	Q.4. Population group & size Q.5. Health condition/problem Q.6. Healthcare context/setting addressed Q.7. Healthcare professionals/personnel involved	Q.8 & 9 Outcomes assessed & Effects on outcomes Q.10. Components of model/system/policy/ intervention associated with <u>improved</u> outcomes	Q.11. Resource implications (e.g. cost, personnel) Q.12. Enablers Q.13. Barriers	Additional Comments e.g. explanatory notes; key recommendations/messagesR eported quality stated by authors.
Martinez et al. (2006) Spain Syst.Rev. (n= 42) – 13 RCTs, 10 non-RCTs, 19 non-controlled clinical series or descriptive studies	To "assess the value of home monitoring for heart failure patients" (p. 234)	1 NR 2 Telehealth: Home monitoring for heart failure (HF) 3 Self-monitoring of vital signs: devices for measuring and transmitting electrocardiograms (ECG), blood pressure, heart rate, medication use, bodyweight, and symptoms	4 Older adults: mean age – 67 yrs; NR for 8 studies (n= 2303, NR for 5 studies) 5 Heart failure patients at risk of early re-admission 6 Home 7 Specialised nurses	8 & 9 **Readmission (n= 23):** Significantly reduced (n= 10), reduced but NS (n= 5), reduced but not statistically tested (n= 8). **LOS (n= 16):** Significantly reduced (n= 8), reduced but NS (n= 5), reduced but not statistically tested (n= 3). **Quality of life (n= 18):** Significantly increased (n= 7), increased but NS (n= 7), increased but not statistically tested (n= 4) **Mortality (n= 6):** Significantly reduced (n= 3), reduced but NS (n= 2), reduced but not statistically tested (n= 1). **Cost (n= 9):** Significantly reduced (n= 2), reduced but NS (n= 3), reported "important tendencies" (n= 4; details NR). **Use:** Ease of use of monitoring devices – patients rated 'very easy to use' (n= 5). **Acceptance:** ≥ 80% of patients expressed a good/very good impression of home experience and felt safer about their health (n= 17). Health staff lower (65%, n= 6) Interventions compared against usual care, home nurse visits, or pre-intervention.	11 NR 12 Home monitoring: technically effective and easy to use. 13 NR	Quality of studies varied greatly: 6 studies were of very good strength of evidence, 10 studies of good evidence, 7 studies of fair evidence, and 19 studies of poor evidence. Authors report that home monitoring increases quality of life, while reduces hospital readmissions, length of stay, and mortality rates. Noted that there was a lack of data assessing the effect of home monitoring on improvement in diagnosis, and on organisation. Economic studies focused on hospital impact, not on the patients or the health system. Home monitoring seems to produce significant hospital cost reductions, but the results are strongly dependent on the specific national health model. One study noted although the cost per patient was higher in the intervention group, after 8 months there was a 10% saving per patient reported due to 20% lower hospitalisation/medical

				10 NR		costs. Recommend that additional trials of the technology for home monitoring are not needed. Authors suggest that "home monitoring could be successfully implemented for HF patients on a national scale…producing a better quality of life for patients, which in turn would bring benefits to the national health system" (p. 240)
Motamedi et al. (2011) Canada Syst. Rev. (n= 12) – 8 RCTs, 4 Quasi-experimental studies.	To evaluate "the efficacy of computer-enabled discharge communication interventions for patients discharged from acute care hospitals." (p. 403)	1 **Computer-enabled discharge communication**: Contain one or more of: "(1) automatic population of the discharge document by computer database(s); (2) transmission of discharge information via computer technology (eg, text, email, or Internet); or (3) computer technology providing a platform for dynamic bidirectional discharge communication to occur between parties." (p. 404) 2 Computer technology interventions 3 Web-based communication system (e.g. ED notes, consultant notes, imaging reports) and daily advisory emails (n= 2); IT platform including web-based call center (n= 2); computer database(s) for electronic discharge summaries (n= 7).	4 Adults (n= 3579) & neonates (n=30) 5 Chronic obstructive pulmonary disease patients, medical patients, diabetic/endocrinology patients/rehabilitation/neonatal critically ill. . 6 ED/medical wards/neonatal ICU/rehabilitation 7 Primary care physician/Nurse care manager	8 & 9 **Readmissions/ED visits (n= 3):** No significant difference (n= 2); significantly lower in intervention group at 12 months (p = 0.033; n= 1) **Mortality (n= 3):** No significant difference (n= 3) **Adverse events/near misses:** No significant difference (n= 1) **Timeliness:** Discharge summaries were significantly generated more efficiently than traditional summaries & transmitted to the PCP more quickly (n= 5). **Accuracy/Quality:** Intervention summaries were more accurate or contained a similar number of errors (n= 2); Significant improvements in intervention completeness (e.g. legibility, medications, planned follow-up; n= 3); No significant difference (n= 1); Intervention summaries contained significantly more errors/omissions (n= 1) **Satisfaction:** PCP satisfaction similar to or greater with intervention summaries than traditional summaries. (n= 8); Patients - significantly improved knowledge of disease and self-	11 NR 12 NR 13 NR	Based on Jadad score, each included RCT scored 3 or 4/5 with appropriate descriptions of randomization procedures, allocation concealment. Main weakness related to the absence of double blinding. Future research: **"**Given the rapid uptake and continuing evolution of electronic patient information systems in acute and primary care settings, it is important to continue to scientifically study the extent to which such systems affect patient outcomes." (p.414)

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				management techniques and satisfied with overall quality of care and the care environment. (n= 8) 10 NR		
Blum et al. (2014) USA RCT	"To analyse Medicare claims data to identify effects of home tele-monitoring on medical costs, 30-day re-hospitalization, mortality, and health-related quality of life" (p 513).	1 NR 2 Home tele-monitoring over a range of 33 to 1,614 days i.e. the Medicare Coordinated Care Demonstration Project for Home Tele-monitoring of Heart Failure (MCCD) 3 Randomisation visit involving in-depth history, medication review, chart review, brief physical examination, and the Mini-Mental Status Examination (MMSE). Medical Outcomes Survey Short Form (SF-36) and the Minnesota Living With Heart Failure Questionnaire (MLHF) administered by face to face interview.	4 Adults (n=204) 5 Heart failure 6 Recruited from heart failure services at medical centres (n=2), and several private cardiology practices in the Baltimore/Washington DC area. Patients 7 Heart failure research nurse coordinator	8& 9 No difference between groups in relation to length of stay, 30 day readmissions. Tele-monitoring associated with lower percentage of 30 day readmissions in first year or intervention, but effect did not persist. 10 NR	11 Intervention did not lead to reduced healthcare costs. 12 NR 13 NR	
Gellis et al. 2014 USA RCT	"To evaluate an integrated tele-health intervention to improve chronic illness and comorbid depression in the home healthcare setting" (p889)	1 NR 2 Integrated Tele-health Education and Activation of Mood (I-TEAM) 3 Tele-monitoring, chronic illness and depression care management, and PST for comorbid depression.	4 older adults receiving home care 5 chronic illness(congestive heart failure, chronic obstructive pulmonary disease) and comorbid depression 6 home healthcare setting 7 Assigned home care nurses, nurses who had received tele-health training (n=3), primary care physician.	8 & 9 Groups compared at baseline, 3 months and 6 months on clinical measures (depression, health, problem-solving) and at 12 months on health utilization (readmission, episodes of care, and ED visits). Individuals in intervention group developed significantly better problem-solving skills and self-efficacy in managing their medical condition. The I-TEAM group had significantly fewer ED visits (P = .01) but did not have significantly fewer days in the hospital at 12 months post-baseline. Depression lower among intervention group than control at 3 and 6 months. 10 NR	11 NR 12 NR 13 NR	Findings demonstrate that integrated tele-health care can reduce symptoms and post-discharge ED use in older adults with chronic illness and comorbid depression in home health settings.

Steventon et al. (2013) UK RCT	"to assess the impact of telecare on the use of social and health care. Part of the evaluation of the Whole Systems Demonstrator trial" (p501).	1 NR 2 Tele-care compared with usual care. 3 Functional monitoring: bed and chair occupancy sensors, enuresis sensors, epilepsy sensors, fall detectors, medication dispensers. Security monitoring: bogus caller buttons, infrared movement sensors, property exit sensors. Environmental monitoring: gas/ monoxide/ smoke detectors, heat sensors, extreme temperature sensors, flood detectors. Additional devices e.g. big button phones, key safes for carers. Data from the peripheral devices were sent to a monitoring centre via a telephone line and alerts monitored continuously.	4 People with social care needs (n=2,600). 5 Mobility difficulties, history of falls, cognitive impairment or confusion 6 Home, recruited from 217 general practices 7 Contacts with general practitioners and practice nurses.	8 & 9 Our primary endpoint was the proportion with inpatient admission within 12 months Secondary endpoints: mortality; proportion admitted to permanent residential/nursing care; weeks of domiciliary social care paid for by local authority; inpatient hospital bed days, emergency or elective admissions, outpatient attendances, ED visits; length of inpatient hospital stays; number of contacts with GPs and practice nurses, and costs. No significant differences in admissions, service use, mortality. 10 NR	11 Intervention's lack of effect may have implications for use of resources. 12 NR 13 NR	
Gurwitz et al. (2014) USA RCT	"To assess the effect of an electronic health record–based transitional care intervention involving automated alerts to primary care providers and staff when older adults were discharged from the hospital" (p865).	1 NR 2 electronic health record–based transitional care intervention 3 System notified primary care providers about recent discharge, information about new drugs added while in hospital, warnings about drug interactions, recommended dose changes and laboratory monitoring regarding high-risk medications, and alerted to staff to schedule a post-hospitalization visit.	4 Individuals aged 65 and older discharged from hospital to home (n=2645) 5 Medical/ surgical patients, including diabetes mellitus, myocardial infarction, heart failure, chronic lung disease, cancer, stroke and cerebrovascular disease, and renal disease 6 Large multispecialty group practice 7 Primary care physicians and their support staff (n= unspecified).	8 & 9 Outcomes - office visits with primary care physician within 7, 14, or 30 days post discharge; whether re-hospitalized within 30 days. Intervention did not have a significant effect on the timeliness of office visits to primary care providers after hospitalization or risk of re-hospitalization. 10 NR	11 NR 12 NR 13 NR	

Appendix 2j: Residential Care Interventions

Source and Type of Evidence	Aim	Q.1. Definitions Q.2. Model/system/ policy/intervention Q.3. Main components of Q2	Q.4. Population group & size Q.5. Health condition/problem Q.6. Healthcare context/setting addressed Q.7. Healthcare professionals/personnel involved	Q.8 & 9 Outcomes assessed & Effects on outcomes Q.10. Components of model/system/policy/ intervention associated with <u>improved</u> outcomes	Q.11. Resource implications (e.g. cost, personnel) Q.12. Enablers Q.13. Barriers	Additional Comments e.g. explanatory notes; key recommendations/messagesReported quality stated by authors.
Connolly et al. (2015) New Zealand Cluster RCT	"To assess effect of a complex, multidisciplinary intervention aimed at reducing avoidable acute hospitalisation of residents of residential aged care (RAC) facilities" (p49).	1 NR 2 Facility-based complex intervention, lasting 9 months. 3 Staff education led by Gerontology Nurse Specialist (GNS), review of residents by GNS , facility bench-marking, and multidisciplinary discussions using standard criteria	4 Residents (n=1998). 5 NR 6 Residential aged care facilities (n=36), divided into intervention facilities (n=18) and control facilities (n=18). 7 Geriatrician, primary-care physician, pharmacist, Geriatric Nurse Specialist, and facility nurse.	8 & 9 Primary outcome: avoidable hospitalizations. Secondary outcome: all acute admissions, mortality, and acute bed-days. No overall impact study outcomes. 10 NR	11 If confirmed by others that it is not possible to reduce hospitalizations from RAC, must increase acute provision, which has resource implications for acute care. If difficult or not possible to reduce ASH from RAC using outreach model, need for more RAC facility resources e.g. staff, Or, interventions may need to be more intensive which has resource implications for RAC. 12 NR 13 NR	

Harvey et al. (2014) Australia RCT	"to evaluate (1) the feasibility and consumer satisfaction with a geriatrician-led supported discharge service for older adults living in residential care facilities (RCF) and (2) its impact on the uptake of Advanced Care Planning (ACP) and acute health care service utilisation" (p. e1).	1 NR 2 Residential Care Intervention Program in the Elderly (RECIPE). 3 Geriatrician–led outreach service: home visit within 96 hours post discharge, included comprehensive geriatric assessment development of care plan developed. Additional meetings available to patients and family to discuss Advanced Care Plans and Advanced Directives (AD).	4 Patients (n=116 participants) recruited during while in acute care, followed up at the RCF for six months. Divided between intervention (n=57) and controls (n=59). 5 NR 6 Residential care facilities (RCF). 7 RCF staff and the patients' primary care physician	8 & 9 Higher satisfaction with care in intervention group (p = 0.006). More ADs in intervention group. Fewer outpatient visits in intervention group at 6 months (37% versus controls 76%, i.e. p < 0.001). No difference in readmission rates Trend towards reduced hospital bed-day utilisation (intervention group 271 days versus controls 372 days). Factors predictive of readmission were: length of stay at index admission and number of medications at baseline (p = 0.03). 10 Rapid access to geriatrician review in RCF impacted on the number of hospital ambulatory care visits i.e. intervention group patients were less likely to need to attend medical outpatient clinics than controls (37% vs 76%, p < 0.001).	11 NR 12 NR 13 NR	Findings indicate that a multi-faceted approach is required to significantly reduce acute care readmissions rates. Recommendations: up-skilling of RCF staff in management of acute deterioration in health; tele-health consultations in favour of emergency department in situations where primary care physicians unavailable for consultation; increased use of 'Hospital at Home' services.
Boyd et al. (2014) New Zealand Randomised Comparison Trial	To evaluate a quality improvement outreach programme designed to support residential aged care staff, and compare hospitalisation rates with facilities receiving usual care.	1 NR 2 Residential Aged Care Integration Program (RACIP) 3 Quality improvement scheme involving on-site support, care coordination, clinical coaching, and education.	4 Older adults (n=2553), i.e. intervention group (n=142)(and comparison group (n=1128). 5 Mostly NR, but several facilities provided dementia care, and one facility specialised exclusively in dementia care. 6 Residential aged care facilities, divided between intervention facilities (n=29 facilities; 1,425 residents), and comparison facilities (n=25; 1,128 residents). 7 Coordinated by Gerontology Nurse specialists	8 & 9 Outcome measures included all resident hospitalizations and subgroups classified as medical or surgical admissions. Acute hospitalization rate unexpectedly increased for both groups after program implementation, although the rate of increase was significantly less for the intervention facilities (59% increase in comparison settings, vs 16% in intervention settings; P < .001), although no difference in rates of admission for surgical reasons. 10 NR	11 Intervention's ability to minimise increases in admissions, compared with non - intervention facilities, may save costs. 12 NR 13 NR	Integrating the expertise of Gerontology Nurse Specialists into residential aged care settings may help to support staff in providing optimal care and potentially improving resident health and well-being. RACIP program has received a positive response from facility staff and was helpful in integrating services for frail older people across the secondary and primary healthcare divide. Although admissions increased for both groups, findings indicate that intervention may have caused less significant increase in intervention group, compared with non-intervention group.

Appendix 3: Grey Literature Search - Details of Included Publications

Appendix 3a: Details of Included Empirical Papers/ Publications

Source and Type of Evidence	Aim	Q.1. Definitions Q.2. Model/system/ policy/intervention Q.3. Main components of Q2	Q.4. Population group Q.5. Health condition/problem Q.6. Healthcare context/setting addressed Q.7. Healthcare professionals/personnel involved	Q.8. Outcomes assessed Q.9. Effects on outcomes Q.10. Components of model/system/policy/ intervention associated with <u>improved</u> outcomes	Q.11. Resource implications (e.g. cost, personnel) Q.12. Enablers Q.13. Barriers Q14. Reported quality stated by authors.	Q. 15. Report Recommendations: i Managing delayed discharge ii: Preventing avoidable emergency admission iii Promoting integration of care between community and acute iv Improving patient flow
O' Riordan, Doran & Collins, 2015 Access to Diagnostics in Primary Care and the Impact on a Primary Care Led Health Service Survey	To describe the access of GPs to radiological and endoscopic tests	1 NR 2 NR 3 NR	4 Postal survey to a random sample of 500 GPs, response rate was 58.4%. 5 Not specific 6 GP services 7 GPs	8 The waiting times for select tests. 9 "A marked difference in access to diagnostics for patients in the public healthcare system versus those in the private system -- with a wider distribution and a higher mean in all cases". 21.4% (n=42) of GPs do not have direct access to abdominal, or 24.6% (n=49) do not have direct access to pelvic, ultrasound in the public system. Where access is available patients in the public system wait an average of 14 weeks. In contrast for patients in the private system, 99.2% and 98.8% of GPs have direct access respectively for abdominal (n=159) and pelvic ultrasound n=156) with an average wait of just over four days. Less than a quarter of GPs have direct access to CT scans in the public system e.g. n=31, 18.4% for chest scan, in the public system; even where available, with an average 12 week wait time. In comparison	11 NR 12 NR 13 NR 14 NR	15. i. Reduce diagnostic delay by increasing access to diagnostics for GPs for public patients, Develop joint GP-Hospital referral guidelines. Track the impact of such increased access to diagnostics with a particular focus on the advantages of private versus public provision, community versus hospital based diagnostics and co-ordination across the primary and secondary care interface.

				88.6%, (n=151) GPs have access to CT chest scanning in the private sector, an average waiting time of 5.4 working days. 10NR		
Keane et al. (2014) Efficiency of computerised discharge letters Ireland	To "determine how many discharge letters were received by the correct GP, and clarify factors associated with failure to receive a discharge summary".	1 NR 2 Audit of computerised system for generating discharge letters i.e. TEAMS. 3 Discharge summaries generated by system legible, comprehensive though quick to complete and highlight drug dosage errors to the professional entering the information.	4 Consecutively discharged older adults (n=100) 5 Age related conditions, stroke. 6 Department of age-related health and stroke services. 7 NR	8 Number of discharge letters received by GPs, number received by correct GP, and factors associated with failure to receive discharge summary. 9 Almost 10% of the discharge summaries were not recorded as having been received by the patients' GPs. However, no practice setting reported missing letters. 10 NR	11 NA 12 NA 13 NA 14 NA	15 Need identified to review and centralise process of generating discharge summaries, in order to decrease variations in quality of same across settings. (i) NR (ii) NR (iii) Authors encourage use of secure computerised transfer of information between hospital and GP to improve efficiency of communication. (iv) NR
Rai et al. 2014 Emergency review clinic: impact on paediatric admissions Retrospective review of patients notes	To review emergency clinics and "assess whether we could reduce admission rates by giving carefully selected children follow-up ED review appointments" (p 1).	1 NR 2 Emergency review clinic 3 Clinic to review children not in need of admission but in need of short term follow up. Ran Monday to Friday 10am to noon. Time between first ED visit and review clinic appointment varied depending on severity, treatments, and parents' ability to cope.	4 Children 5 Respiratory problems, gastrointestinal illnesses, cardiovascular problems, neurological symptoms, musculoskeletal issues, renal problems, feeding issues and repeat blood tests. 6 Paediatric section of Emergency Department 7 Senior paediatric registrar	8 Admission rates of paediatric patients via ED. 9 Significant reduction in inpatient admissions of paediatric patients (4053 to 3095 during a period when ED admissions were increasing (p<0.0001). Anecdotal evidence that parents/ caregivers satisfied with having follow up within 1 month of ED visit. Liaison with professionals in primary care improved following interventions due to update and discharge letters sent following review appointment 10 NR.	11 Intervention reduced admissions and deemed to be cost-effective saving estimated to be an average of 0.25 million euros per year after cutting down on these admissions.. 12 NR 13 Caregivers' anxiety and ability to understand /cope influences decisions regarding admission and treatment. 14 NR	15 (i) NR (ii) integration needed between acute care setting and community/primary care to reduce inappropriate admissions/ referrals. (iii) NR (iv) NR

Rashwan, Ragab Abo-Hamad & Arisha 2013 Evaluating policy interventions for delayed discharge: a system dynamics approach-Research underpinning a national project carried out within Health Service Executive	To use System Dynamics (SD) methodology to map the dynamic flow of elderly patients in the Irish healthcare system with the primary aim of delivering a holistic and strategic capacity-planning model at the national level and have a positive impact on the delayed discharge issue	1 Delayed discharge is defined as patients who have completed the acute phase of their care and are medically fit for discharge. 2 Models proposed -A pre-acute care flow policy intervention -A post-acute flow policy intervention 3 - A pre-acute care flow policy intervention. This policy is to increase the accessibility of GPs to community services in order to avoid unnecessary admissions to acute systems. This policy is intended to reduce the need for hospitalization and mitigate the pressure on the acute hospital resources. - A post-acute flow policy intervention. This policy is concerned with the long term care facilities such as nursing homes, where patients stay extended periods compared with acute care. Increasing the discharge rate from long term care facilities by making improvements in homecare packages, which is a preferred option for elderly people.	4. Elderly patients i.e. those who are aged 65 and older. Frail patients (with an array of medical conditions, complex needs and amplified burden of disease) constitute 18-20% of elderly admissions. Frail patients can be characterized as those who need a treatment period in acute system (i.e., hospitals) of more than 15 days. 6. No specific diagnosis 7. Mixture of disciplines	8. Stock and flow intervention policies used in combination are proposed and evaluated within the model. 9. Results from base model showed that there are on average about 600 delayed discharges monthly. The Authors note that a combination of capacity (stock) expansion policies, flow intervention policies and the creation of new pathways is required to meet the needs of the service and address the issue of delayed discharge 10. Each part of the model delivers some improvement but best to look at this issue from both a capacity and flow perspective.	11. Authors noted that average cost of running an acute bed is €850 per night and hence cost of caring for 600 delayed patients is about € 510,000 per day. 12 NR 13 NR 14 NR	15. i. A combination of the stock interventions and flow interventions seems to be more effective than implementing each intervention independently. Note: Elderly patients differ according to their needs and the severity of those needs in particular "frail" patients have more complex needs.

McCarroll et al. 2013 Analysis of retrospective data Discharge of patients to long-term care from a large acute hospital over a 12-year period	"To look at factors associated with discharge to long-term care from St James' Hospital, Dublin between 1997 and 2008" (p345).	1 NR 2 NR 3 NR	4 Adult patients (n=3,107), aged 30 to 107 years, mean age 81.7 years. 5 NR 6 Elderly medicine department of large acute hospital 7 NR	8 Time to discharge 9 Most participants discharged to long term care settings (n=2520). Median time to discharge 52 days. Time to discharge longer in public settings than private settings, i.e. 18 days longer, on average (P=0.006). Time to discharge less in older participants. 10 NR	11 NR 12 NR 13 NR 14 NR	15 (i) need for appropriate mix of private and public hospital beds to prevent delays in transfers and discharge. (ii) NR (iii) NR (iv) NR 16 Use of bed days varied based on time to discharge. 17 Adult patients, mostly older adults.
Concannon et al. 2013 Ireland Day of surgery admission for the elective surgical in-patient: successful implementation of the Elective Surgery Programme Prospective study	"To determine the impact of (1) ring fencing in-patient general surgical beds and (2) introducing a pre-operative assessment clinic (PAC) on the day of surgery admission (DOSA) rate in a single Irish institution, and to analyse the impact of an increased rate of DOSA on cost efficiency and patient satisfaction." (p127).	1 NR 2 Pre-operative assessment clinic on day of surgical admission. Ring-fencing of elective and emergency surgical beds. 3 Multidisciplinary assessment and ring-fencing of surgical beds for day of surgery admissions.	4 An 18-month period (July 2010–December 2011) following ring-fencing of elective and emergency surgical beds and compared to an earlier 6-month period (January 2010–June 2010) prior to ring-fencing and establishment of a PAC 5 Cardiovascular, endocrine, respiratory or renal problems. 6 Acute hospital 7 Clinical nurse manager coordinated clinic. Referrals made by consultant and non-consultant hospital doctors.	8 Rates of day of surgery admissions. Patient satisfaction with day of surgery admission. Cost effectiveness of intervention. 9 Ring fencing of beds, and pre-operative assessment clinic associated with significant increases in rate of day of surgery admissions i.e. from 56% to 85% . High levels of satisfaction reported in relation to day of surgical admission. Significant costs saved following intervention. 10 NR	11 Cost savings of 340,370 following establishment of clinic and ring fencing of surgical beds. 12 NR 13. NR 14. NR	15 (i)NR (ii) NR (iii) NR (iv) Ring fencing of beds supports day of surgery admissions, enabling streamlining of services and efficient utilisation of resources.

Slattery & Harewood 2012 Specialty-specific admission: a cost-effective intervention? Retrospective review of admissions	To ascertain if specialty-specific admission is a cost-effective intervention.	1 NR 2 NR 3 NR	4 Patients (n= 725) admitted with an acute medical illness via the ED to an Irish teaching hospital between January 2007 and December 2008 5 Patients with a GI illnesses 6 Acute Hospital 7 Physicians	8 Length of sat (LOS), mean patient level costs 9 **Mean LOS**: Varied with increasing complexity- 3.2 days for non-complex GI haemorrhage to 14.4 days for complex alcohol related cirrhosis. Mean LOS was lower (by 2 days approx.) with specialty specific admissions, 3.2 versus 5.9 (p=0.0002) and 3.2 versus 5.3 (p=0.05) for "non-cirrhotic/non-alcoholic liver disease, non-complex" and "Non-malignant disorder of biliary tract, non-complex" admissions respectively 10 NR	11 Significant variations in patient level costs were noted which authors suggest area associated with variations in clinical practice and in the complexity of patient cases 12 NR 13 NR 14 NR.	15. i. Introduce specialist rotas for medical emergencies. Further research with bigger sample sizes to evaluate impact of generalist versus specialist admissions for patients in terms of quality of care, LOS, costs and other markers.
Evans et al. 2012 Review of Acute Cancer Beds	To review admissions to cancer services and thereby assess the appropriateness of hospital usage	1 NR 2 The Cancer Bed Utilisation Tool developed to assess cancer bed usage at UHG. I followed the overall format of the Appropriateness Evaluation Protocol (AEP). 3 Tool assessed reasons for admission, alternatives to admission, services/actions to reduce the length of stay, and discharge planning.	4 Adult patients 5 Cancer 6 cancer services at University Hospital Galway (UHG) 7 senior clinicians and management	8 Reasons for admission to cancer services, length of stay, and discharge planning. 9 NR 10 NAR	11 Elective admissions several days longer than emergency admissions, though not statistically significant (p = 0.084). 12 NR 13 Alternatives to admission were identified for 15 patients (19%) who could have attended alternate services if they were available. For the 10 emergency admissions, the main requirement was for access to urgent diagnostics and assessment (n = 7, 70%), while four of the five elective patients could have been dealt with on the day ward if it had been available to them. 14 NR	15 (i) NR (ii) the need for admission would have been significantly reduced if alternative facilities were in place, both in the hospital itself (such as the provision of an Acute Assessment Unit), and also in the community. (iii) NR (iv) ambulatory care services may not always be in a position to meet demand, leading to an inappropriate use of inpatient facilities. Ambulatory care capacity should be reviewed and new models of care developed Note: 67% occupied a cancer bed and 30% were in outlying wards. More bed usage among elective or booked admissions than emergency admissions (91% vs 51%) (p< 0.001).

Sheridan, Howell & Bedford 2012 Hospitalisations and costs relating to ambulatory care sensitive conditions in Ireland Review of data.	The aims of this study were to report on ambulatory care sensitive conditions (ACSCs) in Ireland, and to provide a baseline for future reference.	1 **Ambulatory care sensitive conditions** (ACSCs) are defined as those conditions for which the provision of timely and effective outpatient care can help to reduce the risks of hospitalisation by either preventing onset of an illness or condition, controlling an episodic illness or condition, or managing a chronic disease or condition (Billings et al 1993 cited within Sheridan et al (2012 p.527). Examples of such ACSCs include Influenza and pneumonia, asthma, congestive heart failure, Iron deficiency anaemia, hypertension. 2NR 3 NR	4. Varied conditions as per ACSCs) 5. All inpatient discharges who were admitted to hospital as an emergency, and classified as an ACSC were extracted from the HIPE database for the years 2005–2008. 6. Acute public hospitals in the Republic of Ireland. 7. NR	8. Tracking data (using HIPE) and performing comparisons with EU and national standard population data. 9. Across the country (ROI), there was considerable variation in the discharge rates for the Top-10 ACSCs for the years 2005–2008. Significantly lower rates of hospitalisation were observed in more urban areas including Cork, Dublin and Galway. The most common ACSC in 2008 was diabetes with complications (29.8%) p. 527. ACSC-related hospitalisations were more likely (odds ratio = 1.58, 95% CI: 1.55–1.62, p < 0.001) to involve medical cardholders than non-medical cardholders, with the exception of children. 10. NR	11 Estimated costs (in millions of euros) for ACSCs in 2008 were highest for diabetes complications (139.2), COPD (67.2), Congestive heart failure (36.7), Pyelonephritis (29.7) and Convulsions and epilepsy (19.6). 12 NR 13 NR 14 NR	15 (i)Monitor discharge data for common ACSCs and link data to national deprivation indices. (ii)Explore the variation in data to facilitate the identification of trends and seek to reduce hospitalisations and associated costs for ACSCs, across both adult's and children's services and particularly in relation to diabetes complications.
Healy & Cronin, 2011 Bed utilisation review in a number of hospitals in Cork and Kerry Audit using a tool.	To conduct a Bed Utilisation review to assess the appropriateness of hospital admission.	1 NR 2 NR 3 NR	4 Patients admitted HSE South, Cork and Kerry on Thursday February 10th, Tuesday February 15th and Wednesday February 16th 2011. 5 Acute hospital 6 Staff of Health Services	8 The appropriateness of /need for hospital admission and day of care (according to patient condition, clinical services, nursing/life support services) i.e. using "The Appropriateness Evaluation Protocol" 9 The age profile of adults admitted to acute hospitals is increasing – the average proportion of patients aged over 65 years of age, across all hospitals, was 65% compared to 59% in 2007. The proportion of patients who did not meet the criteria (as needing admission) increased	10 NR 11 NR 12 NR	15 (i) Urgently develop services to provide IV therapy in settings outside acute hospitals, e.g. Community Intervention Teams. Provide dedicated Elective surgery facilities, with ring-fenced, actively managed elective surgery beds. Develop Acute Medical and Surgical Assessment Units. Patient discharge should be actively planned from the early stages of patient admission. (ii) Increase the emphasis on chronic disease prevention and management, with particular emphasis on hospital avoidance and the development of

				from 13% in 2007 to 20% in 2011. The proportion of patients for whom IV therapy was the only indication for admission has increased from 8% to 10%.		primary care
McDonnell et al. 2011

Potential economic savings of administration of home intravenous antibiotic therapy to patients with acute respiratory infections in Ireland

Experimental study | "To analyse the potential cost-effectiveness of HIVA (home intravenous antibiotic therapy) in patients with ARI (acute respiratory infections) in Ireland" | 1 NR

2 Administration of home intravenous antibiotic therapy

3 NR | 4 NR

5 Acute respiratory infections (ARI).

6 Impact of home care

7 NR | 8 Length of stay, and cost effectiveness of intervention.

9 HIVA administration is a safe, cost-effective alternative in suitable patients with ARI, potentially providing significant savings to the health service in Ireland.

10 NR | 11HIVA administration is a safe, cost-effective alternative in suitable patients with ARI, potentially providing significant savings to the health service in Ireland.

12 NR

13 NR

14 NR | 15 NR |
| Department of Health and Children 2009

Evaluation included review of Irish data, in depth analysis of cases (n=999) | To evaluate the delivery of Home Care Packages between 2006 and 2008 | 1 Delayed discharge "refers to a patient who is delayed in an acute hospital despite being medically fit to be discharged" p. 3.
Home care package was defined as "A suite of supports provided to an older person, enabling them to live in their own home and reducing risk of admission to acute or residential care" p. 3.

2 Home care packages (HCPs) were established to support government policy (Transformation Programme and the Primary Care Strategy) and the individual's preference which placed emphasis on the shift of care from acute /residential care to the persons own home. HCPs | 4 The majority (77%) of HCP recipients were over 75 years of age and 38% of recipients were over 85 years.

5 Complexity of care needs demonstrated by the measurement of dependency factors (e.g. Assistance with washing/dressing, incontinence): 93.6% had one or more dependency factor, 78.3% of recipients had at least two dependency factors and 58.4% had at least three.

6 The majority of HCPs involved two or more service elements, e.g. physiotherapy, home help

7 Varied according to HCP | 8 Assessment through quantitative and qualitative research whether the objectives of Home Care Packages were being met in the most economically viable manner.

9 HCPs are benefiting the acute sector by improving timely discharge for older people.

10 Not clear | 11 Inconsistent approach noted

12 Some examples of good practice were cited in the report

13 The absence of national guidelines led to duplication of effort and regional variation (in number of Home Care Packages delivered and delivery approach) which was attributed to a lack of a national approach to delivery in terms of HCP value, service and duration.
The absence of a funding model/allocation based on need.
The inadequacy of | 15
(ii) The Evaluation found that for future delivery, the acute sector and PCCC should determine jointly the volume and types (i.e. short-term and long-term) of HCPs they aim to deliver in their area, based on the local health system configuration and pressures, and the needs of the local population. National guidelines on HCPs should be rolled out immediately to standardise delivery. Strengthen the linkage with the acute sector at national HSE and LHO level in the governance arrangements for Home Care Packages. Establishing robust financial monitoring of Home Care Package budget and expenditure is essential to improving future service delivery. Develop a national HSE approach to procurement of all services related to Home Care Packages. Develop and implement a standard ICT-based approach to managing Home |

					management information. Under-developed ICT systems and supports for sharing information and knowledge. 14 NR	Care Package information.
		were categorised as wither 1) short term (with services intended to achieve a particular outcome such as a return to independence, recovery from an event) or 2) Longer-term packages (including a greater number of services to maintain the individual at home) 3 HCPs were personalised to the specific needs of the individual. The type, make-up and duration of the packages vary according to the needs of the patient. Key worker' model (e.g. public health nurse) i.e. one person coordinating the HCP becoming more prevalent. Emergent linkages to the Primary Care Teams/team based model.				
Conway & Murray 2011 Assessment of service delays and impact on bed utilisation in a major teaching hospital Prospective observational study	To assess the causes for delay in a patient's discharge.	1 NR 2 NR 3 NR	4 Consecutive patients (n= 70) admitted to an acute hospital. Total of 678 bed days with a mean of 9.7 days per patient. 5 An acute hospital 6 Patients admitted under the care of the gastroenterology and hepatology service. 7 Multidisciplinary team	8 Services included in the assessment were: radiology, endoscopic procedures, interventions performed by the department of cardiology, allied health professional referrals, and referrals sent to the medical and surgical consult service. 9 "Median delays of 2 and 3 days for an MRI and colonoscopy, a delay of 3 days for a Holter monitor report, and 9 days for an occupational therapy referral. The median wait for consults was 1 day across all three services" p.533. The median waiting times were physiotherapy review (0.5 days, (IQR 0–1)); social work (2 days ,IQR 2–3) and	11 NR 12 NR 13 NR 14 NR	15 i Changes the practice were recommended to optimise the efficiency of patient flow through the acute care service.

				dietetics (1 day, IQR 1–3). Occupational therapy (n=1) referral waiting time was 9 days. These delays in turn led to discharge delays for patients.		
Gallagher et al. (2008) Do Relatives of Elderly Patients Block the Discharge Process? Ireland	To "prospectively analyse consecutive referrals to the discharge co-ordinator of an acute general hospital over a two-year period" (p70).	1 NR 2 NR 3 NR	4 Patients with perceived discharge problem or requiring services post discharge. All ages. 5 NA 6 All disciplines in acute hospital 7 Discharge coordinator	8 Number of bed-days, reasons for delay in discharge, prevalence of relatives opposing discharge. 9 7.2% of patients had delayed discharge (n=90), which caused a loss of 2436 bed days in 2 years. Mean age of patients affected was 75.5-77.7 years (male and female respectively). Common reasons for delay: awaiting long term accommodation (n=50, i.e. 1729 bed days) – mean waiting time for same 34.5 days; awaiting comuity supports e.g. home help. Relative opposed to discharge in only 10% of cases, not considered to block discharge, as concerns reflective of inadequacies in health system and community care services. Administration required for discharge to other facilities a significant factor in delays. Delays in funding for transfer to long term care settings accounted for almost 40% of delays. 10 NR	11 Significant number of additional bed days due to delay in accessing long term care beds in other settings. 12 Older age; availability of family carer; dependency level of patient; number of comorbidities; availability of services; administrative factors e.g. timeliness of referrals. 13 NR	15 (i) Need to improve access to services in community setting, and community supports for older people. (ii) NR (iii) NR (iv) Improving access and timeliness of transfer to long term care settings could significantly reduce delays and so improve patient flow in the acute setting. Note: Those awaiting long term care accounted for 1729 bed days (n=50 patients), with average waiting time of each of these patients 34.5 days.

Kulasegarah, Lang, Carolan, Viani, Gaffney, Walsh & Walsh, 2008 Day of Surgery Admission – Is This Safe Practise? Audit	To conduct an audit of Day of surgery admissions (DOSA) in an acute hospital in Ireland	1 Day of surgery admission (DOSA) describes the process whereby patients are admitted to hospital and have surgery, on the same day 2 NR 3 NR	4 Consecutive patients (n=75) admitted on the same day as surgery 5 Surgical patients 6 Acute Hospital context 7 Multidisciplinary team	8 A prospective review of patients details, with completion of an associated form by the admitting doctor. Details of patient background, reasons for surgery, delays in going to theatre, medical history were gathered. 9 NR	11 12 13 14	15 i. NR ii. A centralised preoperative assessment clinic. admission for major surgery on the same day as surgery is not appropriate for all patients, but only in a select group of patients. The decision as to suitability for DOSA should be made by the medical teams involved and not by nonmedical personnel.
Donohue & Feeley 2007 Community intervention teams – an evaluation Survey design	To assess the performance of the CITs to date and make recommendations for the future with regard to their development ± expansion.	1 In this study "Community Intervention Teams (CIT) are nurse-led and aim to avoid unnecessary referrals to Accident and Emergency (A+E) and / or hospital admissions or to facilitate early discharge from hospital by providing a rapid response from community services" p.1	4 Patients referred to CITs. 5 Varied majority referred with orthopaedic/ mobility, neurological issues. 6 Community context 7 CIT teams led by nurses	8 Survey collected data on the main characteristics of each CIT. b. describe profiles of patients seen by the CIT (Patient data was provided on 540 referrals). 9 82.7% of patients using the service were aged over 65. Almost half (44%) of referrals were received over the weekend period (Friday to Sunday). Admission avoidance is achieved in a high percentage of cases - only 11% of CIT patients were referred to hospital CITs aim to provide both admission avoidance and early discharge. Currently the main activity is admission avoidance.	11 NR 12 NR 13 NR 14 NR	15 KEY RECOMMENDATIONS Principal recommendation: "existing service must work to capacity before considering extending the number of teams Other specific recommendations include: •Increase awareness of the service nationally and locally. •Orientate towards early discharge •Increase referrals with diagnoses other than orthopaedic / mobility •Existing CITs to consider extending geographical area covered and hours of operation •Ensure adequate weekend staff capacity •Maintain 72 hour target •Agree core dataset to facilitate future audit / evaluation" p.1.

Source and Type of Evidence	Aim	Q.1. Definitions Q.2. Model/system/policy/intervention Q.3. Main components of Q2	Q. 15. Report Recommendations: i Managing delayed discharge ii: Preventing avoidable emergency admission iii Promoting integration of care between community and acute iv Improving patient flow
HSE 2015 Report of the Emergency Department Task Force Built on the findings of the HSE task force (HSE 2006)	To identify sustainable solutions to ED issues at a whole system level.	1 NR 2 NR 3 NR	15 The recommendations of the ED Task Force, 2015 were centred on three domains: • Optimising existing capacity (optimise the existing capacity to manage activity levels) • Capability (gaining efficiencies in patient flow and processes) • Control (accountability, oversight, measurement) (p.5). Enhance the use of Information and Communication Technology to support front line service delivery thus this will enhance transparency and accountability improving delivery processes and management's operational grip (p.5). (Table below taken directly from HSE 2015, p.13)

"Domain	Key Features
Leadership and Governance	• Performance is owned by local leaders, with a clearly identified Unscheduled Care Lead. • Supported by the SDU and the Clinical Care Programmes, this local ownership is a critical prerequisite to unscheduled care improvement. • It must be embedded into every local operational structure and delivered within a coherent hospital / group governance model. • Every site that has achieved sustained improvement has created a broad internal leadership coalition of managerial, nursing and medical leaders, changing the internal organisational narrative and reinforcing the moral obligation to prevent high trolley counts and reduce PET times in ED.
Process Improvement	**Patient assessment** Key features of 'performing' sites are: • The development of a well-functioning patient pathway which comprises: ➤ acute assessment by senior clinical decision makers, ➤ well-structured short stay facility supported by timely diagnostics and ➤ Protected streaming including ANPs, especially in high volume model 4 hospitals. • Development of frail elderly pathways underpinned by strong clinical governance and clear linkages between geriatric medicine and emergency medicine can effect reductions in length of stay • Use of rapid access assessment models for geriatric medicine and chronic disease are enabling hospital avoidance and re admission. • Geriatric teams in all sites should seek to create an immediate access elderly assessment and treatment service for elderly patients otherwise requiring ED assessment. As extensive operating hours as possible will be sought
Process Improvement	**Patient pathways and processes** Critical determinant of success are: • Systematised approach to patient flow where each point of the patient journey is mapped and understood • Use of demand/capacity modelling and process improvement techniques. • Standards around ALoS, driven by a navigational hub/visual hospital function, -

| | | | | Integrated Planning | • meaningful use of predicted date of discharge (care planning for each patient),
• Specialty wards configuration and a focus on weekend discharging.
• Systems and processes in relation to patient flow and processing reflective of 7 day business of hospital services to avoid the "queue" build up over weekends and out of hours, giving rise to high trolley numbers and congestion in the early days of each week.
• Continuous focus on 7 day discharges with agreed daily review of predicted discharges that take account of demand capacity requirements (hospital to set daily target based on average daily admissions for that day)
• 7 day working of AMAUs
• planned weekend handovers of discharges (e.g. CUH, Tallaght, Kerry)

Integrated discharge planning
Dependencies on stakeholders external to the hospital, particularly for complex discharge needs must be clearly understood and managed proactively. This is especially important in efficient model three hospitals, where egress blocks have a disproportionate impact on operational efficiency. Bottlenecks at any stage of patient flow will result in queues across the system.
• Every hospital has a tolerance level for limitations on access. With specific reference to delayed discharges 10% of acute beds, in any one hospital, are considered to be an inflexion point beyond which efficiency markedly deteriorates and suboptimal care is delivered. However it is also acknowledged that even at 5-10%, it poses challenges in a system that is operating consistently at 100% occupancy
• Hospitals and their community partners must integrate their planning and understand their demand for efficient egress flows. The required resources must be delivered in a timely, efficient and continuous manner.
• The flows are predictable, with hospitals able to quantify the numbers of home care packages and transitional care beds required on a weekly basis to maintain equilibrium |
| | | | | Data and Information | Good use of Information and Communication Technology implemented to support front line service delivery will enhance transparency and accountability improving delivery processes and management's operational grip.
• Appropriate data systems are important for success. The system must value and exploit the potential of web-based timely, accurate, visual data systems in providing business intelligence. Organisations can then understand, plan and respond in an appropriate manner to demand and capacity profiles
• Use of SDU Standardised Unscheduled Care Assessment Tool to measure performance
• Use of standardised templates by hospitals to develop improvement plans – these can then be measured objectively to determine effectiveness
• Use of systems with proven potential to provide real time oversight and business intelligence to deliver smarter, more responsive care. TrolleyGar, the SDU Emergency Care Performance Improver web-site and the HSE Compstat are all worthy of further development.
• Use of demand and capacity spreadsheets for local use in hospitals with less developed IT systems". |

HIQA 2014 Review of pre-hospital emergency care services to ensure high quality in the assessment, diagnosis, clinical management and transporting of acutely ill patients to appropriate healthcare facilities (2014) Review + report	A review of public pre-hospital emergency care services undertaken by the Health Information and Quality Authority (the Authority)	1 NA 2 Pre-hospital emergency services 3 100% transporting of patients (using national emergency ambulance service) to hospital emergency department	Review the current model of Ambulance/paramedic care provided which requires 100% transporting of patients to hospital emergency department in all cases. In the interim, both services (HSE and ambulance service) should act to implement 'hear and treat' and direct access to alternative care pathways, to include local injuries units in smaller hospitals, where appropriate" p.18. "Implement an ongoing community education programme promoting appropriate use of ambulances. Such public education should seek to reduce unnecessary requests for ambulances, and improve public awareness of the clinical skills and competencies that pre-hospital emergency care practitioners possess. Public awareness of, and support for alternate care pathways will be critical to their successful application" p. 19.

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Pike & Mongan on behalf of the HRB 2014 The integration of health and social care services Report of 2 reviews of the international evidence.	The Department of Health commissioned the Health Research Board to undertake two reviews of the international evidence in relation to mechanisms and structures used to integrate general health services with the two sets of services funded by general taxation, i.e. one review of the integration of public health services, and one of the integration of social care services p.6.	1. NR 2. 'Integrated care' 3. Three key dimensions of Integrated care were identified: 1. Services which are well co-ordinated around the needs of individuals and the population. 2. Integrated care is necessary for anyone for whom a lack of care co-ordination leads to an adverse impact on their care experiences and outcomes. 3. The patient or users perspective is the organising principle of service delivery. Three levels of integration of service delivery are • **Macro -** across the full spectrum of services to the whole population. • **Meso-** for a particular group of people with the same disease or condition (example care for elderly people, disease management programmes and managed clinical networks). • **Micro-** individual service users through means such as care co-ordination, care planning or case management Integrative processes require coordination at a number of levels: • **Systemic** – the co-ordinating and aligning policies, rules and regulatory frameworks. • **Organisational** – the coordinating structures, governance systems and relationships across different organisations . • **Clinical/service** – how care services are coordinated. • **Informational** – the clinical and managerial information systems to support practice across different care settings. Information is a key enabler of integration. • **Financial** – the budgetary and payment systems in place across the participating organisations. • **Normative –** the extent to which mission, work values etc. are shared within a system. P.7	Comments: A requirement to undertake baseline assessment, monitoring and evaluation as it is only possible to improve what is measured. 15. For integration to work it must incorporate all three levels – macro, meso and micro. However one form of integrated care does not fit all. Changes require careful analysis, consideration of contextual factors e.g. the goals of the project, the needs of service users and other stakeholders involved, existing provision and available resources. Integration initiatives can reduce hospital admissions, reduce duplication and improve patient experience. Acknowledge that integration takes time to become successful and sustainable and it may cost before it pays.

HSE 2014 Integrated Care Guidance: A practical guide to discharge and transfer from hospital QPSD-D-037-2. V.2 Guidance document developed based upon consultation	To replace existing Code of Practice Integrated Discharge Planning (2008) and to support healthcare providers to improve their discharge and transfer processes from the acute hospital setting back into the community.	1 Complex discharge "relates to service users: ➤ who will be discharged home or to a carer's home, or to intermediate care, or to a nursing or residential care home, and ➤ who have complex ongoing health and social care needs which require detailed assessment, planning, and delivery by the multi-professional team and multi-agency working, and whose length of stay in hospital is more difficult to predict" p61. Integrated discharge planning relates to "the activities that facilitate a service user's movement from one health care setting to another, or to home. It is a multi-disciplinary process involving physicians, nurses, social workers, and other health and social care professionals; its goal is to enhance continuity of care. It begins before or on admission" p.62. 2 NR 3 The National Integrated Care Guidance begins by outlining and explaining the nine key steps required for effective discharge planning and transfer from the acute hospital setting 1. Begin planning for discharge or transfer before or on admission 2. Identify whether the service user has simple or complex needs 3. Develop a treatment plan within 24 hours of admission 4. Work together to provide comprehensive service user assessment and treatment 5. Set an Estimated Length of Stay /Predicted Date of Discharge, (ELOS/PDD) transfer within 24-48 hours of admission 6. Involve service users and carers so they make informed decisions and choices 7. Review the treatment plan on a daily basis with the service user 8. Use a discharge checklist 24-48 hours before discharge 9. Make decisions to discharge/transfer service users each day The guidance is underpinned by 8 core principles (access, accountability, dignity and respect, safe and effective services, communication and information, participation, privacy and improving health) and a detailed medication reconciliation (proactive, retroactive) process	15 NR 16 NR 17 NR Comment: process described could be paper based which may lead to delayed communication of information between service providers.

HSE 2013 National rapid discharge guidance for patients who wish to die at home produced for the National Clinical Programme for Palliative Care Clinical Strategy and Programmes Directorate	The aim of the Rapid Discharge Guidance is to facilitate a safe, smooth and seamless transition of care from hospital to community for patients with terminal illness who choose to be cared for in their own home for their last days of life.	1 Discharge "is the outcome of the decision made by the patient's consultant/medical team when the patient is deemed fit to leave the hospital/healthcare organisation. It also refers to the event of the patient leaving the hospital/healthcare organisation" p. 4. Discharge Plan "refers to the documentation in the patient's healthcare record that demonstrates the key tasks from patient assessment to discharge" p.4. Rapid discharge planning (RDP) "is a form of integrated discharge planning guidance that begins when a seriously ill patient expresses the wish to die in their home environment" p.5 . 2 National rapid discharge guidance for patients who wish to die at home 3 Four step process ➢ The imminently dying patient chooses to die at home and no issues are identified regarding the potential need for a coroners post mortem or organ donation. ➢ The Doctor confirms that it is appropriate to focus on palliation at home, family / carer support patient decision. ➢ CNM identifies lead nurse. ➢ Lead nurse organises the process and links with key stakeholders to ensure the discharge is facilitated as quickly as possible.	15 NR 16 NR 17 NR
HIQA (2012	To investigate the quality, safety and governance of the care provided by the Adelaide and Meath Hospital, Dublin incorporating the National Children's Hospital (the Hospital) for patients who require acute admission.	1 NR 2 NR 3 NR	15 The report included recommendations regarding unscheduled Care, scheduled care which incorporated specific recommendations pertaining to Patient Admission and Discharge Pathway. The Hospital must engage fully and effectively with the range of stakeholders, including general practitioners, in order to ensure the most effective referral process for patients. Nationally integrated programme-managed approach to the implementation of the Clinical Care Programmes and patient admission and discharge strategies across the country which is effectively led, governed, managed and monitored at national level. Implement and monitor arrangements in place to ensure that early morning ward rounds are undertaken by senior clinical decision makers and that these form part of the explicit responsibilities of each consultant. Active patient discharge planning management is in place to include each patient having an individual discharge care plan with an estimated date of discharge from hospital. Review the current arrangements to provide patient access to multidisciplinary rehabilitation, community support and intermediate- and long-term care for patients requiring residential services. An integrated approach should be implemented, involving all health and social care professionals, with identified critical decision making at key points and key performance indicators to ensure a timely and seamless transition for the admission to and discharge from the acute service. Consider, where appropriate, safe mechanisms for implementing nurse-led patient discharge

			processes with the appropriate supporting clinical governance arrangements. (P. 19)
HSE 2012 The National Emergency Medicine Programme. A strategy to improve safety, quality, access and value in Emergency Medicine in Ireland	The overarching aim of the Emergency Medicine Programme (EMP) is to improve the safety and quality of care and reduce waiting times for patients in Emergency Departments (EDs)	1 NR 2 Develop a National Emergency Care System comprising networks of EDs fully integrated with pre-hospital and hospital-based services. 3 Emergency Care Networks (are described as including: ➢ 24/7 Emergency Departments (EDs) ➢ Local Injury Units (LIUs) where patients with non-life-threatening or limb-threatening injuries can receive care ➢ The potential role of Local Emergency Units (LEUs) providing daytime-only emergency services.	15 (i) Develop and implement national Key Performance Indicators (KPIs) which include a "6-hour standard for ED attendances so that 95% of patients are admitted or discharged within six hours of attending an ED" p.3. Clinical Decision Units (relating to specified suspected conditions using standard operating procedures) should be developed in all 24/7 EDs. ED attendees. Interesting the strategy notes that national clinical guidelines will be developed and implemented for the top 20 high-risk and high-volume emergency conditions. (iii) Calls for closer collaboration and integration of Geriatric Care in particular at the hospital/ community/public health nursing/General Practice interface with safe hospital avoidance and timely discharge. Establish specific early detection and screening tools for rapid detection of 'at risk' older patients. Emergency diagnostics should be routinely available from 08:00 to 20:00 seven days a week. Electronic transfer and sharing of patient care data. Standard discharge instructions (with customisation as required) can be a vehicle for transfer of information. Adequate resources should be provided to ensure the needs of patients (e.g. requiring nutrition intervention) are met in an appropriate setting following discharge from the ED.
HSE 2007 Acute Hospital Bed Capacity Review: A Preferred Health System in Ireland to 2020 Report based upon stakeholder consultation, desk research and modelling.	PA Consulting Group was commissioned to complete an independent review of acute bed capacity requirements for Ireland until the year 2020	1 NR 2 Preferred Health system- which seeks to deliver a) Better service to patients b) Better patient outcomes c) More efficient service for taxpayers 3 Preferred Health System is characterised by: • An emphasis on illness prevention, early detection and early intervention • The nature, capacity and availability of responsive community based services is configured to avoid unnecessary admissions to acute care and to facilitate earlier discharge and a return to independence • Internal hospital processes are optimised to support high quality care, reduce patient delay and maximise use of the bed capacity • A fully integrated approach across all directorates of the health system. • Greater involvement of patients in their own care of minor, acute and long term conditions – with professionals providing a supportive, advisory, educational and skills training role.	15 (i) Overall the health service in Ireland must be considered as a total system in which a decrease in one area can lead to an increase in another. Improve the efficiency of Irish hospitals and transfer the delivery of health services out of acute hospitals to a more appropriate setting. To implement the Preferred Health System the role of the Acute hospital must be reviewed to ensure that 1) patients attend a hospital when necessary 2) when the patient is admitted they have a reduced stay; 3) transfer the delivery of care to a setting more appropriate and convenient for the patient. At a local level, strong operational bed management procedures must be established within each hospital to challenge current inefficient behaviours and improve the overall flow of patients through the hospital. Performance statistics should be fully available in hospitals to drive improvements on the ground. Hospital inpatient discharge planning should be standard. Consider Health system reform levers Financial reform (Performance based funding and money following the patient), demand side reform (patient as a consumer), system management (performance targets and dedicated support), supply side reform (Plurality of provision and decentralisation). Notes: OECD data shows that Ireland has 30% fewer acute hospital inpatient beds per capita, but this excludes private hospitals. Discharge planning is not the norm in Irish hospitals, with only 40% of the surveyed inpatients having any form of discharge plan and 17% an expected discharge date. This lack of formal process unnecessarily extends the stay for some Irish hospital inpatients.