National Institute for Health and Care Excellence

1

Consultation

Chapter 36 Standardised discharge criteria

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

NICE guideline <number>

July 2017

Draft for consultation

Developed by the National Guideline Centre, hosted by the Royal College of Physicians

1

Chapter 36 Standardised discharge criteria

Contents

1

36 Standardised discharge criteria

36.1 Introduction

The treatment of patients with an acute medical emergency can sometimes be guided by the use of standardised criteria, resulting in improved outcomes. Typically, the clinician scores or grades key aspects of the patient's condition. An established algorithm is then used to identify the most appropriate form of treatment. An example is the Blatchford score which uses health and physiological criteria to stratify patients with upper Gastrointestinal bleeding, and to determine the need for medical intervention. In some cases, the use of standardised criteria has been incorporated into condition-specific NICE guidance, such as NICE Guideline CG141 – Acute upper gastrointestinal bleeding in over 16s: management[29].

The question addressed in this chapter is whether standardised criteria can be applied to distinguish between patients who can safely be discharged from hospital, with confidence that their clinical condition will not deteriorate or recur, in contrast to a group of patients who need to remain in hospital for evaluation or treatment. The advantages of timely discharge from hospital include a lower risk of hospital-acquired infection; a reduced risk of over-investigation or unnecessary treatment, and the complications that can arise from that; reduced rates of delirium and loss of function in the elderly; improved patient and/or carer satisfaction; and more efficient use of hospital resources.

A particular question for this guideline was whether any standardised discharge criteria can be applied across diverse acute medical emergencies.

36.2 Review question: Do standardised criteria for hospital discharge facilitate earlier discharge and/or reduce readmission rates?

For full details see review protocol in Appendix A.

Table 1: PICO characteristics of review question

Population	Adults and young people (16 years and over) at risk of an AME, or with a suspected or confirmed AME. Strata: • Disease-specific criteria • Generic criteria
Intervention	Standardised criteria (for example, a checklist incorporating physiological stability, functional capacity, therapeutic dependency or disease severity) for discharge from hospital to community (including both general and condition-specific criteria).
Comparison	No standardised criteria for discharge from hospital to community.
Outcomes	• Mortality (CRITICAL) • Avoidable adverse events (CRITICAL) • Quality of life (CRITICAL) • Patient and /or carer satisfaction (CRITICAL) • Length of stay/time to discharge (CRITICAL) • Readmission up to 30 days (IMPORTANT)
Study design	Systematic reviews (SRs) of RCTs, RCTs, observational studies only to be included if no relevant SRs or RCTs are identified.

36.3 Clinical evidence

Two randomised controlled studies were included in the review; these are summarised in Table 2 and the evidence from these studies is summarised in the clinical evidence summary (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 randomised controlled studies included in the review

Study	Intervention and comparison	Population	Outcomes	Comments
Rapoport 1999[34] Conducted in 6 countries (South Africa, Colombia, Israel, Peru, Argentina, Spain and Switzerland) RCT	Intervention: clinically stable patients not requiring skilled nursing care were eligible for discharge if their peak temperature had been less than 38 degrees and neutrophil count greater than 0.5 x 10 9/L for 24 hours. Duration: treatment in hospital. Comparison: standard in-patient care. Treatment prior to randomisation: once daily intravenous antibiotic regimen (ceftriaxone 2g for ≥5 days + aminoglycoside [gentamicin and metilmicin at 4.5-6.5mg/kg, 300mg max, amikacin 20mg/kg, 1.5g max for ≥2 days]) until patients afebrile for 4 days, local signs of infection cleared and pathogen if known eradicated; filgrastim subcutaneously once a day (5microg/kg, max 300/480 microg for body weight below/above 60kg, respectively until neutrophil count ≥1.0 x 10 9/L for 2 consecutive days. After 48-72 hours of treatment in hospital, patients initially responding (peak temperature <38C or a decrease of at least 1C versus baseline, with improvement in clinical signs and symptoms) were randomised.	Adults with febrile neutropenia following chemotherapy for non-myeloid malignancies (single axillary temperature ≥38.5C or repeat measurement ≥38.0C; neutrophil count <0.5 x 10 9/L) able to comply with the protocol for ambulatory therapy. Inclusion: confirmed non-myeloid malignancies after chemotherapy, fever (single axillary temperature greater than 38.5 or repeat measurements above 38), neutrophil count less than $0.5x10^9$/l, and could comply with the requirements of the protocol for the ambulatory therapy. Exclusion: bone marrow or peripheral blood progenitor cell transplantation, inability to comply with the requirements of the protocol, previous enrolment in the study, on-going psychiatric treatment, known allergy to beta-lactam antibiotics or aminoglycosides, history of anaphylactic or severe skin reactions, known hypersensitivity to E.coli-derived preparations, pregnancy or nursing, treatment with parenteral antimicrobial agents within the past 14 days, administration of investigational new drugs within the last 12 weeks, renal failure requiring dialysis, suspected meningitis, known HIV infection, infection with a pathogen known to be resistant to ceftriaxone, septic shock, or likelihood to expire within 48h of study entry. Patients not responding after 72	7 day mortality. 7 day adverse events. Length of stay.	

Study	Intervention and comparison	Population	Outcomes	Comments
		hours to antibiotics withdrawn from study (non-responders)		
Stone 2005[38] Cluster-RCT	Intervention (n=240): discharge criteria plus empiric antibiotic therapy (ceftriaxone sodium). Discharge guideline was based on a review of the medical literature and empiric evidence on the time to reach clinical stability. Each component of the guideline was discussed by a national panel of experts in pulmonary medicine, infectious diseases, and internal medicine until consensus was reached. Discharge criteria: Adequate fluid balance maintained, at the time of assessment. Normal or baseline mental status during the previous 16 hours. Stable vital signs during the previous 16 hours. No evidence of new, or worsening, or decompensating medical problems during the previous 24 hours. No evidence of new occurrence of other conditions precluding use of guideline, at any time during hospitalisation Stable laboratory values Control (n=209): No standardised discharge criteria and any antibiotic therapy apart from the intervention antibiotic.	Community-acquired Pneumonia patients at 8 teaching hospital and 17 non-teaching hospital admitted into 85 physician groups. Inclusion: working diagnosis of pneumonia and a chest radiograph positive for a new pulmonary infiltrate consistent with pneumonia; at least 18 years of age; admitted for care by a participating physician. Exclusion: Pneumonia Severity Index (PSI) category V; required mechanical ventilation; had active underlying pulmonary disease; had serious combed illness (no further details); required admission to a critical care unit; were immunocompromised; had a metastatic concomitant infection; were hospitalised for palliative care only; resided in a skilled nursing facility or were homeless; were pregnant, nursing, or of child-bearing potential and not using reliable contraception; currently using illicit drugs; had been in an acute care hospital within the past 10 days or had been hospitalised for an established diagnosis of pneumonia within the past 30 days; had a known or suspected hypersensitivity to ceftriaxone sodium, cephalosporins or penicillins.	Length of stay. 30 day mortality. 30 day serious adverse events. 30 day readmission.	Both groups underwent the discharge criteria but only the intervention group were notified. Length of stay was reported in the article as a risk ratio. Not enough data to extract data for mean-difference analysis (no standard deviations).

Table 3: Clinical evidence summary: Standardised discharge criteria versus no standardised criteria

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 Standardised discharge criteria versus no standardised criteria (95% CI)
Mortality	526 (2 studies) 7-30 days	⨁⊖⊖⊖ VERY LOW[a,b] due to risk of bias, imprecision	RR 1.68 (0.46 to 6.14)	7 per 1000	5 more per 1000 (from 4 fewer to 36 more)
Length of stay[d]	442 (1 study)	⨁⨁⊖⊖ LOW[a,b] due to risk of bias	RR 0.88 (0.75 to 1.03)[d]	Mean: 5.0 days Median: 4.0 days	Mean: 5.5 days Median: 4.0 days
Readmission	442 (1 study) 30 days	⨁⊖⊖⊖ VERY LOW[a,b] due to risk of bias, imprecision	RR 1.1 (0.59 to 2.07)	77 per 1000	8 more per 1000 (from 32 fewer to 82 more)
Adverse events	526 (2 studies) 7-30 days	⨁⊖⊖⊖ VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision	RR 1.29 (0.81 to 2.03)	147 per 1000	43 more per 1000 (from 28 fewer to 151 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 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.
(c) Downgraded by 1 or 2 increments because the point estimate varies widely across studies, unexplained by subgroup analysis.
(d) Summary risk ratio reported – mean and median values reported with no standard deviations.

Outcome from one RCT[38] that could not be analysed in Revman:

Length of stay in days, median (95% CI) – intervention: 4 (4-5) and control: 6 (5-7).

36.4 Economic evidence

Published literature

No relevant health economic studies were identified.

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

36.5 Evidence statements

Clinical

Two studies comprising 526 people evaluated the role of standardised criteria for hospital discharge improving outcomes in secondary care in adults and young people at risk of an AME, or with a suspected or confirmed AME. The evidence suggested that the use of standardised discharge criteria has no effect on readmission (1 study, very low quality) and length of stay (1 study, low quality). The evidence suggested that there was an increase in adverse events and mortality with standardised discharge criteria (2 studies, very low quality).

Economic

- No relevant economic evaluations were identified.

36.6 Recommendations and link to evidence

Recommendations	-
Research recommendations	**RR15. Are standardised criteria for hospital discharge clinically and cost-effective in specific medical emergencies?**
Relative values of different outcomes	Mortality, avoidable adverse events, quality of life, length of stay and readmission were considered by the guideline committee to be critical outcomes. Staff satisfaction was considered to be an important outcome.
Trade-off between benefits and harms	Two randomised controlled trials were included. They included 2 distinct populations: patients with post-chemotherapy febrile neutropenia and patients with community acquired pneumonia (CAP). They both evaluated the use of physiological variables and pathological results as criteria for discharge. The post-chemotherapy febrile neutropenia study also used disease specific discharge criteria, while the CAP study also used functional capacity, therapeutic dependency and disease severity. The evidence suggested that the use of standardised discharge criteria in those 2 populations had no effect on readmission or length of stay for the data that was extractable; however, narrative evidence from 1 of the 2 studies showed a decrease in length of stay with standardised discharge criteria compared to using no criteria. The evidence also showed an increase in adverse events and mortality for the standardised discharge criteria under test. No evidence was identified for quality of life or staff satisfaction. The committee noted that the expectation would be that standardised discharge criteria, if designed well, would lead to a reduced length of stay in hospital. However, if the criteria were poorly developed or applied this might result in poorer post-discharge outcomes including hospital readmission, mortality and adverse events. The evidence from the 2 studies suggested that the use of standardised discharge criteria could be harmful. However, the evidence was not considered strong enough for the committee to make a negative recommendation and therefore they decided to make a recommendation for further research. The committee felt that application of risk stratification scores or tools could facilitate earlier safe discharge and some of the committee had experience of this. It was also felt that a wider range of acute medical clinical conditions should be subject to research in the efficacy of standardised discharge criteria. These discharge criteria would need to be evaluated and then validated in separate populations.
Trade-off between net effects and costs	No economic studies were included. The committee noted that no further costs to the hospital are likely to be incurred as a result of instituting standardised criteria for discharge as these are likely to be mainly physiological parameters and blood results for which the data are routinely collected. The committee did acknowledge that there would be a need to educate staff on how to use the tool and on-going audit and evaluation. This would have to be a rolling programme due the nature of new staff continually being rotated to hospitals and departments in secondary care. The committee felt that discharging patients early is likely to reduce hospital costs due to the shorter length of stay; however, this must be weighed against any possible adverse factors (for example, mortality, re-consultation rates and re-presentation to the GP and/or emergency department). Some of this cost saving might be offset by increased community-based services but as these services are generally found to be less costly than hospital based services, the more effective the discharge criteria tool is, the more likely that it will be cost-effective or cost saving. The committee also noted that patients generally prefer to be in their own home rather than in hospital.

Recommendations	-
Research recommendations	**RR15. Are standardised criteria for hospital discharge clinically and cost-effective in specific medical emergencies?**
	The committee highlighted that current practice is varied and the use of discharge criteria is neither routine nor standardised across the NHS. The committee also noted that it is unlikely that a single standardised set of criteria could be used across all conditions and patient groups. It is possible that physiological and some functional parameters could be uniform with disease specific add-ons. In the absence of evidence of effectiveness and cost-effectiveness, the committee made a research recommendation.
Quality of evidence	The majority of evidence was graded at very low quality, with length of stay graded at low quality. All evidence was downgraded due to a very high risk of bias, with the majority also downgraded for imprecision. The evidence for adverse events was further downgraded for inconsistency. In addition, the evidence for mortality was obtained from 2 studies which both reported low event rates and had wide confidence intervals. No economic evidence was identified.
Other considerations	The committee noted that this question refers to standardised hospital discharge, with no enhanced post-discharge support. Early supportive discharge, such as hospital at home or community nurse support, has been reviewed separately in this guideline (see Chapter 9). Existing NICE guidance is available within the "Pneumonia in adults" guideline (CG191)[30] which recommends using specific standardised criteria during assessment to determine the type of treatment needed which helps in deciding the appropriate place for the care to be given. Standardised criteria would need to take into account the patient dependence and contextual factors such as the discharge destination. Evidence was identified in only 2 specific disease conditions, although acute medical emergencies contain a broad range of medical conditions. The use of standardised criteria in haematological malignancies (non-myeloid) may have limited generalisability in terms of addressing the review question. Risk stratification models have shown that solid organ tumours are probably more amenable to this type of criterion-based assessment. The community acquired pneumonia study required external assessment to determine whether the patient had achieved the criteria and as a result, this may have led to a delay. Currently the use of standardised discharge criteria is variable across both the country and across different conditions. If they were proved to be effective, they should be easy to implement, with minimal cost or work-load implications. The criteria should have content validity for secondary, primary and social care, since perceptions of readiness for discharge may differ between discharging and receiving organisations and services. The committee made a research recommendation. They noted the difficulties in designing and implementing generic discharge criteria that could be used across a wide range of conditions. They concluded that further condition-specific discharge criteria should be evaluated.

1
2

References

1 Guidelines for intensive care unit admission, discharge, and triage. Task Force of the American College of Critical Care Medicine, Society of Critical Care Medicine. Critical Care Medicine. 1999; 27(3):633-638

2 Awad IT, Chung F. Factors affecting recovery and discharge following ambulatory surgery. Canadian Journal of Anesthesia. 2006; 53(9):858-872

3 Basger BJ, Moles RJ, Chen TF. Impact of an enhanced pharmacy discharge service on prescribing appropriateness criteria: a randomised controlled trial. International Journal of Clinical Pharmacy. 2015; 37(6):1194-1205

4 Caldwell MA, Howie JN, Dracup K. BNP as discharge criteria for heart failure. Journal of Cardiac Failure. 2003; 9(5):416-422

5 Carlton EW, Khattab A, Greaves K. Identifying patients suitable for discharge after a single-presentation high-sensitivity troponin result: a comparison of five established risk scores and two high-sensitivity assays. Annals of Emergency Medicine. 2015; 66(6):635-645

6 Casula RP, Velissaris TJ, Dar M, Athanasiou T. Is early hospital discharge feasible following normothermic coronary artery surgery on the fibrillating heart. Journal of Cardiovascular Surgery. 2003; 44(5):583-589

7 Chaparro M, Barbero A, Martin L, Esteban C, Espinosa L, De La Morena F et al. Prospective evaluation of a clinical guideline recommending early patients discharge in bleeding peptic ulcer. Journal of Gastroenterology and Hepatology. 2010; 25(9):1525-1529

8 Domingo GRR, Reyes FC, Thompson FV, Johnson PM, Shortridge-Baggett LM. Effectiveness of structured discharge process in reducing hospital readmission of adult patients with community acquired pneumonia: a systematic review. JBI Library of Systematic Reviews. 2012; 10(18):1086-1121

9 Dubois L, Vogt KN, Davies W, Schlachta CM. Impact of an outpatient appendectomy protocol on clinical outcomes and cost: a case-control study. Journal of the American College of Surgeons. 2010; 211(6):731-737

10 El-Khuffash A, James AT, Corcoran JD, Dicker P, Franklin O, Elsayed YN et al. A patent ductus arteriosus severity score predicts chronic lung disease or death before discharge. Journal of Pediatrics. 2015; 167(6):1354-1361

11 Escobar GJ, Ragins A, Scheirer P, Liu V, Robles J, Kipnis P. Nonelective rehospitalizations and postdischarge mortality: predictive models suitable for use in real time. Medical Care. 2015; 53(11):916-923

12 Fiore JF, Browning L, Bialocerkowski A, Gruen RL, Faragher IG, Denehy L. Hospital discharge criteria following colorectal surgery: a systematic review. Colorectal Disease. 2012; 14(3):270-281

13 Garcia-Molina SC, Urbieta SE, Madrigal de TM, Vicente VT, Perez Carceles MD. Reconciliation errors at hospital discharge in spain: development of a predictive model. Latin American Journal of Pharmacy. 2015; 34(10):2027-2035

14 Glasby J, Littlechild R, Pryce K. All dressed up but nowhere to go? Delayed hospital discharges and older people. Journal of Health Services Research and Policy. 2006; 11(1):52-58

15 Kariv Y, Delaney CP, Senagore AJ, Manilich EA, Hammel JP, Church JM et al. Clinical outcomes and cost analysis of a "fast track" postoperative care pathway for ileal pouch-anal anastomosis. A case control study. Diseases of the Colon and Rectum. 2007; 50(2):137-146

16 Kelly KB, Koeppel ML, Como JJ, Carter JW, McCoy AM, Claridge JA. Continued rationale of why hospital mortality is not an appropriate measure of trauma outcomes. American Journal of Surgery. 2012; 203(3):366-369

17 Lauck SB, Wood DA, Achtem L, Baumbusch J, Boone RH, Cheung A et al. Risk stratification and clinical pathways to optimize length of stay after transcatheter aortic valve replacement. Canadian Journal of Cardiology. 2014; 30(12):1583-1587

18 Lee RWW, Lindstrom ST. Early switch to oral antibiotics and early discharge guidelines in the management of community-acquired pneumonia. Respirology. 2007; 12(1):111-116

19 Lindstrom ST, Wong EKC. Procalcitonin, a valuable biomarker assisting clinical decision-making in the management of community-acquired pneumonia. Internal Medicine Journal. Australia: Lindstrom,S T. Department of Respiratory and Sleep Medicine, St George Hospital, Sydney, New South Wales, Australia. 2014; 44(4):390-397

20 Loubani M, Mediratta N, Hickey MS, Galinanes M. Early discharge following coronary bypass surgery: is it safe? European Journal of Cardio-Thoracic Surgery. 2000; 18(1):22-26

21 Lowthian JA, McGinnes RA, Brand CA, Barker AL, Cameron PA. Discharging older patients from the emergency department effectively: a systematic review and meta-analysis. Age and Ageing. 2015; 44(5):761-770

22 McAllister DA, Halbesma N, Carruthers K, Denvir M, Fox KA. GRACE score predicts heart failure admission following acute coronary syndrome. European Heart Journal Acute Cardiovascular Care. 2015; 4(2):165-171

23 McManus TE, Marley A-M, Kidney JC. The Mater Hospital multiprofessional care pathway for acute exacerbations of chronic obstructive pulmonary disease. Journal of Integrated Care Pathways. 2005; 9(1):32-36

24 Meijer R, van Limbeek J, Peusens G, Rulkens M, Dankoor K, Vermeulen M et al. The Stroke Unit Discharge Guideline, a prognostic framework for the discharge outcome from the hospital stroke unit. A prospective cohort study. Clinical Rehabilitation. 2005; 19(7):770-778

25 Meijer R, van Limbeek J, de Haan R. Development of the Stroke-unit Discharge Guideline: choice of assessment instruments for prediction in the subacute phase post-stroke. International Journal of Rehabilitation Research. 2006; 29(1):1-8

26 Mistiaen P, Francke AL, Poot E. Interventions aimed at reducing problems in adult patients discharged from hospital to home: a systematic meta-review. BMC Health Services Research. 2007; 7:47

27 Moreno P, Jaurrieta E, Aranda H, Fabregat J, Farran L, Biondo S et al. Efficacy and safety of an early discharge protocol in low-risk patients with upper gastrointestinal bleeding. American Journal of Medicine. 1998; 105(3):176-181

28 Mortenson WB, Bishop AM. Discharge criteria and follow-up support for dementia care units. Journal of Applied Gerontology. 2016; 35(3):321-330

29 National Clinical Guideline Centre. Gastrointestinal bleeding: the management of acute upper gastrointestinal bleeding. NICE clinical guideline 141. London. National Clinical Guideline Centre, 2012. Available from: http://guidance.nice.org.uk/CG141

30 National Clinical Guideline Centre. Pneumonia: Diagnosis and management of community- and hospital-acquired pneumonia in adults. NICE clinical guideline CG191. London. National Clinical Guideline Centre, 2014. Available from: http://guidance.nice.org.uk/CG191

31 Parker SG, Peet SM, McPherson A, Cannaby AM, Abrams K, Baker R et al. A systematic review of discharge arrangements for older people. Health Technology Assessment. 2002; 6(4):1-142

32 Phillips NM, Street M, Kent B, Haesler E, Cadeddu M. Post-anaesthetic discharge scoring criteria: key findings from a systematic review. International Journal of Evidence-Based Healthcare. 2013; 11(4):275-284

33 Preyde M, Brassard K. Evidence-based risk factors for adverse health outcomes in older patients after discharge home and assessment tools: a systematic review. Journal of Evidence-Based Social Work. 2011; 8(5):445-468

34 Rapoport BL, Sussmann O, Herrera MV, Schlaeffer F, Otero JC, Pavlovsky S et al. Ceftriaxone plus once daily aminoglycoside with filgrastim for treatment of febrile neutropenia: early hospital discharge vs. standard in-patient care. Chemotherapy. 1999; 45(6):466-476

35 Rhew DC, Tu GS, Ofman J, Henning JM, Richards MS, Weingarten SR. Early switch and early discharge strategies in patients with community-acquired pneumonia: a meta-analysis. Archives of Internal Medicine. 2001; 161(5):722-727

36 Simpson JEP, Cox AG, Meade TW. 'Right' stay in hospital after surgery: randomised controlled trial. BMJ. 1977; 1(6075):1514-1516

37 Stephenson ME. Discharge criteria in day surgery. Journal of Advanced Nursing. 1990; 15(5):601-613

38 Stone RA, Mor MK, Lave JR, Hough LJ, Fine MJ. Implementation of an inpatient management and discharge strategy for patients with community-acquired pneumonia. American Journal of Managed Care. 2005; 11(8):491-499

39 Sun BC, McCreath H, Liang LJ, Bohan S, Baugh C, Ragsdale L et al. Randomized clinical trial of an emergency department observation syncope protocol versus routine inpatient admission. Annals of Emergency Medicine. 2014; 64(2):167-175

40 Tavender EJ, Bosch M, Green S, O'Connor D, Pitt V, Phillips K et al. Quality and consistency of guidelines for the management of mild traumatic brain injury in the emergency department. Academic Emergency Medicine. 2011; 18(8):880-889

41 Than M, Aldous S, Lord SJ, Goodacre S, Frampton CMA, Troughton R et al. A 2-hour diagnostic protocol for possible cardiac chest pain in the emergency department: a randomized clinical trial. JAMA Internal Medicine. 2014; 174(1):51-58

42 Tokatli A, Karauzum K, Ural D, Baydemir C, Kozdag G, Celikyurt U et al. Discharge risk scoring method for predicting mortality in hospitalized chronic heart failure patients with severe systolic dysfunction. Acta Cardiologica. 2015; 70(4):442-449

43 Tralhao A, Ferreira AM, Madeira S, Borges SM, Castro M, Rosario I et al. Applicability of the Zwolle risk score for safe early discharge after primary percutaneous coronary intervention in ST-segment elevation myocardial infarction. Revista Portuguesa De Cardiologia. 2015; 34(9):535-541

44 Wagman LD, Terz JJ, Hill LR, Beatty JD, Kokal WA, Riihimaki DU et al. Evaluation of a short-stay program for patients undergoing mastectomy. Journal of Surgical Oncology. 1989; 41(2):98-102

45 Webster J, Connolly A, Paton F, Corry J. The effectiveness of protocol drive, nurse-initiated discharge in a 23-h post surgical ward: a randomized controlled trial. International Journal of Nursing Studies. 2011; 48(10):1173-1179

46 Wells M, Harrow A, Donnan P, Davey P, Devereux S, Little G et al. Patient, carer and health service outcomes of nurse-led early discharge after breast cancer surgery: a randomised controlled trial. British Journal of Cancer. 2004; 91(4):651-658

47 Yoon KB, Koh SO, Han DW, Kang OC. Discharge decision-making by intensivists on readmission to the intensive care unit. Yonsei Medical Journal. 2004; 45(2):193-198

Appendices

Appendix A: Review protocol

Table 4: Review protocol: Standardised criteria for hospital discharge

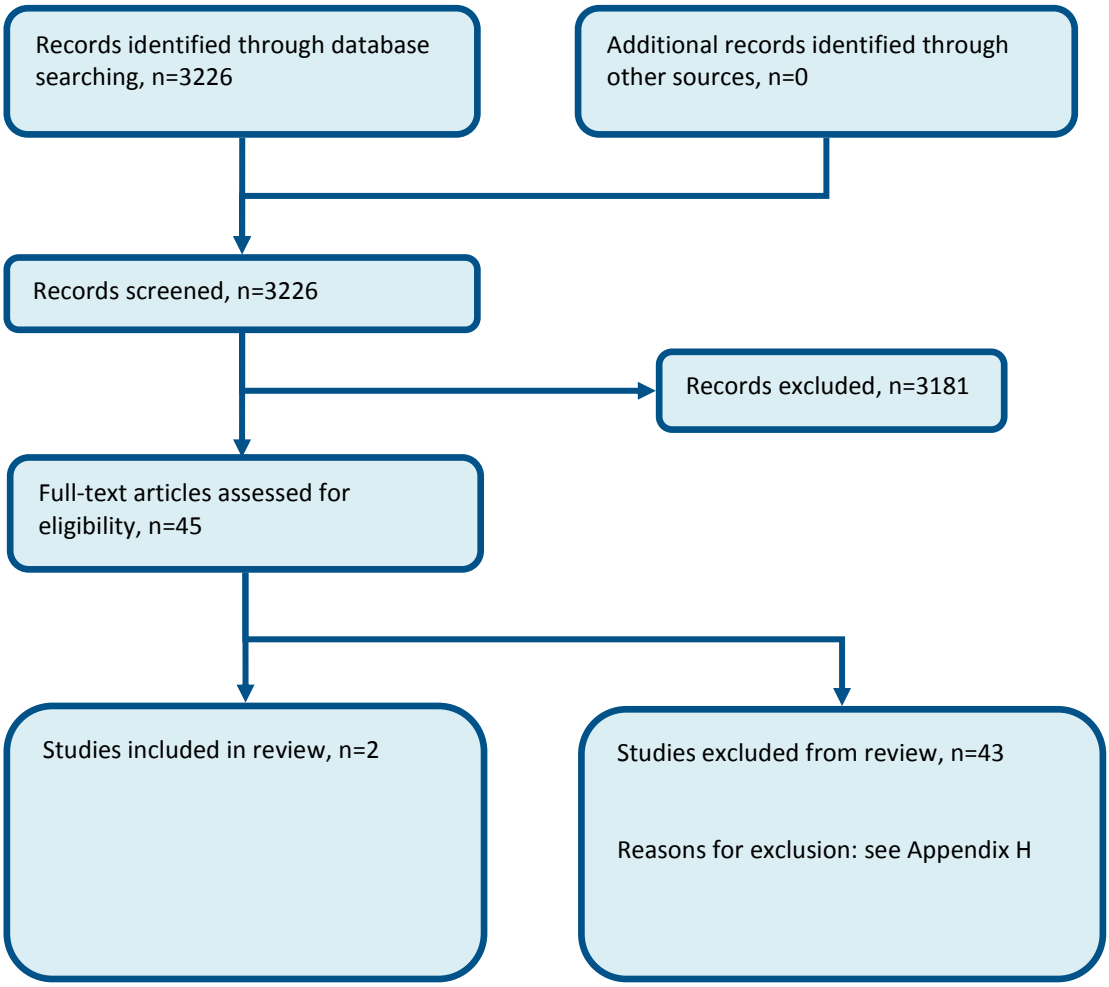
Review question	Do standardised criteria for hospital discharge facilitate earlier discharge and/or reduce readmission rates?
Guideline condition and its definition	Acute Medical Emergencies. Definition: people with suspected or confirmed acute medical emergencies or at risk of an acute medical emergency.
Objectives	To assess whether standardised criteria for discharge will facilitate earlier discharge and or reduce readmission.
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)	Standardised criteria for discharge from hospital to community (for example, a checklist incorporating physiological stability, functional capacity, therapeutic dependency or disease severity) including both general and condition-specific criteria. No standardised criteria for discharge from hospital to community; no standardised criteria.
Outcomes	- Mortality during the study period (Dichotomous) CRITICAL - Length of stay/time to discharge during the study period (Continuous) CRITICAL - Readmission up to 30 days (Dichotomous) IMPORTANT - Quality of life during the study period (Continuous) CRITICAL - Avoidance of adverse events during the study period (Dichotomous) CRITICAL - Patient and family satisfaction during the study period (Dichotomous) CRITICAL
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.
Crossover study	Permitted.
Minimum duration of study	Not defined.
Other exclusions	Non-OECD countries.
Population stratification	Disease specific criteria. Generic criteria.
Reasons for stratification	These were thought to be distinctly separate.
Subgroup analyses if there is heterogeneity	- Frail elderly (frail elderly; not frail elderly); results may differ for this population. - People with serious mental illness (people with serious mental illness; people without serious mental illness); results may differ for this population. - Clinical condition (stroke; respiratory; surgery; general); results may differ for

Review question	Do standardised criteria for hospital discharge facilitate earlier discharge and/or reduce readmission rates?
	different conditions for generic tools. - Expertise of decision maker (expertise; no expertise); the results may differ depending on expertise.
Search criteria	Databases: Medline, Embase, the Cochrane Library. Date limits for search: None. Language: English.

1
2

Appendix B: Clinical article selection

Figure 1: Flow chart of clinical article selection for the review of discharge criteria



Appendix C: Forest plots

C.1 Standardised criteria versus no standardised criteria

Figure 2: Mortality

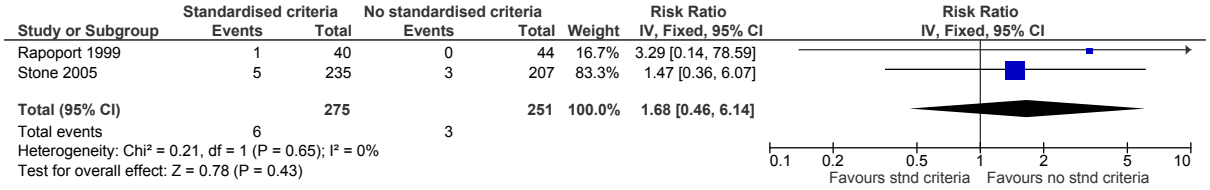


Figure 3: Length of stay

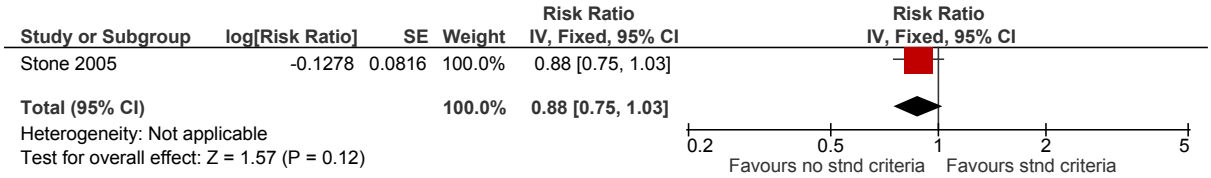
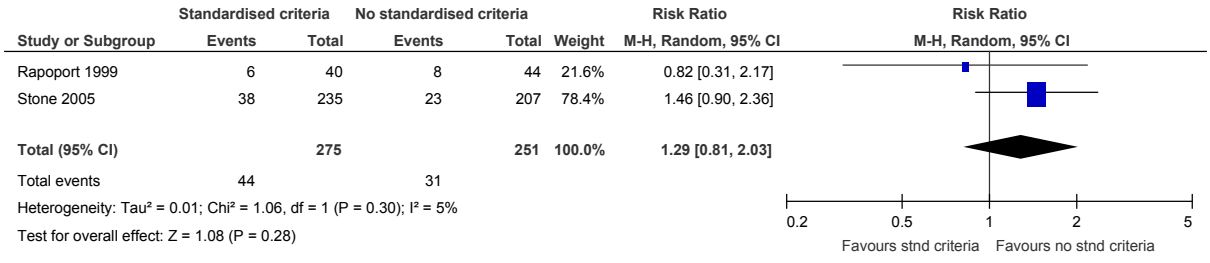


Figure 4: Readmission (30 days)

Figure 5: Adverse events



Appendix D: Clinical evidence tables

Study	Rapoport 1999[34]
Study type	RCT (Patient randomised; Parallel).
Number of studies (number of participants)	1 (n=84).
Countries and setting	Conducted in multiple countries; setting: secondary care.
Line of therapy	Not applicable.
Duration of study	Intervention + follow up: Intervention (in hospital) and follow up for 7 days after cessation of treatment.
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: febrile neutropenia.
Stratum	Disease specific criteria.
Subgroup analysis within study	Not applicable.
Inclusion criteria	Adults with febrile neutropenia following chemotherapy for non-myeloid malignancies (single axillary temperature ≥38.5C or repeat measurement ≥38.0C; neutrophil count <0.5 x 10 9/L) able to comply with the protocol for ambulatory therapy.
Exclusion criteria	Bone marrow or peripheral blood progenitor cell transplantation, inability to comply with the requirements of the protocol, previous enrolment in the study, on-going psychiatric treatment, known allergy to beta-lactam antibiotics or aminoglycosides or a history of anaphylactic or severe skin reactions, known hypersensitivity to E coli-derived preparations, pregnancy or nursing, treatment with parenteral antimicrobial agents within the past 14 days, administration of investigational new drugs within last 12 weeks, renal failure requiring dialysis, suspected meningitis, known HIV infection, infection with a pathogen known to be resistant to ceftriaxone, septic shock or likelihood to expire within 48 hours of study entry.
Recruitment/selection of patients	Eligible patients presenting to secondary care.
Age, gender and ethnicity	Age - Median (range): In-patients: 48 (22-73); out-patients: 45 (19-73) years. Gender (M:F): 35:49. Ethnicity: Caucasian: 55/84; Other: 29/84.
Further population details	1. Clinical condition: general (febrile neutropenia). 2. Frail elderly: not frail elderly (age 19-73 years). 3. People with serious mental illness: people without serious mental illness (people with on-going psychiatric treatment excluded).
Indirectness of population	No indirectness.
Interventions	(n=40) Intervention 1: Standardised criteria for discharge from hospital to community – for example, a checklist incorporating physiological stability, functional capacity, therapeutic dependency or disease severity). Including both general and condition-specific criteria. Clinically stable patients not requiring skilled nursing care were eligible for

Study	Rapoport 1999[34]
	discharge if their peak temperature had been <38C and neutrophil count > 0.5 x 10 9/L for 24 hours. Duration: treatment in hospital. Concurrent medication/care: prior to randomisation once daily intravenous antibiotic regimen (ceftriaxone 2g for ≥5 days + aminoglycoside [gentamicin and metilmicin at 4.5-6.5mg/kg, 300mg max, amikacin 20mg/kg, 1.5g max for ≥2 days]) until patients afebrile for 4 days, local signs of infection cleared and pathogen if known eradicated; filgrastim subcutaneously once a day (5microg/kg, max 300/480 microg for body weight below/above 60kg, respectively until neutrophil count ≥1.0 x 10 9/L for 2 consecutive days; patients not responding after 72 hours withdrawn from study. After 48-72 hours of treatment in hospital, patients initially responding (peak temperature <38C or a decrease of at least 1C versus baseline, with improvement in clinical signs and symptoms) were randomised. Further details: 1. Expertise of decision maker: not applicable/not stated/unclear. (n=44) Intervention 2: No standardised criteria for discharge from hospital to community - no standardised criteria. Standard in-patient care. Duration: in hospital. Concurrent medication/care: prior to randomisation once daily intravenous antibiotic regimen (ceftriaxone 2g for ≥5 days + aminoglycoside [gentamicin and metilmicin at 4.5-6.5mg/kg, 300mg max, amikacin 20mg/kg, 1.5g max for ≥2 days]) until patients afebrile for 4 days, local signs of infection cleared and pathogen if known eradicated; filgrastim subcutaneously once a day (5microg/kg, max 300/480 microg for body weight below/above 60kg, respectively until neutrophil count ≥1.0 x 10 9/L for 2 consecutive days; patients not responding after 72 hours withdrawn from study. After 48-72 hours of treatment in hospital, patients initially responding (peak temperature <38C or a decrease of at least 1C versus baseline, with improvement in clinical signs and symptoms) were randomised. Further details: 1. Expertise of decision maker: not applicable/not stated/unclear.
Funding	Study funded by industry (F. Hoffmann-La Roche Ltd, Basel, Switzerland).
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: FOR EXAMPLE, A CHECKLIST INCORPORATING PHYSIOLOGICAL STABILITY, FUNCTIONAL CACPACITY, THERAPEUTIC DEPENDENCY AND DISEASE SEVERITY). INCLUDING BOTH GENERAL AND CONDITION-SPECIFIC CRITERIA versus NO STANDARDISED CRITERIA. Protocol outcome 1: Mortality - Actual outcome for Disease specific criteria: death at 7 days after end of treatment; Group 1: 1/40, Group 2: 0/44; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness ; Baseline details: Imbalance in gender (out-patients 21/40 (52%) male vs. in-patients 14/44 (32%); gender imbalance was shown not to influence time to discharge; Group 1 Number missing: 0; Group 2 Number missing: 0 Protocol outcome 2: Length of stay/time to discharge. - Actual outcome for Disease specific criteria: Time to discharge at Index hospitalisation; Other: Median: intervention: 4 days (95% CI 4-5 days) versus control: 6 days	

Study	Rapoport 1999[34]
(95% CI 5-7 days), p=0.0064; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness ; Baseline details: Imbalance in gender (out-patients 21/40 (52%) male vs. in-patients 14/44 (32%); gender imbalance was shown not to influence time to discharge; Group 1 Number missing: 0; Group 2 Number missing: 0 Protocol outcome 3: Avoidance of adverse events - Actual outcome for Disease specific criteria: Total adverse events at 7 days; Group 1: 6/40, Group 2: 8/44; Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Subgroups - Low; Indirectness of outcome: No indirectness ; Baseline details: Imbalance in gender (out-patients 21/40 (52%) male vs. in-patients 14/44 (32%); gender imbalance was shown not to influence time to discharge; Group 1 Number missing: 0; Group 2 Number missing: 0	
Protocol outcomes not reported by the study	Readmission; Quality of life; Patient and family satisfaction.

Study	Stone 2005[38]
Study type	RCT (Hospital randomised; Parallel).
Number of studies (number of participants)	1 (n=536).
Countries and setting	Conducted in USA; Setting: 8 teaching hospital and 17 non-teaching hospitals.
Line of therapy	Not applicable.
Duration of study	Follow up (post intervention): 30 days.
Method of assessment of guideline condition	Method of assessment/diagnosis not stated.
Stratum	Disease specific criteria: Community-acquired pneumonia.
Subgroup analysis within study	Not applicable.
Inclusion criteria	Working diagnosis of pneumonia and a chest radiograph positive for a new pulmonary infiltrate consistent with pneumonia; at least 18 years of age.
Exclusion criteria	Pneumonia Severity Index (PSI) category V; required mechanical ventilation; had active underlying pulmonary disease; had serious combed illness (no further details); required admission to a critical care unit; were immunocompromised; had a metastatic concomitant infection; were hospitalised for a palliative care only; resided in a skilled nursing facility or were homeless; were pregnant, nursing, or of child-bearing potential and not using reliable contraception;

Study	Stone 2005[38]
	currently using illicit drugs; had been in an acute care hospital within the past 10 days or had been hospitalised for an established diagnosis of pneumonia within the past 30 days; had a known or suspected hypersensitivity to ceftriaxone sodium, cephalosporins or penicillins.
Recruitment/selection of patients	Admitted for care by a participating physician.
Age, gender and ethnicity	Age - Other: Percentage of, 18-44 - Group 1: 20.0, Group 2: 15.8; 45-64 - Group 1: 25.4, Group 2: 28.2; Over 65 - Group 1: 54.6, Group 2: 56.0. Gender (M:F): 219:449. Ethnicity: 83% white.
Further population details	1. Clinical condition: Respiratory (community-acquired pneumonia). 2. Frail elderly: not frail elderly 3. People with serious mental illness: not applicable/not stated/unclear.
Indirectness of population	No indirectness.
Interventions	(n=240) Intervention 1: Standardised criteria for discharge from hospital to community (for example, a checklist incorporating physiological stability, functional capacity, therapeutic dependency or disease severity) including both general and condition-specific criteria. Discharge guideline was based on a review of the medical literature and empiric evidence on the time to reach clinical stability. Each component of the guideline was discussed by a national panel of experts in pulmonary medicine, infectious diseases and internal medicine until consensus was reached. Discharge criteria: adequate fluid balance maintained, at the time of assessment; normal or baseline mental status during the previous 16 hours, stable vital signs during the previous 16 hours; no evidence of new, or worsening, or decompensating medical problems during the previous 24 hours; no evidence of new occurrence of other conditions precluding use of guideline at any time during hospitalisation; stable laboratory values. Duration: until discharge. Concurrent medication/care: "empiric antibiotic therapy" (ceftriaxone sodium); 45.0 received a macrolide with the first 24 hours and 4.2% started macrolide therapy between 24 and 48 hours after admission. Further details: 1. Expertise of decision maker: not applicable/not stated/unclear (discharge criteria assessment by "on-site medical personnel"). (n=209) Intervention 2: No standardised criteria for discharge from hospital to community - no standardised criteria. No standardised discharge criteria. Duration: until discharge. Concurrent medication/care: any antibiotic treatment apart from intervention antibiotic (ceftriaxone sodium) - 56.0% received cephalosporins other than ceftriaxone sodium, 31.1% received fluoroquinolones, 24.9% received penicillins, and 5.7% received ceftriaxone sodium. 58.4% received macrolide within the first 24 hours and 1.4% started macrolide therapy between 24 and 48 hours Further details: 1. Expertise of decision maker: not applicable/not stated/unclear.
Funding	Study funded by industry (NR15534/M44119 from Roche Laboratories).

Study	Stone 2005[38]
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: A CHECKLIST INCORPORATING PHYSIOLOGICAL STABILITY, FUNCTIONAL CACPACITY, THERAPEUTIC DEPENDENCY AND DISEASE SEVERITY versus NO STANDARDISED CRITERIA. Protocol outcome 1: Mortality during the study period. - Actual outcome for disease specific criteria: mortality at 30 days; Group 1: 5/235, Group 2: 3/207; Risk of bias: All domain - Very high, Selection - Very high, Blinding - Very high, Incomplete outcome data - High, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Baseline details: Difference in source of admission (5.8% vs 11.0% recruited directly via physician office or clinic) - possibly compounded by lack of blinding; Group 1 Number missing: 5, Reason: Enrolled at sites with only 1 physician group; Group 2 Number missing: 2, Reason: Enrolled at sites with only 1 physician group Protocol outcome 2: Length of stay/time to discharge during the study period. - Actual outcome for Disease specific criteria: Length of stay at in-hospital; RR 0.88 (95%CI 0.75 – 1.03); Mean (median) – Group 1:5.5 (4), Group 2: 5.0 (4); Risk of bias: All domain - Very high, Selection - Very high, Blinding - Very high, Incomplete outcome data - Low, Outcome reporting - Very high, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Baseline details: Difference in source of admission (5.8% vs 11.0% recruited directly via physician office or clinic) - possibly compounded by lack of blinding; Group 1 Number missing: 5, Reason: Enrolled at sites with only 1 physician group; Group 2 Number missing: 2, Reason: Enrolled at sites with only 1 physician group Protocol outcome 3: Readmission up to 30 days. - Actual outcome for Disease specific criteria: Readmission at 30 days; Group 1: 20/235, Group 2: 16/207; Risk of bias: All domain - Very high, Selection - Very high, Blinding - Very high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Baseline details: Difference in source of admission (5.8% vs 11.0% recruited directly via physician office or clinic) - possibly compounded by lack of blinding; Group 1 Number missing: 5, Reason: Enrolled at sites with only 1 physician group; Group 2 Number missing: 2, Reason: Enrolled at sites with only 1 physician group Protocol outcome 4: Avoidance of adverse events during the study period. - Actual outcome for Disease specific criteria: Serious adverse events at 30 days; Group 1: 38/235, Group 2: 23/207; Risk of bias: All domain - Very high, Selection - Very high, Blinding - Very high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness; Baseline details: Difference in source of admission (5.8% vs 11.0% recruited directly via physician office or clinic) - possibly compounded by lack of blinding; Group 1 Number missing: 5, Reason: Enrolled at sites with only 1 physician group; Group 2 Number missing: 2, Reason: Enrolled at sites with only 1 physician group	
Protocol outcomes not reported by the study	Quality of life during the study period; Patient and family satisfaction during the study period.

Appendix E: Economic evidence tables

No studies were included.

Appendix F: GRADE tables

Table 5: Clinical evidence profile (RCT): Standardised discharge criteria versus no standardised criteria

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Standardised discharge criteria versus no standardised criteria	Control	Relative (95% CI)	Absolute		
Mortality (follow-up 7-30 days)												
2	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	None	6/275 (2.2%)	0.7%	RR 1.68 (0.46 to 6.14)	5 more per 1000 (from 4 fewer to 36 more)	⊕OOO VERY LOW	CRITICAL
Length of stay												
1	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision[2]	None	-	-	RR 0.88 (0.75 to 1.03)	-	⊕⊕OO LOW	CRITICAL
Readmission (follow-up 30 days)												
1	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	None	20/235 (8.5%)	7.7%	RR 1.1 (0.59 to 2.07)	8 more per 1000 (from 32 fewer to 82 more)	⊕OOO VERY LOW	IMPORTANT
Adverse events (follow-up 7-30 days)												
2	randomised trials	very serious[1]	serious[3]	no serious indirectness	serious[2]	None	44/275 (16%)	14.7%	RR 1.29 (0.81 to 2.03)	43 more per 1000 (from 28 fewer to 151 more)	⊕OOO VERY LOW	CRITICAL

[1] 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.
[2] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.
[3] Downgraded by 1 or 2 increments because the point estimate varies widely across studies, unexplained by subgroup analysis.

Appendix G: Excluded clinical studies

Table 6: Studies excluded from the clinical review

Study	Exclusion reason
Anon 1999[1]	Incorrect study design (non-systematic review)
Awad 2006[2]	Systematic review: quality assessment is inadequate
Basger2015 [3]	Not AME patients. Inclusion- patients admitted for treatment of chronic medical conditions, in addition to rehab after joint replacement surgery. Inappropriate intervention- discharge medication counselling and a medication review by a clinical pharmacist.
Caldwell 2003[4]	Systematic review: quality assessment is inadequate
Carlton 2015[5]	Incorrect study design (prospective cohort)
Casula 2003[6]	Inappropriate comparison. Both groups had defined discharge criteria
Chaparro 2010[7]	Incorrect interventions. No discharge criteria
Domingo 2012[8]	Systematic review is not relevant to review question or unclear PICO. No discharge criteria studies
Dubois 2010[9]	No admission - Outpatient surgical recovery room only
El-khuffash 2015[10]	Not review population (infants); Incorrect study design (prospective cohort)
Escobar 2015[11]	Incorrect study design (retrospective cohort)
Fiore 2012[12]	Systematic review: quality assessment is inadequate
Garcia-molina 2015[13]	Incorrect study design (cross sectional)
Glasby 2006[14]	Systematic review: quality assessment is inadequate
Kariv 2007[15]	Fast-track recovery
Kelly 2012[16]	Incorrect interventions. Early discharge versus standard discharge - no discharge criteria mentioned
Lauck 2014[17]	All patients had discharge criteria
Lowthian2015 [21]	Systematic review- does not meet PICO protocol criteria. The review examined ED community transition strategies and evaluated their effectiveness.
Lee 2007[18]	Incorrect study design (before and after)
Lindstrom 2014[19]	All patients had discharge criteria
Loubani 2000[20]	Incorrect interventions. fast-track recovery
Mcallister 2015[22]	Incorrect study design (retrospective cohort); Incorrect interventions
Mcmanus 2005[23]	Inappropriate comparison. Integrated care pathway - no comparison versus usual care
Meijer 2005[24]	Incorrect study design (prospective cohort)
Meijer 2006[25]	Systematic review is not relevant to review question or unclear PICO
Mistiaen 2007[26]	Systematic review is not relevant to review question or unclear PICO. No discharge criteria papers
Moreno 1998[27]	Incorrect study design. Non-randomised study
Mortenson 2016[28]	Incorrect study design (survey about current discharge criteria)
Parker 2002[31]	Systematic review is not relevant to review question or unclear PICO. No relevant studies
Phillips 2013[32]	Systematic review: quality assessment is inadequate

Study	Exclusion reason
Preyde 2011[33]	Incorrect interventions. No discharge criteria
Rhew 2001[35]	Systematic review: study designs inappropriate
Simpson 1977[36]	Not guideline condition
Stephenson 1990[37]	Systematic review: quality assessment is inadequate
Sun 2014[39]	No admission - Emergency department only
Tavender 2011[40]	Systematic review: study designs inappropriate
Than 2014[41]	No admission - Emergency department only
Tokatli 2015[42]	Incorrect study design (retrospective cohort); Validation study of discharge criteria
Tralhao 2015[43]	No discharge criteria. No comparison
Wagman 1989[44]	Inappropriate comparison. All patients had discharge criteria
Webster 2011[45]	post-surgical patients
Wells 2004[46]	Inappropriate comparison
Yoon 2004[47]	Incorrect study design (before and after)

1
2

Appendix H: Excluded health economic studies

No studies were excluded.