

# Chapter 37 Post-discharge early follow-up clinics

Emergency and acute medical care in over 16s: service delivery and organisation

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Chapter 37 Post-discharge early follow-up clinics

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## 37 Post-discharge early follow-up clinics

### 37.1 Introduction

Timely outpatient follow-up has been promoted as a strategy to reduce hospital readmissions and obtain better longer term health outcomes for patients. It is understood that there are a number of acute medical emergency conditions where the days immediately following discharge are a vulnerable period. Often in such conditions care is complicated and co-ordination of care is important in preventing readmission. Frequently in such conditions there are often additions or changes in therapy that may have unknown or unpredictable effects especially when patients have other co-morbidities. Early review therefore would seem a logical strategy to consider.

Early readmission to hospitals including readmission within 30 days of discharge in the acute medical emergency population is responsible for a large proportion of healthcare spend. It is therefore of interest to understand if early follow-ups in either all or particular specialties would be clinically beneficial and cost-effective to patient management. Furthermore, it would be useful to understand if the early follow up clinics should be conducted by primary care physicians, hospital physicians or in a multidisciplinary team.

### 37.2 Review question: Do post discharge early follow up clinics optimise outcomes for patients with a suspected or confirmed acute medical emergency?

For full details see review protocol in Appendix A.

**Table 1: PICO characteristics of review question**

<b>Population</b>	Adults and young people (16 years and over) with a suspected or confirmed acute medical emergency.
<b>Intervention</b>	Attendance at a post discharge follow up clinic (for example, attending a post critical care/critical illness clinic, post discharge clinic, or early follow up clinic).
<b>Comparison</b>	No post discharge or early follow up clinic.
<b>Outcomes</b>	<ul style="list-style-type: none"> <li>• Mortality (CRITICAL)</li> <li>• Avoidable adverse events (CRITICAL)</li> <li>• Quality of life (CRITICAL)</li> <li>• Patient and/or carer satisfaction (CRITICAL)</li> <li>• ED attendance (CRITICAL)</li> <li>• Readmission up to 30 days (IMPORTANT)</li> <li>• Return to work (CRITICAL)</li> </ul>
<b>Study design</b>	Systematic reviews (SRs) of RCTs, RCTs, observational studies only to be included if no relevant SRs or RCTs are identified.

### 37.3 Clinical evidence

Nine studies (10 papers) were included in the review;<sup>4,7-10,15-17,25,26</sup> these are summarised in Table 2 below. Evidence from these studies is summarised in the clinical evidence summary below (Table 3). See also the study selection flow chart in Appendix B, forest plots in Appendix C, study evidence tables in Appendix D, GRADE tables in Appendix F and excluded studies list in Appendix G.

**Table 2: Summary of studies included in the review**

Study	Intervention and comparison	Population	Outcomes	Comments
Capomolla 2002 <sup>4</sup>  (RCT)	Heart failure management programme delivered in the day hospital of the heart failure unit (1 cardiologist, 4 nurses, 2 physiotherapists and 1 part-time dietician, psychologist and social assistant), plan of care and tailored interventions (for example, risk stratification, physical training, education or counselling), continuity with community care.  Versus  Usual care - patients referred to their primary care physician and cardiologist.	n=234 patients with chronic heart failure referred to a heart failure unit and a heart transplantation programme between January 1999 and January 2000.	Mortality (CRITICAL). Avoidable adverse events (CRITICAL). Quality of life (CRITICAL). Readmission (CRITICAL).	Authors do not specify how long between discharge and initiation of intervention.
De la Porte 2007 <sup>7</sup>  (RCT)	Intensive follow up for 1 year at a heart failure outpatient clinic led by a HF physician and a cardiovascular nurse - telephone call at 1 week, visit to clinic at weeks 1 and 3 including verbal and written education, individualised diet advice, weight control & exercise advice, patient diary, easy access to clinic, appointment with dietician, tailored treatment regimen, regular follow-up visits at weeks 5, 7 and months 3, 6, 9 and 12.  Versus	n=240 patients either hospitalised or visiting the cardiology outpatient clinic.  Inclusion criteria: New York Heart Association class 3 or 4 heart failure.  Exclusion criteria: dementia or psychiatric illness; discharged to or staying in a nursing home; any disease other than HF; expected survival of <1 year; participation in another trial; under on-going or planned hospitalisation;	Mortality (CRITICAL). Readmission (CRITICAL).	

Study	Intervention and comparison	Population	Outcomes	Comments
	Usual care - largely according to the guideline of the European Society of Cardiology (version 2001).	undergoing kidney function replacement therapy.		
Dhalla 2014 <sup>8</sup> (RCT)	<p>Virtual ward – written information about services with telephone number to call, virtual ward team meeting each morning to design and execute individualised care plans (beginning the day after discharge), telephone communication between virtual ward physician and primary care physician, home visit from care coordinator within a few days of discharge, patients assessed by telephone, at home or in the virtual ward clinic as needed.</p> <p>Versus</p> <p>Usual care – typewritten structured discharge summary given to the patient and the primary care physician, a prescription when indicated, counselling, arrangements for home care as needed, recommendations/ap pointments for follow up care with primary care and specialist physicians, follow up clinic only</p>	<p>n=1932 patients being discharged from the general internal medicine ward at high risk of readmission.</p> <p>Inclusion criteria: ≥18 years; being discharged from the general internal medicine ward of the participating hospitals; at high risk of readmission (determined by length of stay, acuity of the admission, comorbidities, ED visits in the previous 6 months); residing within the boundaries of the Toronto Central Local Health Integration Network.</p> <p>Exclusion criteria: being discharged to a rehabilitation or complex continuing care facility; non-English speaking; previous enrolment in the study; did not wish to participate.</p>	<p>Mortality (CRITICAL). ED attendance (CRITICAL). Readmission (CRITICAL).</p>	

Study	Intervention and comparison	Population	Outcomes	Comments
	at discretion of discharging physician.			
Doughty 2002 <sup>9</sup>  (RCT)	<p>Outpatient clinical review at a hospital-based heart failure clinic within 2 weeks of discharge, patient education, patient diary and information booklet, 6-weekly visits alternating between GP and HF clinic, close liaison between patient/family, GP and HF clinic, group education sessions, team available by telephone during working hours.</p> <p>Versus</p> <p>Usual care - care of GP with additional follow-up measures as usually recommended by the medical team.</p>	<p>n=197 patients admitted to the general medical wards with a primary diagnosis of heart failure.</p> <p>Inclusion criteria: heart failure diagnosed on the basis of typical symptoms and signs, with review of the chest radiograph, ECG &amp; echocardiogram.</p> <p>Exclusion criteria: surgically remediable cause for HF such as severe aortic stenosis; consideration for heart transplantation; inability to provide informed consent; terminal cancer; participation in any other clinical trial.</p>	<p>Mortality (CRITICAL). Readmission (CRITICAL).</p>	
Ekman 1998 <sup>10</sup>  (RCT)	<p>Structured care programme - nurse-monitored outpatient clinic in cooperation with study doctors, patients could contact nurses during working hours, offered a visit to the clinic 1 week after discharge, patient education, tailored care and goal setting, notebook for weight monitoring, medication calendars, guidelines and information, regular nurse</p>	<p>n=158 heart failure patients in medical wards</p> <p>Inclusion criteria: age 65 years; Boston criteria score 8; New York Heart Association classification 3 or 4 at the last hospitalisation; residence within the catchment area.</p> <p>Exclusion criteria: large myocardial infarction during the preceding 8</p>	<p>Mortality (CRITICAL). Readmission (CRITICAL).</p>	<p>Authors do not report how many patients in the intervention group accepted the offer of a visit to the outpatient clinic 1 week after discharge.</p>



Study	Intervention and comparison	Population	Outcomes	Comments
	<p>telephone contact.</p> <p>Versus</p> <p>Usual care - treated and followed by a GP and visited the ED if symptoms worsened.</p>	<p>weeks (new Q wave or serum CK-MB <math>&gt;100\mu\text{kat.l}^{-1}</math>); need of specialist treatment; serum creatinine <math>&gt;300\mu\text{mol.l}^{-1}</math>; need of permanent nursing-home care; serious or life threatening other disease or communication problems.</p>		
<p>Kasper 2002<sup>15</sup></p> <p>(RCT)</p>	<p>Telephone calls from nurse coordinator within 72 hours of discharge, weekly for a month, twice in the second month and then monthly, monthly follow-up visits with CHF nurses in CHF clinics or at home, diet restriction, exercise advice, pill sorter, patient education materials, contact number 24 hours a day.</p> <p>Versus</p> <p>Usual care - care from primary physicians.</p>	<p>n=200 patients admitted with CHF.</p> <p>Inclusion criteria: English speaking; primary diagnosis of New York Heart Association classification 3 or 4 and judged to be at high risk of CHF readmission defined as 1 or more risk factor (for example, age <math>&gt;70</math> years, LVEF<math>&lt;35\%</math>, at least, ischemic cardiomyopathy, peripheral oedema at hospital discharge or <math>&lt;3\text{kg}</math> weight loss in hospital).</p> <p>Exclusion criteria: valvular heart disease requiring surgical correction; substance abuse; peripartum cardiomyopathy; hypertrophic cardiomyopathy with left ventricular outflow tract obstruction, restrictive cardiomyopathy, constrictive pericarditis;</p>	<p>Mortality (CRITICAL).</p> <p>Readmission (CRITICAL).</p>	<p>The authors do not specify how long between discharge and the first monthly follow-up visit or how many follow-up visits took place in CHF clinics (versus patients' homes).</p>

Study	Intervention and comparison	Population	Outcomes	Comments
		<p>psychiatric disease/dementia; concurrent non-cardiac illness; heart transplantation likely within 6 months; uncorrected thyroid disease; serum creatinine <math>\geq 265 \mu\text{mol/l}</math>; long-term intravenous inotropic therapy at home; cardiac surgery/MI during index admission; participation in another research trial; unwillingness to consent or residence in a nursing home/outside catchment area.</p>		
<p>Ledwidge 2003<sup>16</sup>  (RCT)</p>	<p>Nurse-led education and dietetic consultations on 3 or more occasions, telephone calls 3 days after discharge and then weekly until 12 weeks, 2 HF outpatient clinic visits (week 2 and 6), patients advised to contact clinic if weight increased by 2kg or more for a medication increase.</p> <p>Versus</p> <p>Routine care - patients referred back to primary care physician.</p>	<p>n=98 patients admitted to hospital with heart failure.</p> <p>Inclusion criteria: &gt;18 years; admitted with diagnosis of HF; diagnosis confirmed by a cardiologist based on history and examination compatible with HF, chest x-ray appearance of congestion, echocardiography evidenced left ventricular systolic or diastolic dysfunction and response to initial therapy.</p> <p>Exclusion criteria: patients presenting with HF in the setting of myocardial</p>	<p>Mortality (CRITICAL). Quality of life (CRITICAL). Readmission (CRITICAL).</p>	<p>Companion paper of McDonald 2002.</p>

Study	Intervention and comparison	Population	Outcomes	Comments
		<p>infarction or unstable angina; failure not the primary problem; illnesses that compromise survival over the duration of the study or cognitive impairment.</p>		
<p>McDonald 2002<sup>17</sup>  (RCT)</p>	<p>Nurse-led education and dietetic consultations on 3 or more occasions, telephone calls 3 days after discharge and then weekly until 12 weeks, 2 HF outpatient clinic visits (week 2 and 6), patients advised to contact clinic if weight increased by 2kg or more for a medication increase.</p> <p>Versus</p> <p>Routine care - patients referred back to primary care physician.</p>	<p>n=98 patients admitted to hospital with heart failure.</p> <p>Inclusion criteria: &gt;18 years; admitted with diagnosis of HF; diagnosis confirmed by a cardiologist based on history and examination compatible with HF, chest x-ray appearance of congestion, echocardiography evidenced left ventricular systolic or diastolic dysfunction and response to initial therapy.</p> <p>Exclusion criteria: patients presenting with HF in the setting of myocardial infarction or unstable angina; failure not the primary problem; illnesses that compromise survival over the duration of the study or cognitive impairment.</p>	<p>Mortality (CRITICAL). Readmission (CRITICAL).</p>	
<p>Stromberg 2003<sup>25</sup>  (RCT)</p>	<p>Nurse-led heart failure clinic 2-3 weeks after discharge, patient</p>	<p>n=106 patients hospitalised due to heart failure.</p>	<p>Mortality (CRITICAL). Readmission (CRITICAL).</p>	

Study	Intervention and comparison	Population	Outcomes	Comments
	<p>and family education, dietary and lifestyle changes, nurses available by phone during working hours.</p> <p>Versus</p> <p>Current clinical practice - conventional follow-up in primary health care.</p>	<p>Inclusion criteria: New York Association classification 2-4; diagnosed heart failure by echocardiography, radiographic evidence of pulmonary congestion or typical symptoms and signs.</p> <p>Exclusion criteria: severe chronic pulmonary disease; dementia or other psychiatric illness; short anticipated survival; discharge to geriatric clinic or home care or already receiving follow-up at the nurse-led HF clinic.</p>		
<p>Thompson 2005<sup>26</sup></p> <p>(RCT)</p>	<p>Information before discharge, home visit within 10 days of discharge including education and clinical examination, telephone access to nurses during working hours, monthly nurse-led out-patient HF clinic for at least 6 months.</p> <p>Versus</p> <p>Standard care - explanation of condition and medications by ward nurse and referral to appropriate post-discharge support, outpatient appointment 6-8 weeks after discharge.</p>	<p>n=106 chronic heart failure patients.</p> <p>Inclusion criteria: acute admission to hospital with a diagnosis of CHF; objective evidence of impaired left ventricular systolic function evidenced by a left ventricular ejection fraction of <math>\leq 45\%</math> immediately prior to study recruitment and discharged to home.</p> <p>Exclusion criteria: patients awaiting an elective cardiac procedure to reverse the cause of underlying heart failure or terminal illness other than</p>	<p>Mortality (CRITICAL). Readmission (CRITICAL).</p>	<p>Authors do not specify how long between discharge and first monthly out-patient HF clinic visit.</p> <p>79% attended all clinic visits.</p>

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Study	Intervention and comparison	Population	Outcomes	Comments
		CHF.		

**Table 3: Clinical evidence summary: follow up clinic versus no follow up clinic**

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Attendance at a post discharge early follow up clinic versus no post discharge early follow up clinic (95% CI)
Mortality (heart failure patients)	1316 (8 studies) 3-12 months	⊕⊕⊖⊖ LOW <sup>a,b</sup> due to risk of bias, indirectness	RR 0.53 (0.4 to 0.7)	Moderate	
				180 per 1000	85 fewer per 1000 (from 54 fewer to 108 fewer)
Mortality (general medical patients)	1896 (1 study) 12 months	⊕⊕⊕⊖ MODERATE <sup>b</sup> due to indirectness	RR 0.97 (0.84 to 1.13)	Moderate	
				265 per 1000	8 fewer per 1000 (from 42 fewer to 34 more)
Avoidable adverse events urgent transplantations	234 (1 study) 12 months	⊕⊖⊖⊖ VERY LOW <sup>a,b,c</sup> due to risk of bias, indirectness, imprecision	OR 8.08 (0.16 to 408.63)	Moderate	
				0 per 1000	Not calculable
ED attendance number of ED visits	1823 (1 study) 12 months	⊕⊕⊖⊖ LOW <sup>a,b</sup> due to risk of bias, indirectness	RR 1.02 (0.96 to 1.08)	Moderate	
				706 per 1000	14 more per 1000 (from 28 fewer to 56 more)
Quality of life Minnesota Living With Heart Failure Questionnaire	98 (1 study) 3 months	⊕⊖⊖⊖ VERY LOW <sup>a,b,c</sup> due to risk of bias, indirectness, imprecision		The mean quality of life in the intervention groups was 11 lower (19.39 to 2.61 lower)	
Quality of life time trade-off	234 (1 study) 12 months	⊕⊖⊖⊖ VERY LOW <sup>a,b,c</sup> due to risk of bias, indirectness, imprecision		The mean quality of life in the intervention groups was 0.09 higher (0.04 to 0.14 higher)	
Readmission number of patients readmitted	340 (2 studies)	⊕⊕⊖⊖ LOW <sup>a,b</sup>	RR 0.38 (0.2 to	Moderate	
				370 per	229 fewer per 1000

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Attendance at a post discharge early follow up clinic versus no post discharge early follow up clinic (95% CI)
(heart failure patients readmitted for any cause)		due to risk of bias, indirectness	0.73)	1000	(from 100 fewer to 296 fewer)
Readmission number of patients readmitted (general medical patients)	1800 (1 study) 12 months	⊕⊕⊕⊖ MODERATE <sup>b</sup> due to indirectness	RR 1.01 (0.94 to 1.1)	Moderate	
				584 per 1000	6 more per 1000 (from 35 fewer to 58 more)
Readmission due to heart failure number of patients readmitted due to heart failure	870 (5 studies) 3-12 months	⊕⊖⊖⊖ VERY LOW <sup>a,b,c,d</sup> due to risk of bias, inconsistency, indirectness, imprecision	RR 0.7 (0.47 to 1.05)	Moderate	
				255 per 1000	76 fewer per 1000 (from 135 fewer to 13 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias.

(b) Downgraded by 1 or 2 increments because the majority of the evidence was based on indirect comparisons.

(c) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

(d) Downgraded by 1 or 2 increments because Heterogeneity,  $I^2=50%$ ,  $p=0.04$ , unexplained by subgroup analysis.

## 37.4 Economic evidence

### Published literature

One health economic study were identified with the relevant comparison and was included in this review.<sup>7</sup> This is summarised in the economic evidence profile below (Table 4) and the economic evidence table is in Appendix E.

The economic article selection protocol and flow chart for the whole guideline can found in the guideline's Appendix 41A and Appendix 41B.



**Table 4: Economic evidence profile: Follow up clinic versus no follow up clinic**

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost-effectiveness	Uncertainty
De la Porte 2007 <sup>7</sup> (Netherlands)	Partially applicable <sup>(a)</sup>	Potentially serious limitations <sup>(b)</sup>	<p>Within-trial (RCT) cost-consequence analysis. Costing of hospitalisation and outpatient clinic attendances over 12 months.</p> <p><b>Intervention 1:</b> No post discharge or early follow up clinic.</p> <p><b>Intervention 2:</b> Intensive follow up at a heart failure physician and cardiovascular nurse-led heart failure outpatient clinic - telephone call at 1 week, visit to clinic at 1 and 3 weeks, including verbal and written education, individualised lifestyle advice, patient diary, easy access to clinic, appointment with dietician, tailored treatment regimen.</p>	Saves £463 per patient.	<p>Mortality (1-year RR): 0.54</p> <p>Re-admission (1-year RR): 0.47</p>	Follow up clinics dominated	Baseline differences in sex were adjusted for but did not change the results.

Abbreviations: RCT: randomised controlled trial; RR: risk ratio.

(a) Not from a UK NHS perspective and does not use QALYs as an outcome measure.

(b) Single trial that may not reflect the entire evidence base. Costs may not reflect a UK NHS perspective.

## 37.5 Evidence statements

### Clinical

- Nine studies comprising 3271 people evaluated the role of post discharge early follow up clinics for improving outcomes in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that post discharge early follow up clinics may provide a benefit in reduced mortality in heart failure patients (8 studies, low quality), quality of life (1 study, very low quality), readmission for heart failure patients readmitted for any cause (2 studies, low quality) and readmission due to heart failure (5 studies, very low quality). However, the evidence suggested there was no effect on mortality in general medical patients (1 study, moderate quality), avoidable adverse events expressed as urgent transplantation (1 study, very low quality), ED attendance (1 study, low quality) and readmission in general medical patients (2 studies, low quality).

### Economic

- One cost-consequences analysis showed that post discharge follow up clinics were cost saving and resulted in improved health outcomes including reduced mortality and reduced re-admissions. This analysis was assessed as partially applicable with potentially serious limitations.

## 37.6 Recommendations and link to evidence

<b>Recommendations</b>	-
<b>Research recommendations</b>	<b>RR16. What is the clinical and cost effectiveness of post-discharge early follow up clinics for people who have had a medical emergency and are at risk of unscheduled hospital readmission?</b>
Relative values of different outcomes	The guideline committee considered mortality, avoidable adverse events, quality of life, patient satisfaction, ED attendance and return to work to be critical outcomes. Carer satisfaction/burden and readmission were considered to be important outcomes.
Trade-off between benefits and harms	<p>A total of 9 studies were identified that assessed post discharge early follow up clinics. Eight of these were in heart failure patients and 1 study included general medical patients.</p> <p><b>Heart failure patients</b></p> <p>The evidence suggested that post discharge early follow up clinics may provide a benefit for heart failure patients in reduced mortality, quality of life, readmission for heart failure (reported from 3-12 months) and readmission for any cause (at 6-12 months). However, the evidence suggested there was no effect on avoidable adverse events (urgent transplantation).</p> <p><b>General medical patients</b></p> <p>There was no effect on mortality, ED attendance and readmission at 12 months for patients discharged from a general internal medical medicine ward. No evidence was identified for patient satisfaction, readmission within 30 days, return to work or carer satisfaction/burden.</p> <p>Eight of the 9 studies included in the review were based on the heart failure population. The committee considered that this evidence could not be generalised to unselected patients with acute medical emergencies. Therefore, the committee did not consider there to be enough evidence to support a general recommendation. The NICE guideline on acute heart failure in adults recommends that a follow-up clinical assessment should be undertaken by a member of the specialist heart failure team within 2 weeks of the person being discharged from hospital.<sup>20</sup></p> <p>The committee emphasised the challenges inherent in evaluating people with multimorbidity. It was also noted that in patients with unselected medical conditions, the requirement and the timing of follow up, if required at all, may vary considerably between each presenting or admitting condition. The committee agreed that a research recommendation on post discharge early follow up clinics was appropriate to ascertain if they had a role in the management of patients presenting with acute medical emergencies.</p>
Trade-off between net effects and costs	<p>One of the studies included in the review included a cost analysis that was suitable for inclusion as economic evidence. It was in a heart failure population and showed cost savings as well as reduced mortality and readmission for the follow up clinic intervention. Another study found similar cost savings also in a heart failure population but was outside the time period for studies included in the review.</p> <p>The committee found the heart failure evidence compelling and were content to cross-refer to the relevant recommendation from NICE's Acute Heart Failure guideline but did not feel they could make a recommendation generalisable to all acute medical conditions, as the evidence was limited to that population.</p>
Quality of evidence	Evidence for the outcome of mortality was considered to be a mixture of moderate quality due to indirectness and low quality due to risk of bias and indirectness (of study intervention). For avoidable adverse events, evidence was considered to be of very low quality due to risk of bias, indirectness (of study intervention) and

<b>Recommendations</b>	-
<b>Research recommendations</b>	<b>RR16. What is the clinical and cost effectiveness of post-discharge early follow up clinics for people who have had a medical emergency and are at risk of unscheduled hospital readmission?</b>
	<p>imprecision. Evidence for ED attendance was considered to be of low quality due to risk of bias and indirectness (of study intervention). Evidence for quality of life was considered to be of very low quality due to risk of bias, indirectness (of study intervention) and imprecision.</p> <p>For readmission in general medical patients, the evidence was considered to be moderate quality due to indirectness. Readmission in heart failure patients readmitted for any cause was low quality due to risk of bias and indirectness (of study intervention) and readmission due to heart failure evidence was very low quality due to risk of bias, inconsistency, indirectness (of study intervention) and imprecision.</p> <p>The included economic evaluation was assessed as partially applicable because it was not from a UK NHS perspective and because it did not use QALYs as an outcome measure. It was assessed as having potentially serious limitations because it was based on a single trial that may not reflect the entire evidence base.</p>
<b>Other considerations</b>	<p>Heart failure clinics are already part of current clinical practice. Heart failure is associated with a large burden on the NHS. It accounts for 2% of the NHS budget much of which is due to inpatient care.<sup>19</sup> Patients with heart failure are at a high risk of readmission. People with other chronic conditions such as chronic obstructive pulmonary disease were also identified by the committee as being at a high risk of readmission. Targeting such conditions with early follow up may be beneficial in preventing readmission.</p> <p>There are many tools available for identifying patients who are at high risk of readmission. The committee considered that conducting early follow up may complement interventions that promote timely discharge. However, defining precisely the timing and content of the intervention (for example, staff, interval or setting) are critical for interpreting research outcomes. Currently with respect to post discharge clinics, this information is not well characterised.</p> <p>Access to such clinics for patients would be important, particularly for the frail elderly. Provision of such services in the community would need to be considered. Also, the impact of such clinics on other outpatient or GP clinics would need to be examined. Patients who require specialised evaluation as part of their follow up, particularly in terms of equipment which is not portable, may benefit from such an approach but these patients need to be defined. Patients with specific chronic diseases would likely be followed up by the relevant speciality; those with multimorbidity require an integrated approach to improve outcomes, including patient convenience and satisfaction and minimising duplication of effort. The cost of delivering these services must also be taken into account and this is likely to be a major driver in the decision making of where to place services.</p>

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- 15 Kasper EK, Gerstenblith G, Hefter G, van Anden E, Brinker JA, Thiemann DR et al. A randomized trial of the efficacy of multidisciplinary care in heart failure outpatients at high risk of hospital readmission. *Journal of the American College of Cardiology*. 2002; 39(3):471-480
- 16 Ledwidge M, Barry M, Cahill J, Ryan E, Maurer B, Ryder M et al. Is multidisciplinary care of heart failure cost-beneficial when combined with optimal medical care? *European Journal of Heart Failure*. 2003; 5(3):381-389
- 17 McDonald K, Ledwidge M, Cahill J, Quigley P, Maurer B, Travers B et al. Heart failure management: multidisciplinary care has intrinsic benefit above the optimization of medical care. *Journal of Cardiac Failure*. 2002; 8(3):142-148
- 18 Mehlhorn J, Freytag A, Schmidt K, Brunkhorst FM, Graf J, Troitzsch U et al. Rehabilitation interventions for postintensive care syndrome: a systematic review. *Critical Care Medicine*. 2014; 42(5):1263-1271
- 19 National Clinical Guideline Centre. Chronic heart failure: the management of chronic heart failure in adults in primary and secondary care. NICE clinical guideline 108. London. National Clinical Guideline Centre, 2010. Available from: <http://guidance.nice.org.uk/CG108/>
- 20 National Clinical Guideline Centre. Acute heart failure: diagnosing and managing acute heart failure in adults. NICE clinical guideline 187. London. National Clinical Guideline Centre, 2014. Available from: <http://guidance.nice.org.uk/CG187>
- 21 Paratz JD, Kenardy J, Mitchell G, Comans T, Coyer F, Thomas P et al. IMPOSE (IMProving Outcomes after Sepsis)-the effect of a multidisciplinary follow-up service on health-related quality of life in patients postsepsis syndromes-a double-blinded randomised controlled trial: protocol. *BMJ Open*. 2014; 4(5):e004966
- 22 Powell LH, Calvin JE, Jr., Richardson D, Janssen I, Mendes de Leon CF, Flynn KJ et al. Self-management counseling in patients with heart failure: the heart failure adherence and retention randomized behavioral trial. *JAMA - Journal of the American Medical Association*. 2010; 304(12):1331-1338
- 23 Rainville EC. Impact of pharmacist interventions on hospital readmissions for heart failure. *American Journal of Health-System Pharmacy*. 1999; 56(13):1339-1342
- 24 Schandl A, Bottai M, Hellgren E, Sundin O, Sackey P. Gender differences in psychological morbidity and treatment in intensive care survivors--a cohort study. *Critical Care*. 2012; 16(3):R80
- 25 Stromberg A, Martensson J, Fridlund B, Levin LA, Karlsson JE, Dahlstrom U. Nurse-led heart failure clinics improve survival and self-care behaviour in patients with heart failure: results from a prospective, randomised trial. *European Heart Journal*. 2003; 24(11):1014-1023

- 26 Thompson DR, Roebuck A, Stewart S. Effects of a nurse-led, clinic and home-based intervention on recurrent hospital use in chronic heart failure. *European Journal of Heart Failure*. 2005; 7(3):377-384

## Appendices

### Appendix A: Review protocol

**Table 5: Review protocol: post discharge early follow up clinics**

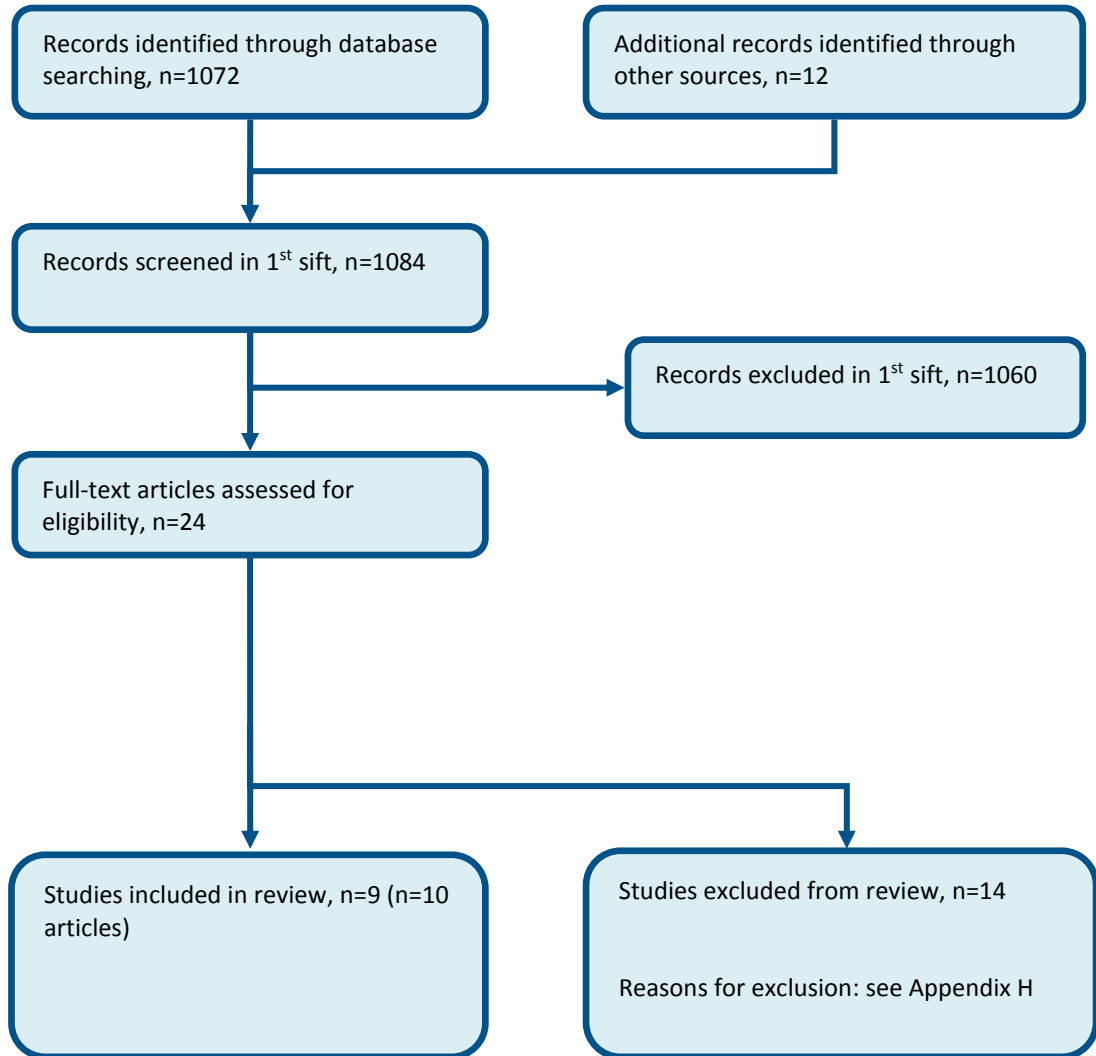
Review question	Do post discharge early follow up clinics optimise outcomes for patients with a suspected or confirmed acute medical emergency?
Guideline condition and its definition	Acute medical emergencies.
Review population	Adults and young people (16 years and over) with a suspected or confirmed AME.
	Adults.
	Line of therapy not an inclusion criterion.
Interventions and comparators: generic/class; specific/drug  (All interventions will be compared with each other, unless otherwise stated)	Attendance at a post discharge follow up clinic; including attending a post critical/critical illness clinic. Attendance at a post discharge follow up clinic; post discharge clinic. Attendance at a post discharge follow up clinic; early follow up clinic. No post discharge or early follow up clinic; as defined by study.
Outcomes	<ul style="list-style-type: none"> <li>- Quality of life (Continuous) CRITICAL</li> <li>- Mortality (Dichotomous) CRITICAL</li> <li>- Avoidable adverse effects (Dichotomous) CRITICAL</li> <li>- Readmission up to 30 days (Dichotomous) IMPORTANT</li> <li>- Patient and/or carer satisfaction (Dichotomous) CRITICAL</li> <li>- Return to work (Dichotomous) CRITICAL</li> <li>- ED Attendance (Dichotomous) CRITICAL</li> <li>- Carer satisfaction/burden (Dichotomous) IMPORTANT</li> </ul>
Study design	Systematic reviews (SRs) of RCTs, RCTs, observational studies only to be included if no relevant SRs or RCTs are identified.
Unit of randomisation	Patient. Hospital. Ward.
Crossover study	Not permitted.
Minimum duration of study	Not defined.
Other exclusions	Community rehabilitation. Hospital at home. Community matron. Home visits.
Subgroup analyses if there is heterogeneity	<ul style="list-style-type: none"> <li>- Frail Elderly (frail elderly; no frail elderly); different outcomes for frail.</li> <li>- Critical illness (critically ill; not critically ill); different outcome for critically ill patients.</li> <li>- Clinic within 7 days of discharge (within 7 days; not within 7 days); different outcome for clinic within 7 days.</li> <li>- Clinic within 28 days of discharge (within 28 days; not within 28 days); different outcome for clinic within 28 days.</li> </ul>
Search criteria	Databases: Medline, Embase, the Cochrane Library.



<b>Review question</b>	<b>Do post discharge early follow up clinics optimise outcomes for patients with a suspected or confirmed acute medical emergency?</b>
	Date limits for search: None. Language: English.

## Appendix B: Clinical article selection

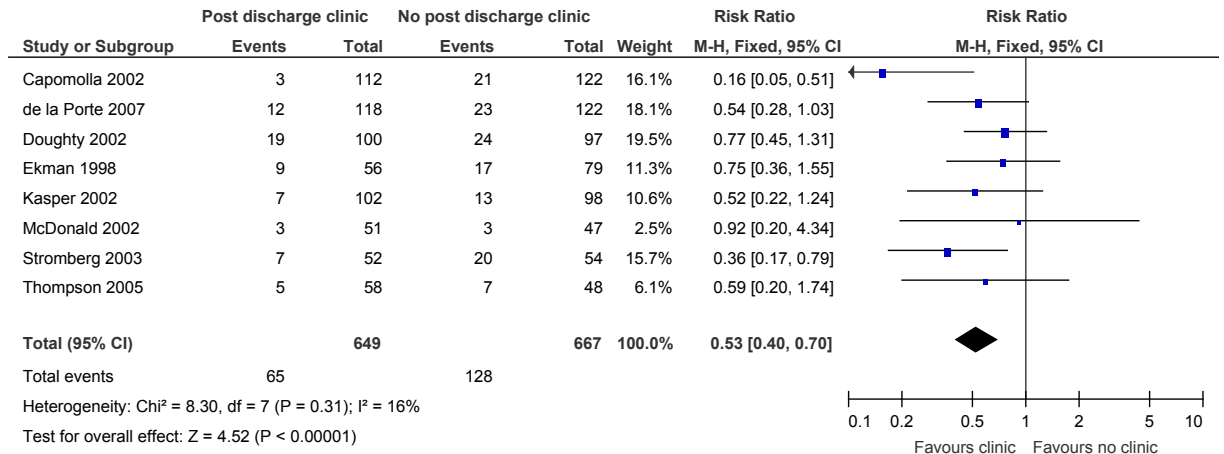
Figure 1: Flow chart of clinical article selection for the review of post discharge early follow up clinics



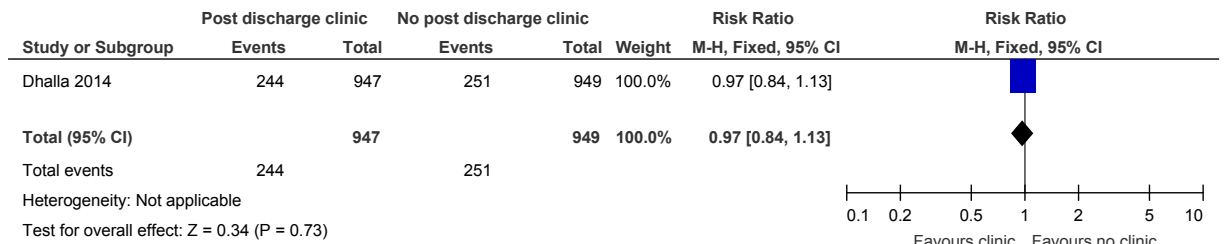
# Appendix C: Forest plots

## C.1 Post discharge early follow up clinic versus no post discharge clinic

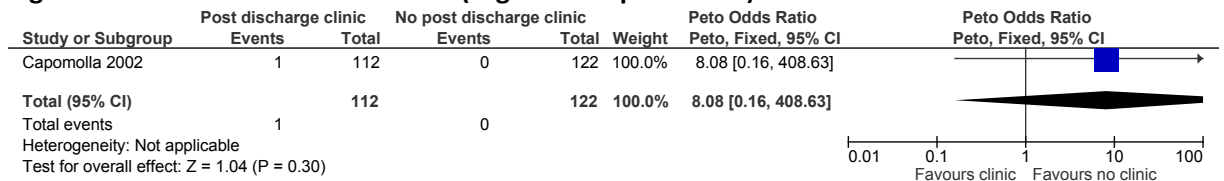
**Figure 2: Mortality (heart failure patients)**



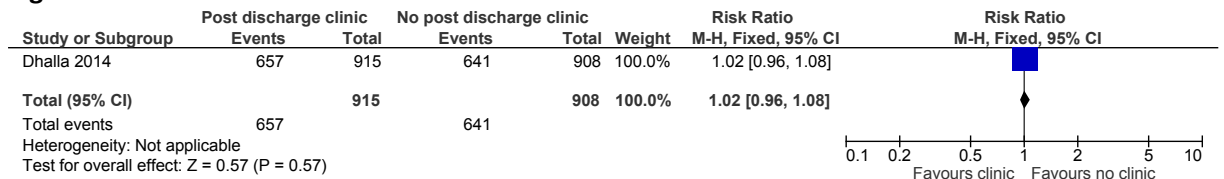
**Figure 3: Mortality (general medical patients)**



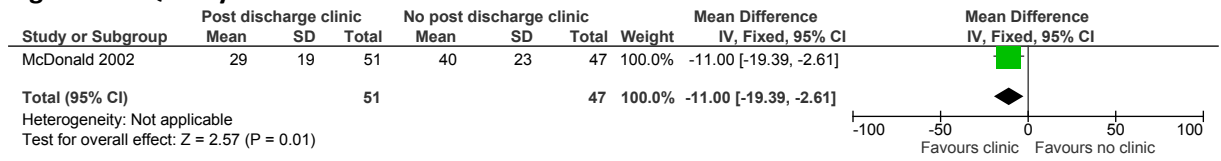
**Figure 4: Avoidable adverse events (urgent transplantation)**



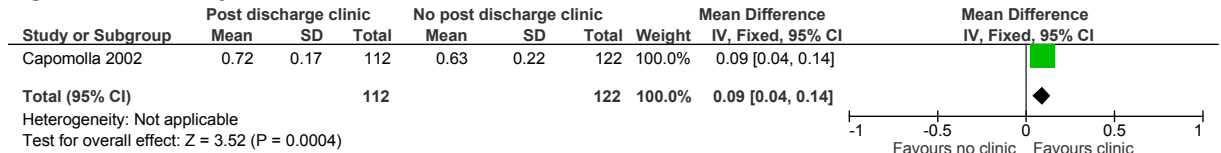
**Figure 5: ED attendance**



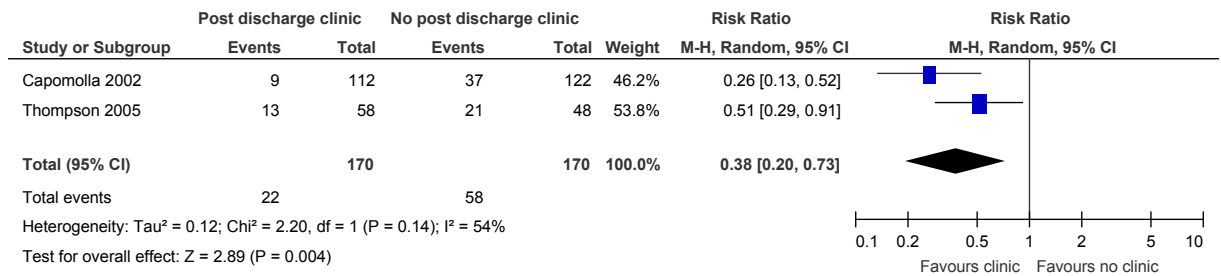
**Figure 6: Quality of life**



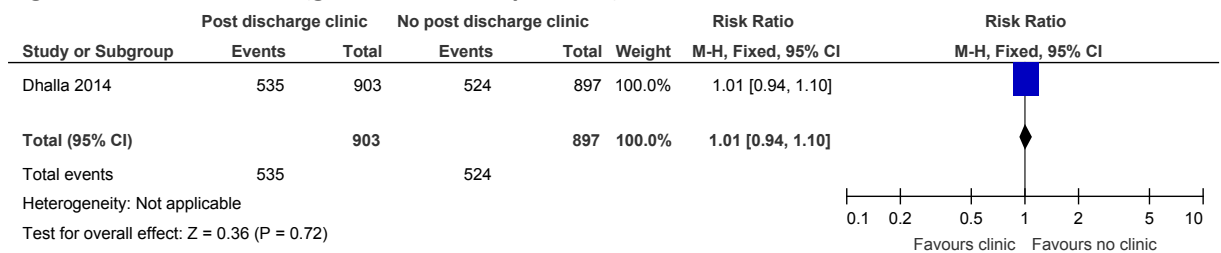
**Figure 7: Quality of life**



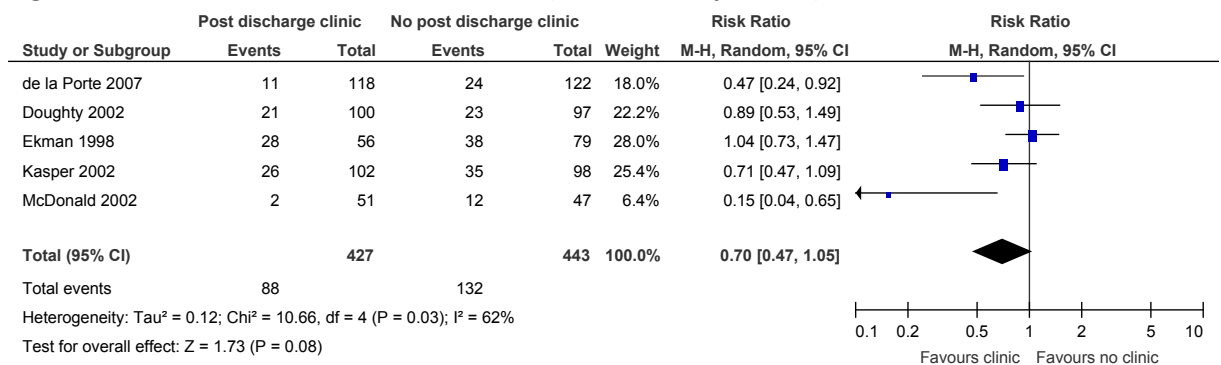
**Figure 8: Readmission (heart failure patients readmitted for any cause)**



**Figure 9: Readmission (general medical patients)**



**Figure 10: Readmission due to heart failure (heart failure patients)**



## Appendix D: Clinical evidence tables

Study	Capomolla 2002 <sup>4</sup>
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=234)
Countries and setting	Conducted in Italy; setting: Heart Failure Unit of Montescano Medical Centre and the Heart Transplantation Program of the Cardiac Surgery Division of Policlinico S. Matteo, Pavia, Italy
Line of therapy	Not applicable
Duration of study	Intervention + follow up: 12 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: diagnosis of chronic heart failure
Stratum	Overall: not applicable
Subgroup analysis within study	Not applicable: not applicable
Inclusion criteria	Diagnosis of CHF supported by clinical history, physical signs and symptoms and echocardiographic findings
Exclusion criteria	Not reported
Recruitment/selection of patients	Consecutive patients meeting the inclusion criteria between January 1999 and January 2000
Age, gender and ethnicity	Age - Mean (SD): 56 (10). Gender (M:F): 196:38. Ethnicity: not reported
Further population details	1. Critical illness: Not applicable/Not stated Unclear. 2. Frail Elderly: Not applicable/Not stated Unclear.
Indirectness of population	No indirectness: not applicable
Interventions	(n=112) Intervention 1: Attendance at a post discharge follow up clinic - post discharge clinic. Heart failure management programme delivered in the day hospital of the heart failure unit including plan of care, tailored interventions (for example, risk stratification, physical training, education and counselling) telephone calls and continuity with community care. Duration: not reported. Concurrent medication/care: not applicable.  (n=122) Intervention 2: No post discharge or early follow up clinic - As defined by study. Usual care - patients referred to their primary care physician and cardiologist. Duration: 12 months. Concurrent medication/care: not applicable.
Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: POST DISCHARGE CLINIC versus AS DEFINED BY STUDY	
Protocol outcome 1: Quality of life	

Study	Capomolla 2002 <sup>4</sup>
	<p>- Actual outcome: utility measured by time trade-off at 12 months; Group 1: mean 0.72 (SD 0.17); n=112, Group 2: mean 0.63 (SD 0.22); n=122, Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable; Baseline details: no significant clinical or instrumental differences between the two groups</p> <p>Protocol outcome 2: Mortality</p> <p>- Actual outcome: cardiac death at 12 months; Group 1: 3/112, Group 2: 21/122; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable; Baseline details: no significant clinical or instrumental differences between the two groups</p> <p>Protocol outcome 3: Avoidable adverse effects</p> <p>- Actual outcome: urgent transplantation at 12 months; Group 1: 1/112, Group 2: 0/122; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable; Baseline details: no significant clinical or instrumental differences between the two groups</p> <p>Protocol outcome 4: Readmission</p> <p>- Actual outcome: no. of patients re-hospitalised at 12 months; Group 1: 9/112, Group 2: 37/122; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable; Baseline details: no significant clinical or instrumental differences between the two groups</p>
Protocol outcomes not reported by the study	Patient satisfaction; Return to work; ED Attendance; Carer satisfaction/burden

Study	De la porte 2007 <sup>7</sup>
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=240)
Countries and setting	Conducted in Netherlands; setting: 2 regional teaching hospitals
Line of therapy	Not applicable
Duration of study	Intervention time + follow up: 12 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: NYHA class 3 or 4 heart failure
Stratum	Overall: not applicable
Subgroup analysis within study	Not applicable: not applicable
Inclusion criteria	NYHA class 3 or 4 heart failure
Exclusion criteria	dementia/psychiatric illness; discharged to or staying in nursing home; disease other than HF; expected survival of

Study	De la porte 2007 <sup>7</sup>
	<1year; participation in another trial; on-going or planned hospitalisation; undergoing kidney function replacement therapy
Recruitment/selection of patients	Those meeting the inclusion criteria who gave informed consent
Age, gender and ethnicity	Age - Range of means: 70-71. Gender (M:F): 174:66. Ethnicity: not reported
Further population details	1. Critical illness: Not applicable/Not stated Unclear. 2. Frail Elderly: Not applicable/Not stated Unclear.
Indirectness of population	No indirectness: not applicable
Interventions	(n=118) Intervention 1: Attendance at a post discharge follow up clinic – post discharge clinic. intensive follow up at a heart failure physician and cardiovascular nurse-led heart failure outpatient clinic - telephone call at 1 week, visit to clinic at 1 and 3 weeks, including verbal and written education, individualised lifestyle advice, patient diary, easy access to clinic, appointment with dietician, tailored treatment regimen, regular follow up visits at weeks 5 and 7 and months 3, 6, 9 and 12. Duration: 1 year. Concurrent medication/care: not applicable.  (n=122) Intervention 2: No post discharge or early follow up clinic - As defined by study. Usual care - largely according to the guideline of the European Society of Cardiology (version 2001). Duration: 1 year. Concurrent medication/care: not applicable.
Funding	Funding not stated
<b>RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: POST DISCHARGE CLINIC versus AS DEFINED BY STUDY</b>	
<p>Protocol outcome 1: Mortality - Actual outcome: death (all cause) at 1 year; Group 1: 12/118, Group 2: 23/122; Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable; Baseline details: well balanced for all baseline characteristics apart from sex</p> <p>Protocol outcome 2: Readmission - Actual outcome: hospitalisation for congestive heart failure at 1 year; Group 1: 11/118, Group 2: 24/122; Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable; Baseline details: well balanced for all baseline characteristics apart from sex</p>	
Protocol outcomes not reported by the study	Quality of life; Avoidable adverse effects; Patient satisfaction; Return to work; ED Attendance; Carer satisfaction/burden

Study	Dhalla 2014 <sup>8</sup>
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=1932)
Countries and setting	Conducted in Canada; setting: 4 hospitals in Toronto
Line of therapy	Not applicable
Duration of study	Intervention + follow up: 12 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: discharged from the internal medicine ward
Stratum	Overall: not applicable
Subgroup analysis within study	Not applicable: not applicable
Inclusion criteria	18 years or older; being discharged from the general medicine ward of the participating hospitals; at high risk of readmission (determined by length of stay, acuity of the admission, comorbidities, ED visits in the previous 6 months); residing within the boundaries of the Toronto Central Local Health Integration Network
Exclusion criteria	being discharged to a rehabilitation or complex continuing care facility; non English speaking; previous enrolment in the study; did not wish to participate
Recruitment/selection of patients	Consecutive patients meeting the inclusion criteria during the recruitment period
Age, gender and ethnicity	Age - Range of means: 71.2-71.3. Gender (M:F): 995:937. Ethnicity: not reported
Further population details	1. Critical illness: Not applicable/Not stated Unclear. 2. Frail Elderly: Not applicable/Not stated Unclear.
Indirectness of population	No indirectness: not applicable
Interventions	(n=963) Intervention 1: Attendance at a post discharge follow up clinic - post discharge clinic. virtual ward - written information about services with telephone number to call, virtual ward team meeting each morning to design and execute individualised care plans (beginning the day after discharge), telephone communication between virtual ward physician and primary care physician, home visit from care coordinator within a few days of discharge, patients assessed by telephone, at home or in the virtual ward clinic as needed. Duration: mean 35.5 days (SD 27 days). Concurrent medication/care: not applicable.  (n=960) Intervention 2: No post discharge or early follow up clinic - As defined by study. Usual care - typewritten structured discharge summary, prescription when indicated, counselling, arrangements for home care as needed, recommendations/appointments for follow up care with primary care and specialist physicians, follow up clinic only at the discretion of the discharging physician. Duration: 1 year. Concurrent medication/care: not applicable.
Funding	Academic or government funding (Canadian Institutes of Health Research, Ontario Ministry of Health and Long-term Care, Green Shield Canada Foundation, University of Toronto Department of Medicine, Academic Funding Plan



Study	Dhalla 2014 <sup>8</sup>
	Innovation Fund)
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: POST DISCHARGE CLINIC versus AS DEFINED BY STUDY	
Protocol outcome 1: Mortality - Actual outcome: death at 12 months; Group 1: 244/947, Group 2: 251/949; Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable	
Protocol outcome 2: Readmission - Actual outcome: readmission at 12 months; Group 1: 535/903, Group 2: 524/897; Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable	
Protocol outcome 3: ED Attendance - Actual outcome: ED visit at 12 months; Group 1: 657/915, Group 2: 641/908; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable	
Protocol outcomes not reported by the study	Quality of life; Avoidable adverse effects; Patient satisfaction; Return to work; Carer satisfaction/burden

Study	Ekman 1998 <sup>10</sup>
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=158)
Countries and setting	Conducted in Sweden; setting: Sahlgrenska University Hospital
Line of therapy	Not applicable
Duration of study	Intervention + follow up: 6 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: heart failure patients in the medical wards at the hospital
Stratum	Overall: not applicable
Subgroup analysis within study	Not applicable: not applicable
Inclusion criteria	65 years; Boston criteria score 8; New York Heart Association classification 3 or 4 at last hospitalisation; residence within the catchment area
Exclusion criteria	Large MI during the preceding 8 weeks (new Q wave or serum CK-MB >100mcgkat.L-1); need of specialist treatment; serum creatinine >300mcgmol.L-1; need of permanent nursing home care; serious or life threatening other disease; communication problems

Study	Ekman 1998 <sup>10</sup>
Recruitment/selection of patients	Consecutive patients meeting the inclusion criteria during the recruitment period
Age, gender and ethnicity	Age - Mean (SD): 80.3 (6.8). Gender (M:F): 91:67. Ethnicity: not reported
Further population details	1. Critical illness: Not applicable/Not stated Unclear. 2. Frail Elderly: Not applicable/Not stated Unclear.
Indirectness of population	No indirectness: not applicable
Interventions	<p>(n=79) Intervention 1: Attendance at a post discharge follow up clinic - post discharge clinic. structured care programme - nurse monitored outpatient clinic in cooperation with study doctors, nurses available by telephone during working hours, visit to the clinic offered at 1 week, patient education, tailored care and goal setting, notebook for weight monitoring, medication calendars, guidelines and information, regular nurse telephone contact. Duration: 6 months. Concurrent medication/care: not applicable.</p> <p>(n=79) Intervention 2: No post discharge or early follow up clinic - As defined by study. Usual care - treated and followed by a GP and visited the ED if symptoms worsened. Duration: 6 months. Concurrent medication/care: not applicable.</p>
Funding	Other (Swedish Medical Research Council, Swedish Foundation for Health Care Sciences and Allergy Research, Merck Sharp & Dohme)
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: POST DISCHARGE CLINIC versus AS DEFINED BY STUDY	
<p>Protocol outcome 1: Mortality  - Actual outcome: number of deaths (at least 1 visit to nurse) at 6 months; Group 1: 9/56, Group 2: 17/79; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable; Baseline details: greater prevalence of atrial fibrillation in the usual care group</p>	
<p>Protocol outcome 2: Readmission  - Actual outcome: readmissions for heart failure (at least 1 visit to nurse) at 6 months; Group 1: 28/56, Group 2: 38/79; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable; Baseline details: greater prevalence of atrial fibrillation in the usual care group</p>	
Protocol outcomes not reported by the study	Quality of life; Avoidable adverse effects; Patient satisfaction; Return to work; ED Attendance; Carer satisfaction/burden

Study	Kasper 2002 <sup>15</sup>
Study type	RCT (Patient randomised; Parallel)

Study	Kasper 2002 <sup>15</sup>
Number of studies (number of participants)	1 (n=200)
Countries and setting	Conducted in USA; setting: the Johns Hopkins Hospital, Maryland, USA
Line of therapy	Not applicable
Duration of study	Intervention + follow up: 6 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: New York Heart Association functional class 3 or 4 CHF
Stratum	Overall: not applicable
Subgroup analysis within study	Not applicable: not applicable
Inclusion criteria	English-speaking; primary diagnosis of NYHA functional class 3/4; judged to be at high risk of CHF readmission (1 or more of the following criteria: >70 years; LVEF<35%; at least 1 additional CHF hospital admission in the previous year; ischemic cardiomyopathy; peripheral oedema at discharge; <3kg weight loss in hospital; peripheral vascular disease or hemodynamic findings of pulmonary capillary wedge pressure >25mm Hg; cardiac index <2.0l/min/m <sup>2</sup> ; systolic BP >180mm Hg/diastolic BP >100mm Hg)
Exclusion criteria	Valvular heart disease requiring surgical correction; active substance abuse; peripartum cardiomyopathy; hypertrophic cardiomyopathy with LV outflow tract obstruction; restrictive cardiomyopathy; constrictive pericarditis; psychiatric disease/dementia; concurrent non-cardiac illness; heart transplantation likely within 6 months; uncorrected thyroid disease; serum creatinine >265 mcgmol/l; long term intravenous inotropic therapy at home; cardiac surgery or myocardial infarction during index admission; participation in another trial; unwillingness to consent; residence in a nursing home/rehabilitation facility/outside catchment area
Recruitment/selection of patients	Consecutive patients meeting the inclusion criteria during the recruitment period
Age, gender and ethnicity	Age - Range of means: 60.2-63.7. Gender (M:F): 121:79. Ethnicity: not reported
Further population details	1. Critical illness: Not applicable/Not stated Unclear. 2. Frail Elderly: Not applicable/Not stated Unclear.
Indirectness of population	No indirectness: not applicable
Interventions	(n=102) Intervention 1: Attendance at a post discharge follow up clinic - post discharge clinic. telephone calls with nurse coordinator within 72 hours of discharge then weekly for a month, twice in the second month and then monthly, monthly follow up visits with CHF nurses in CHF clinics or at home, diet restriction, exercise advice, pill sorter, patient education materials, contact number 24 hours a day. Duration: 6 months. Concurrent medication/care: not applicable.  (n=98) Intervention 2: No post discharge or early follow up clinic - As defined by study. Usual care - care from primary physicians. Duration: 6 months. Concurrent medication/care: not applicable.

Study	Kasper 2002 <sup>15</sup>
Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: POST DISCHARGE CLINIC versus AS DEFINED BY STUDY	
<p>Protocol outcome 1: Mortality            - Actual outcome: number of deaths at 6 months; Group 1: 7/102, Group 2: 13/98; Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable</p> <p>Protocol outcome 2: Readmission            - Actual outcome: no. of patients admitted for chronic heart failure at 6 months; Group 1: 26/102, Group 2: 35/98; Risk of bias: All domain - Low, Selection - Low, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable</p>	
Protocol outcomes not reported by the study	Quality of life; Avoidable adverse effects; Patient satisfaction; Return to work; ED Attendance; Carer satisfaction/burden

Study (subsidiary papers)	Mcdonald 2002 <sup>17</sup> (Ledwidge 2003 <sup>16</sup> )
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=98)
Countries and setting	Conducted in Irish Republic; setting: St. Vincent's University Hospital, Dublin, Ireland
Line of therapy	Not applicable
Duration of study	Intervention time + follow up: 3 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: diagnosis of heart failure confirmed by a cardiologist
Stratum	Overall: not applicable
Subgroup analysis within study	Not applicable: not applicable
Inclusion criteria	>18 years; admitted through injury with a diagnosis of heart failure; diagnosis confirmed by a cardiologist based on history and examination compatible with HF, chest x-ray appearance of congestion, echocardiography evidenced left ventricular systolic or diastolic dysfunction and response to initial therapy
Exclusion criteria	Heart failure in the setting of myocardial infarction or unstable angina; failure not thought to be the primary problem; illnesses that could compromise survival over the duration of the study; cognitive impairment
Recruitment/selection of patients	Consecutive patients meeting the inclusion criteria during the recruitment period (November 1998 to April 2000)

Study (subsidiary papers)	Mcdonald 2002 <sup>17</sup> (Ledwidge 2003 <sup>16</sup> )
Age, gender and ethnicity	Age - Mean (SD): 70.8 (10.47). Gender (M:F): 65:33. Ethnicity: not reported
Further population details	1. Critical illness: Not applicable/Not stated Unclear. 2. Frail Elderly: Not applicable/Not stated Unclear.
Indirectness of population	No indirectness: not applicable
Interventions	(n=51) Intervention 1: Attendance at a post discharge follow up clinic – post discharge clinic. Nurse-led education and dietetic consultations on 3 or more occasions, telephone call 3 days after discharge and weekly until 12 weeks, 2 HF outpatient visits (week 2 and 6), patients advised to contact clinic for medication adjustment if weight increased by 2kg or more. Duration: 3 months. Concurrent medication/care: not applicable.  (n=47) Intervention 2: No post discharge or early follow up clinic - As defined by study. Routine care - patients referred back to primary care physician. Duration: 3 months. Concurrent medication/care: not applicable.
Funding	Other (Irish Heart Foundation and Servier Laboratories, Ireland)
<b>RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: POST DISCHARGE CLINIC versus AS DEFINED BY STUDY</b>	
<p>Protocol outcome 1: Quality of life - Actual outcome: Minnesota Living with Heart Failure score at 3 months; Group 1: mean 29 (SD 19); n=51, Group 2: mean 40 (SD 23); n=47, Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - High, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable</p> <p>Protocol outcome 2: Mortality - Actual outcome: deaths at 3 months; Group 1: 3/51, Group 2: 3/47; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable</p> <p>Protocol outcome 3: Readmission - Actual outcome: readmissions for heart failure at 3 months; Group 1: 2/51, Group 2: 12/47; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable; Blinding details: decision to admit patients in RC group was responsibility of their primary care physician and not influenced by persons involved in the study; charts were subsequently reviewed and diagnosis accepted. Decision to readmit patients in the intervention group was based on specific pre-defined criteria</p>	
Protocol outcomes not reported by the study	Avoidable adverse effects; Patient satisfaction; Return to work; ED Attendance; Carer satisfaction/burden
Study	Stromberg 2003 <sup>25</sup>
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=106)

Study	Stromberg 2003 <sup>25</sup>
Countries and setting	Conducted in Sweden; setting: 1 university hospital and 2 county hospitals
Line of therapy	Not applicable
Duration of study	Intervention time + follow up: 12 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: New York Heart Association Classification 2-4
Stratum	Overall: not applicable
Subgroup analysis within study	Not applicable: not applicable
Inclusion criteria	Diagnosed heart failure (by echocardiography, radiographic evidence of pulmonary congestion or typical symptoms and signs of heart failure)
Exclusion criteria	Severe chronic pulmonary disease; dementia; psychiatric illness; short anticipated survival; discharge to a geriatric clinic/home care; already receiving follow up at the nurse-led HF clinic
Recruitment/selection of patients	Consecutive patients meeting the inclusion criteria during the recruitment period (June 1997 to December 1999)
Age, gender and ethnicity	Age - Range of means: 77-78. Gender (M:F): 65:41. Ethnicity: not reported
Further population details	1. Critical illness: Critically ill (heart failure). 2. Frail Elderly: Not applicable/Not stated Unclear.
Indirectness of population	No indirectness: not applicable
Interventions	(n=52) Intervention 1: Attendance at a post discharge follow up clinic – post discharge clinic. Nurse-led heart failure clinic 2-3 weeks after discharge, patient and family education, dietary & lifestyle changes, nurses available by telephone during working hours. Duration: 1 year. Concurrent medication/care: not applicable.  (n=54) Intervention 2: No post discharge or early follow up clinic - As defined by study. Current clinical practice - conventional follow up in primary health care. Duration: 1 year. Concurrent medication/care: not applicable.
Funding	Academic or government funding (The Health Research Council (South East Sweden), Swedish Foundation for Healthcare Science and Allergy Research, Swedish Heart and Lung Foundation, Research Foundation of the University Hospital of Linköping )
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: POST DISCHARGE CLINIC versus AS DEFINED BY STUDY	
Protocol outcome 1: Mortality - Actual outcome: no. of deaths at 1 year; Group 1: 7/52, Group 2: 20/54; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable ; Baseline details: more patients with hypertension in the intervention group; more patients with diabetes in the control group	

Study	Stromberg 2003 <sup>25</sup>
Protocol outcome 2: Readmission - Actual outcome: all-cause admissions at 1 year; Group 1: 82/52, Group 2: 92/54; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable ; Baseline details: more patients with hypertension in the intervention group; more patients with diabetes in the control group Hospital admissions/patient/months after 12 months: Group 1: 0.18, Group 2: 0.40	
Protocol outcomes not reported by the study	Quality of life; Avoidable adverse effects; Patient satisfaction; Return to work; ED Attendance; Carer satisfaction/burden

Study	The Auckland Heart Failure Management Study trial: Doughty 2002 <sup>9</sup>
Study type	RCT ( randomised; Parallel)
Number of studies (number of participants)	1 (n=197)
Countries and setting	Conducted in New Zealand; setting: Auckland hospital
Line of therapy	Not applicable
Duration of study	Intervention + follow up: 12 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: heart failure diagnosed on the basis of typical symptoms and signs, with review of chest radiograph, ECG and echocardiogram
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients admitted to the general medical wards at Auckland Hospital with a primary diagnosis of heart failure on the basis of typical signs and symptoms with review of chest radiograph, ECG and echocardiogram
Exclusion criteria	A surgically remediable cause for heart failure, such as severe aortic stenosis; consideration for heart transplantation; inability to provide informed consent; terminal cancer; participation in any other clinical trial
Recruitment/selection of patients	GPs randomly allocated to intervention or control groups
Age, gender and ethnicity	Age - Range: 34-92 years. Gender (M:F): 118:79. Ethnicity: not reported
Further population details	1. Critical illness: Not applicable/Not stated Unclear. 2. Frail Elderly: Not applicable/Not stated Unclear.
Indirectness of population	No indirectness: not applicable
Interventions	(n=100) Intervention 1: Attendance at a post discharge follow up clinic - early follow up clinic. outpatient clinical review at a hospital-based heart failure clinic within 2 weeks of discharge, patient education, patient diary and

<b>Study</b>	<b>The Auckland Heart Failure Management Study trial: Doughty 2002<sup>9</sup></b>
	information booklet, 6-weekly visits alternating between GP and HF clinic, group education sessions, team available by telephone during working hours. Duration: 1 year. Concurrent medication/care: not applicable.  (n=97) Intervention 2: No post discharge or early follow up clinic - As defined by study. Usual care - care of GP with additional follow up measures as usually recommended by the medical team. Duration: 1 year. Concurrent medication/care: not applicable.
Funding	Other (project grant from National Heart of Zealand and unrestricted educational grant from Merck Sharp Dohme (NZ))
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: POST DISCHARGE CLINIC versus AS DEFINED BY STUDY	
<p>Protocol outcome 1: Mortality - Actual outcome: deaths (all cause) at 1 year; Group 1: 19/100, Group 2: 24/97; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable; Baseline details: group differences in ischaemic HF patients, patients living alone, patients treated for hypertension and patients with diabetes (differences not statistically significant;</p> <p>Protocol outcome 2: Readmission - Actual outcome: no. of patients readmitted for heart failure at 1 year; Group 1: 21/100, Group 2: 23/97; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable; Baseline details: group differences in ischaemic patients, patients living alone, patients treated for hypertension and patients with diabetes</p>	
Protocol outcomes not reported by the study	Quality of life; Avoidable adverse effects; Patient and/or carer satisfaction; Return to work; ED Attendance; Carer satisfaction/burden

<b>Study</b>	<b>Thompson 2005<sup>26</sup></b>
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=106)
Countries and setting	Conducted in United Kingdom; setting: York District Hospital and Scunthorpe General Hospital
Line of therapy	Not applicable
Duration of study	Intervention + follow up: 6 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: diagnosis of chronic heart failure with objective evidence of impaired left ventricular systolic fraction



Study	Thompson 2005 <sup>26</sup>
Stratum	Overall: not applicable
Subgroup analysis within study	Not applicable: not applicable
Inclusion criteria	Acute hospital admission with a diagnosis of CHF; objective evidence of impaired left ventricular ejection fraction of 45% or less immediately prior to study recruitment; discharge to home
Exclusion criteria	Patients awaiting an elective cardiac procedure to reverse the cause of underlying heart failure; terminal illness other than CHF
Recruitment/selection of patients	Consecutive patients meeting the inclusion criteria during the recruitment period (20 months)
Age, gender and ethnicity	Age - Range of means: 72-73. Gender (M:F): 77:29. Ethnicity: not reported
Further population details	1. Critical illness: Not applicable/Not stated Unclear. 2. Frail Elderly: Not applicable/Not stated Unclear.
Indirectness of population	No indirectness: no indirectness
Interventions	(n=58) Intervention 1: Attendance at a post discharge follow up clinic - post discharge clinic. Information before discharge, home visits within 10 days of discharge including education and clinical examination, telephone access to nurses during working hours, monthly nurse-led outpatient HF clinic for at least 6 months. Duration: 6 months. Concurrent medication/care: not applicable.  (n=48) Intervention 2: No post discharge or early follow up clinic - As defined by study. Standard care - explanation of condition and medication by ward nurse and referral to appropriate post-discharge support, outpatient appointment 6-8 weeks after discharge. Duration: 6 months. Concurrent medication/care: not applicable.
Funding	Other (1 author supported by the National Heart Foundation and the National Health and Medical Research Council of Australia. Study supported by a grant from Merck Pharmaceuticals UK)

#### RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: POST DISCHARGE CLINIC versus AS DEFINED BY STUDY

##### Protocol outcome 1: Mortality

- Actual outcome: mortality at 6 months; Group 1: 5/58, Group 2: 7/48; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable; Baseline details: intervention group had fewer prior admissions and were more likely to be prescribed an ACE inhibitor)

##### Protocol outcome 2: Readmission

- Actual outcome: no. of patients readmitted at 6 months; Group 1: 13/58, Group 2: 21/48; Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness, Comments: not applicable; Baseline details: intervention group had fewer prior admissions and were more likely to be prescribed an ACE inhibitor)

Study	Thompson 2005 <sup>26</sup>
Protocol outcomes not reported by the study	Quality of life; Avoidable adverse effects; Patient and/or carer satisfaction; Return to work; ED Attendance; Carer satisfaction/burden

## Appendix E: Economic evidence tables

Study	De la Porte 2007 <sup>7</sup>			
Study details	Population & interventions	Costs	Health outcomes	Cost effectiveness
<p><b>Economic analysis:</b> CCA (health outcomes: mortality and quality of life)</p> <p><b>Study design:</b> Within-trial analysis (RCT)</p> <p><b>Approach to analysis:</b> Prospective costing of hospitalisation and outpatient clinic attendances.</p> <p><b>Perspective:</b> Netherlands hospital provider.</p> <p><b>Follow-up:</b> 12 months.</p> <p><b>Treatment effect duration:</b> n/a</p> <p><b>Discounting:</b> n/a</p>	<p><b>Population:</b> NYHA class 3 or 4 heart failure.</p> <p><b>Cohort settings:</b> N: 240, Mean age: 70-71, Male: 72.5%</p> <p><b>Intervention 1:</b> No post discharge or early follow up clinic.</p> <p><b>Intervention 2:</b> Attendance at a post discharge follow up clinic. Intensive follow up at a heart failure physician and cardiovascular nurse-led heart failure outpatient clinic - telephone call at 1 week, visit to clinic at 1 and 3 weeks, including verbal and written education, individualised lifestyle advice, patient diary, easy access to clinic, appointment with dietician, tailored treatment regimen.</p>	<p><b>Total costs (mean per patient):</b> Intervention 1: £1,125 Intervention 2: £662 Incremental (2-1): Saves £463 (95% CI: NR; p=NR)</p> <p><b>Currency &amp; cost year:</b> Assumed to be 2003 UK pounds.<sup>(a)</sup></p> <p><b>Cost components incorporated:</b> Daily hospitalisation cost. Outpatient clinic visit including nurse, dietician and doctor's salaries.</p>	<p><b>Mortality (1-year risk):</b> Intervention 1: 0.19 Intervention 2: 0.10 RR (2 versus 1): 0.54 (95% CI: NR; p=NR)</p> <p><b>Re-admission (1-year risk):</b> Intervention 1: 0.20 Intervention 2: 0.09 RR (2 versus 1): 0.47 (95% CI: NR; p=NR)</p>	<p>Intervention 2 dominates</p> <p><b>Analysis of uncertainty:</b> After adjusting for baseline differences in sex there was no change in the results.</p>
<b>Data sources</b>				
<b>Cost sources:</b> NR.				
<b>Comments</b>				
<b>Source of funding:</b> Novartis, AstraZeneca, Bristol-Myers Squibb and Roche. <b>Applicability and limitations:</b> Not a UK NHS perspective and health outcomes not measured in QALYs. The details and source of costs were not fully reported. The time horizon is only 1 year, which may not capture all costs and health effects.				
<b>Overall applicability:</b> Partially applicable <sup>(b)</sup> <b>Overall quality:</b> Potentially serious limitations <sup>(c)</sup>				

Abbreviations: CCA: cost-consequence analysis; ICER: incremental cost effectiveness ratio; n/a: not applicable; NR: not reported; QALYs: quality-adjusted life years; RR: relative risk.

(a) Data collection was completed in 2003 and so this was the assumed date for the costs.

(b) Directly applicable/Partially applicable/Not applicable.

(c) Minor limitations/Potentially serious limitations/Very serious limitations.

## Appendix F: GRADE tables

Table 6: Clinical evidence profile: post discharge clinics versus no post discharge clinics

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Attendance at a post discharge early follow up clinic versus no post discharge early follow up clinic	Control	Relative (95% CI)	Absolute		
<b>Mortality (follow-up 3-12 months; assessed with: number of deaths)</b>												
8	randomised trials	serious <sup>1</sup>	no serious inconsistency	serious <sup>2</sup>	no serious imprecision	none	65/649 (10%)	18%	RR 0.53 (0.4 to 0.7)	85 fewer per 1000 (from 54 fewer to 108 fewer)	⊕⊕⊕⊕ LOW	CRITICAL
<b>Mortality (follow-up 12 months; assessed with: number of deaths)</b>												
1	randomised trials	no serious risk of bias	no serious inconsistency	serious <sup>2</sup>	no serious imprecision	none	244/947 (25.8%)	26.5%	RR 0.97 (0.84 to 1.13)	8 fewer per 1000 (from 42 fewer to 34 more)	⊕⊕⊕⊕ MODERATE	CRITICAL
<b>Avoidable adverse events (follow-up 12 months; assessed with: urgent transplantations)</b>												
1	randomised trials	serious <sup>1</sup>	no serious inconsistency	serious <sup>2</sup>	serious <sup>3</sup>	none	1/112 (0.89%)	0%	OR 8.08 (0.16 to 408.63)	-	⊕⊕⊕⊕ VERY LOW	CRITICAL
<b>ED attendance (follow-up 12 months; assessed with: number of ED visits)</b>												
1	randomised trials	serious <sup>1</sup>	no serious inconsistency	serious <sup>2</sup>	no serious imprecision	none	657/915 (71.8%)	70.6%	RR 1.02 (0.96 to 1.08)	14 more per 1000 (from 28 fewer to 56 more)	⊕⊕⊕⊕ LOW	CRITICAL
<b>Quality of life (follow-up 3 months; measured with: Minnesota Living With Heart Failure Questionnaire; Better indicated by lower values)</b>												

1	randomised trials	very serious <sup>1</sup>	no serious inconsistency	serious <sup>2</sup>	serious <sup>3</sup>	none	51	47	-	MD 11 lower (19.39 to 2.61 lower)	⊕○○○ VERY LOW	CRITICAL
<b>Quality of life (follow-up 12 months; measured with: time trade-off; Better indicated by lower values)</b>												
1	randomised trials	serious <sup>1</sup>	no serious inconsistency	serious <sup>2</sup>	serious <sup>3</sup>	none	112	122	-	MD 0.09 higher (0.04 to 0.14 higher)	⊕○○○ VERY LOW	CRITICAL
<b>Readmission (assessed with: number of heart failure patients readmitted for any cause)</b>												
2	randomised trials	serious <sup>1</sup>	no serious inconsistency	serious <sup>2</sup>	no serious imprecision	none	22/170 (12.9%)	37%	RR 0.38 (0.2 to 0.73)	229 fewer per 1000 (from 100 fewer to 296 fewer)	⊕⊕○○ LOW	CRITICAL
<b>Readmission (follow-up 12 months; assessed with: number of general medical patients readmitted)</b>												
1	randomised trials	no serious risk of bias	no serious inconsistency	serious <sup>2</sup>	no serious imprecision	none	535/903 (59.2%)	58.4%	RR 1.01 (0.94 to 1.1)	6 more per 1000 (from 35 fewer to 58 more)	⊕⊕⊕○ MODERATE	CRITICAL
<b>Readmission due to heart failure (follow-up 3-12 months; assessed with: number of patients readmitted due to heart failure)</b>												
5	randomised trials	serious <sup>1</sup>	serious <sup>4</sup>	serious <sup>2</sup>	serious <sup>3</sup>	none	88/427 (20.6%)	25.5%	RR 0.7 (0.47 to 1.05)	76 fewer per 1000 (from 135 fewer to 13 more)	⊕○○○ VERY LOW	CRITICAL

<sup>1</sup> Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias.

<sup>2</sup> Downgraded by 1 or 2 increments because the majority of the evidence was based on indirect comparisons.

<sup>3</sup> Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

<sup>4</sup> Downgraded by 1 or 2 increments because Heterogeneity, I<sup>2</sup>=50%, p=0.04, unexplained by subgroup analysis.

## Appendix G: Excluded clinical studies

**Table 7: Studies excluded from the clinical review**

Study	Exclusion reason
Angaran 2015 <sup>1</sup>	Not review population (patients were discharged from the ED, patients requiring hospitalisation were excluded); Inappropriate comparison (no comparator)
Batterham 2014 <sup>2</sup>	Incorrect interventions. supervised aerobic exercise rehabilitation
Broomhead 2002 <sup>3</sup>	Narrative review
Cline 1998 <sup>5</sup>	Inappropriate comparison (usual care involved follow up at an outpatient clinic in a cardiology department)
Cuthbertson 2007 <sup>6</sup>	Study protocol (no data)
Gonseth 2004 <sup>11</sup>	Systematic review is not relevant to review question or unclear PICO
Gorthi 2014 <sup>12</sup>	Systematic review is not relevant to review question or unclear PICO
Harrison 2002 <sup>13</sup>	Incorrect interventions (no post discharge clinic)
Jaarsma 1999 <sup>14</sup>	Incorrect interventions (no post discharge clinic)
Mehlhorn 2014 <sup>18</sup>	Systematic review is not relevant to review question or unclear PICO
Paratz 2014 <sup>21</sup>	Study protocol (no data)
Powell 2010 <sup>22</sup>	Incorrect interventions (1 year patient education program)
Rainville 1999 <sup>23</sup>	Incorrect interventions (no post discharge clinic)
Schandl 2012 <sup>24</sup>	Inappropriate study design (cohort study)

## Appendix H: Excluded health economic studies

No relevant studies identified.