National Institute for Health and Care Excellence

Final

Chapter 23 Liaison psychiatry

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

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Chapter 23 Liaison psychiatry

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23 Liaison psychiatry

23.1 Introduction

People with mental ill health have significantly worse physical health status than people without mental health problems, and individuals with more serious mental illnesses die on average 10-17 years early. When people with mental ill health develop a physical health problem, they use less planned admissions, and use more emergency hospital care than those without mental ill health. In 2013/14 this equated to 3.2 times the number of accident and emergency attendances and 4.9 times the emergency inpatient admission rate. [Quality Watch 2015, Focus on: people with mental ill health and hospital use, publ. The Health Foundation & Nuffield Trust.]

Mental health problems are a factor in a significant minority of hospital presentations with acute medical emergencies. Overdose and poisoning account for 8-10% of medical admissions [Blatchford et al 1999, BJ General Practice], and deliberate self-harm is one of the top five reasons for medical admission [House et al, 1989]. Up to 20% of medical inpatients have delirium [Ryan 2013, BMJopen], and 20% of over-70s admitted to hospital can be expected to have dementia [Travers 2013, Internal Medicine Journal]

Liaison Psychiatry services are dedicated psychiatry teams based in general hospitals, providing assessment and treatment of mental health problems in the emergency department and on medical wards. As a minimum, liaison psychiatry services are expected to improve the integrated care of physical and mental health problems, and to improve the patient and carer experience for people with mental ill health attending a general hospital. The NHS "Five Year Forward View for Mental Health" [Mental Health Taskforce, 2016, www.england.nhs.uk/mentalhealth/taskforce p.12] has recommended that " By 2020/21 no acute hospital should be without all-age mental health liaison services in emergency departments and inpatient wards", and goes on to make specific recommendations on staffing levels.

The question addressed in this chapter is whether clinical outcomes are better for patients where liaison psychiatry services are available, and also whether the work of liaison psychiatry teams leads to care being provided more cost-effectively, for example by reducing waiting times in emergency departments, or reducing length of stay.

23.2 Review question: Do acute psychiatric services improve outcomes for patients with mental health disturbance presenting with an acute medical emergency?

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) with a suspected or confirmed AME with a mental health disturbance (for example, delirium, drug overdose or attempted self-harm).
Intervention	Liaison psychiatry consultation (psychiatric teams based in acute hospitals [anywhere in acute hospital], service specifically in acute hospital).
Comparison	No liaison psychiatry consultation.
Outcomes	• Early diagnosis and treatment (IMPORTANT) • Earlier hospital discharge (reduced length of stay) (CRITICAL) • Discharge destination (home versus care home – back to usual place of residence

	better) (IMPORTANT) • Admission prevention (IMPORTANT) • Readmission up to 30 days (IMPORTANT) • Quality of life (CRITICAL) • Mortality (CRITICAL) • Avoidable adverse events (CRITICAL) • Patient and/or carer satisfaction (CRITICAL) • Staff satisfaction (IMPORTANT)
Study design	Systematic reviews (SRs) of RCTs, RCTs, observational studies only to be included if no relevant SRs or RCTs are identified.

23.3 Clinical evidence

Seven studies were included in the review;[10,18,19,21,38,52,57] 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 H.

Table 2: Summary of studies included in the review

Study	Intervention and comparison	Population	Outcomes	Comments
Baldwin 2004[10] Conducted in the UK (RCT)	Intervention lasted for 6 weeks. Multi-faceted intervention led by a mental health liaison nurse (n=77). Versus Control group (usual care) (n=76).	Medically ill older people with depression and/or cognitive impairment (n=153) in 4 medical wards in a district general hospital in a northern UK town. Patients had a score of 2 or above on the GDS4 and/or above 10 on the OMC.	Length of stay in hospital, Health of the Nation Outcome Scale 65+ (HoNOS65+), mortality and readmission at 3 months.	Screening was at 3-5 days after admission and took place between June 2001 and September 2002. Comprised the 4-item Geriatric Depression Scale (GDS) and the 6-item Orientation-Memory-Concentration test (OMC). Usual care was defined as care and treatment delivered by the acute ward staff. This could include referral to the local old age psychiatry team, and/or a psychiatrist.
Cole 1991[18] Conducted in Canada (RCT)	Geriatric psychiatry consultation (n=35). Versus Control group (n=28).	Eight week long study conducted in a 400-bed university-affiliated primary acute care hospital involving hospitalised patients aged 65 and over(n=80).	Length of hospital stay days (narrative only).	Multidisciplinary Geriatric Team (MGT) including a consultant geriatric psychiatrist, nurse and geriatrician, carried out the consultation for patients in the interventions group.

Study	Intervention and comparison	Population	Outcomes	Comments
		Patients included had a score of 3 or more on the Short Portable Status Questionnaire, score of 52 or more on the Geriatric Depression Scale, or score of 50 or more on the Anxiety Status Inventory.		Does not say what care the control group received. 58% patients had dementia.
Cole 2002[19] Conducted in Canada (RCT)	Consultation and follow-up by a geriatric internist or psychiatrist (n=113). Versus Usual care (n=114).	Patients aged 65 or more with prevalent or incident delirium (n=299) who were admitted to 5 general medical units between 15th March 1996 and 31st January 1999 in a 400-bed university-affiliated primary acute care facility. Patients were screened for delirium within 24 hours of admission by study nurse using the Short Portable Mental Status Questionnaire and then the Confusion Assessment Method (DSM-III-R).	Length of stay and mortality.	Intervention: consultant assess and followed the patient as required, study nurse visited the patient 5 days per week, intervention team (2 geriatric psychiatrists, 2 geriatric internists and study nurse) met after every 8-10 patients were enrolled in the intervention group to discuss delirium management problems. Usual care: standard hospital service. Referrals for geriatric or psychiatric consultations were honoured consistent with usual practice, but patients did not receive systematic consultation by the geriatric specialists.
Cullum 2007[21] Conducted in the UK (RCT)	Intervention lasted for 16 weeks: liaison psychiatric nurse assessment (n=62). Versus Control (usual care) (n=59).	Older (65+ years) general hospital patients (n=121) in a UK district general hospital in rural East Anglia. Participants were eligible if they screened positive for depression on a commonly used rating scale, the 15-item geriatric	Patient satisfaction, quality-adjusted life weeks (QALWs) and mortality.	Liaison psychiatric nurse assessed participants, formulated a care plan for treatment of their depression, ensured its implementation through liaison with appropriate agencies, and monitored participants. Intervention group also received usual care.

Study	Intervention and comparison	Population	Outcomes	Comments
		depression scale (GDS-15).		Not clear what usual care involved.
Levenson 1992[38] Conducted in the USA (RCT)	Intervention: high scoring patients received psychiatric consultation by psychiatrists. (n=256). Versus Control (baseline, n=232) (contemporaneous, n=253).	741 general medical inpatients admitted to a large urban academic medical centre with high Medical Inpatient Screening Test scores (high levels of psychopathology or pain) were included.	Length of stay and number of re-hospitalisations (readmissions).	Psychiatric consultation occurred within 24 hours, provided by 6 different psychiatrists over the 15 months. Baseline and intervention - patients in both periods were subdivided into those with high Medical Inpatient Screening Test scores (high levels of psychopathology or pain) and those with low test scores (low psychopathology or pain). Anxiety and depression were measured with the 23 questions from the Hopkins Symptom Checklist (SCL-90-R) that measure these symptoms. Two control groups • Patients with high Medical Inpatient Screening Test scores from the baseline period. • Patients who had high test scores from the intervention period and were randomised not to receive consultation (contemporaneous control subjects).
Slaets 1997[52] Conducted in the Netherlands (RCT)	Intervention: multidisciplinary joint treatment by a geriatric team in addition to usual care (n= 140). Versus	Study conducted in a 600 bed teaching hospital involving patients (n= 237) 75 years old or older in the general medicine department.	Length of stay.	From October 1989 to October 1990. Intervention team included a geriatrician (trained in geriatric psychiatry), specialised liaison nurse and physiotherapist.

Study	Intervention and comparison	Population	Outcomes	Comments
	Usual care (n=97).			Usual care consisted of services provided by physicians and nurses in another general medical unit in the same hospital but on a different floor.
Talley 1990 [57] Conducted in the USA (RCT)	Consultation by the psychiatric liaison nurse specialist (PLNS) (n= 47). Versus Control (patients without PLNS consultation) (n= 60).	Patients who were admitted to a medical, surgical, obstetrical or gynaecological unit in an acute care hospital. Patient were also assigned a sitter (n=107).	Length of stay (narratively reported), mortality and discharge destination.	Patients were divided into suicidal (n=22) or non-suicidal (n=85). The suicidal group had 11 patients in the control group and 11 patients in the intervention group. The non-suicidal group had 49 patients in the control group and 36 patients in the intervention group.

Table 3: Clinical evidence summary: Liaison psychiatry consultation versus no liaison psychiatry consultation

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 Liaison psychiatry consultation (95% CI)
Mortality	608 (4 studies) 3 months, 8 weeks, 12 weeks, 6-8 months	⨁⊖⊖⊖ VERY LOW[a,b] due to risk of bias, imprecision	RR 1.30 (0.94 to 1.79)	172 per 1000	51 more per 1000 (from 10 fewer to 136 more)
Length of stay (days)	1116 (4 studies) 8 weeks. 6-15 months	⨁⨁⊖⊖ LOW[a] due to risk of bias		The mean length of stay (days) in the control groups was 22.5 days	The mean length of stay (days) in the intervention groups was 1.83 lower (4.53 lower to 0.87 higher)
Quality-adjusted life weeks (QALWs)	86 (1 study) 12 weeks	⨁⊖⊖⊖ VERY LOW[a,b] due to risk of bias, imprecision		The mean quality-adjusted life weeks (QALWs) in the control groups was 9.9 weeks	The mean quality-adjusted life weeks (QALWs) in the intervention groups was 1.5 lower (3.51 lower to 0.51 higher)
Patient satisfaction	84 (1 study) 12 weeks	⨁⊖⊖⊖ VERY LOW[a,b] due to risk of bias, imprecision	RR 1.37 (1.1 to 1.72)	674 per 1000	250 more per 1000 (from 67 more to 486 more)
Health of the Nation Outcome Scale 65+ (score 0-48)	117 (1 study) 6-8 weeks	⨁⨁⨁⊖ MODERATE[a] due to risk of bias		The mean health of the nation outcome scale 65+ (score 0-48) in the control groups was 11.5	The mean health of the nation outcome scale 65+ (score 0-48) in the intervention groups was 0 higher (1.75 lower to 1.75 higher)
Number of re-hospitalisations	508 (1 study) 6-21 months	⨁⨁⊖⊖ LOW[a] due to risk of		The mean number of re-hospitalisations in the control groups was	The mean number of re-hospitalisations in the intervention groups was

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 Liaison psychiatry consultation (95% CI)
		bias		1.43 readmissions	0.19 lower (0.57 lower to 0.19 higher)
Time to next hospitalisation (days)	508 (1 study) 15 months	⨁⨁⨀⨀ LOW[a] due to risk of bias		The mean time to next hospitalisation (days) in the control groups was 176.8 days	The mean time to next hospitalisation (days) in the intervention groups was 29.9 lower (54.78 to 5.02 lower)
Readmission at 3 months	153 (1 study) 3 months	⨁⨀⨀⨀ VERY LOW[a,b] due to risk of bias, imprecision	RR 0.89 (0.52 to 1.52)	276 per 1000	30 fewer per 1000 (from 133 fewer to 144 more)
Discharge to home	107 (1 study) 3 months	⨁⨀⨀⨀ VERY LOW[a,b] due to risk of bias, imprecision	RR 0.96 (0.69 to 1.32)	600 per 1000	24 fewer per 1000 (from 186 fewer to 192 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.

Narrative results

Length of stay

One of the studies reported that the length of hospital stay for patients in the intervention group (liaison psychiatry consultation) was 39.9 days compared with 35 days for patients in the control group.[18]

Another study reported length of stay according to the patient groups investigated (non-suicidal and suicidal). Non-suicidal patients who received the intervention (psychiatric liaison nurse specialist consultation) had a mean length of stay of 21.44 days compared to 25.33 days for non-suicidal patients in

the control group. Suicidal patients who received the intervention had a mean length of stay of 16.0 days compared to 9.7 days for suicidal patients in the control group.[57]

23.4 Economic evidence

Published literature

One health economic study published in 2 papers was identified and has been included in this review.[44,56] This is summarised in the health economic evidence profile below (Table 4) and the health economic evidence table 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: Health economic evidence profile: psychiatric liaison versus no psychiatric liaison

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost-effectiveness	Uncertainty
Tadros 2013[56] Parsonage 2011[44] (UK)	Partially applicable [(a)]	Potentially serious limitations [(b)]	Retrospective cohort analysis comparing before and after the introduction of the RAID psychiatric liaison service at City Hospital, Birmingham. Subgroups were analysed by those who had been referred to the intervention and those who were not referred but were managed while the new service was in place and therefore were considered to be influenced by the service.	Saves £2.7 million per year	Length of stay: Saves 38 beds per day. Length of stay for readmissions: Saves 22 beds per day. Readmission (RAID referrals only): Saves 11 admissions per 100 patients. Readmission (RAID influenced group only): Saves 3 admissions per 100 patients.	n/a[(c)]	No sensitivity analyses were performed.

Abbreviations: n/a: not applicable.

(a) Health benefits are not measured in quality adjusted life years.

(b) Based on a single observational study. Mortality and quality of life were not measured. Cost sources are not reported.

(c) Since the incremental effects are resource use rather than health outcomes, a conclusion on cost effectiveness could not be reached.

23.5 Evidence statements

Clinical

- Seven studies compromising 1738 people evaluated the role of acute psychiatric services for improving outcomes in secondary care in adults and young people at risk of an AME, or with suspected or confirmed AME. Five of the randomised controlled trials looked at people aged 65 years and over. The evidence suggested that liaison psychiatry may provide a benefit in reduced length of stay (4 studies, low quality) and improved patient and/or carer satisfaction (1 study, very low quality). The evidence suggested that there was no difference in the discharge destination of those discharged to their own home (1 study, very low quality), readmission at 3 months (1 study, very low quality), number of re-hospitalisations at 6-21 months (1 study, low quality) and quality of life- Health of the Nation Outcome Scale 65+ (1 study, moderate quality). However, the evidence suggested that there was a possible increase in mortality (4 studies, very low quality), reduced quality of life with quality-adjusted life week score (1 study, very low quality) and increased time to next hospitalisation (1 study, low quality) with liaison psychiatry.

Economic

- One comparative cost analysis found that psychiatric liaison was cost saving compared with usual care. This study was assessed as partially applicable with potentially serious limitations.

23.6 Recommendations and link to evidence

Recommendations	12. Provide access to liaison psychiatry services for people with medical emergencies who have mental health problems.
Research recommendation	
Relative values of different outcomes	The guideline committee considered mortality, quality of life, admission prevention, reduced avoidable adverse events, patient and/or carer satisfaction and earlier hospital discharge (reduced length of stay) as critical outcomes. Readmission, early diagnosis and treatment, discharge destination (home versus care home – back to usual place of residence better) and staff satisfaction were considered to be important outcomes.
Trade-off between benefits and harms	Seven randomised controlled trials were included in the review. Five of the randomised controlled trials looked at people aged 65 years and over. The evidence suggested that liaison psychiatry may provide a benefit in reduced length of stay and improved patient and/or carer satisfaction. The evidence suggested that there was no difference in the discharge destination (those discharged to their own home), readmission at 3 months, number of re-hospitalisations at 6-21 months and quality of life (Health of the Nation Outcome Scale 65+). However, the evidence suggested that there was a possible increase in mortality, reduced quality of life years and increased time to next hospitalisation with liaison psychiatry. No evidence was identified for carer satisfaction, admission prevention, readmission within 30 days, early diagnosis and treatment, avoidable adverse events and staff satisfaction. The committee were of the view that a trend for increased mortality associated with psychiatric liaison had no plausible biological explanation. Cause of death was not reported in the studies. The committee did not think that these deaths were likely to be suicides. Only one study had a sub-population identified who were suicidal and there were no reported deaths in the suicidal sub-population. The committee noted wide confidence intervals for mortality reducing confidence in the point estimate. The committee also noted that the event rates for mortality were small. The committee considered whether an imbalance of risk factors at the start of the studies could have contributed to this unexpected result. One study reported a baseline difference of ischaemic heart disease (32% in the intervention versus 17% in the control arm). It was also noted that most of these studies mainly consisted of older patients and any changes to co-morbidities could have influenced mortality. The majority of the studies were in people aged over 65 years but the committee believed that the evidence was generalisable to all people with medical emergencies who have mental health problems. The committee agreed that given the evidence of improvement in length of stay and satisfaction, and likely confounding as an explanation for the mortality trend, psychiatric liaison should be recommended. However, they did not think the evidence was sufficiently secure to make a strong recommendation and opted to recommend hospitals to consider providing this service.
Trade-off between net effects and costs	One cost-consequence analysis showed that the addition of a psychiatric liaison service was cost saving (£2.7 million per year for City Hospital, Birmingham) due to a reduced mean length of stay and hospital readmission rates. The study was based on case matched data before and after the service was implemented at City Hospital, Birmingham. The evidence included in the review generally followed the same trend for length of stay and readmissions as discussed above. However, the review showed a trend

Recommendations	12. Provide access to liaison psychiatry services for people with medical emergencies who have mental health problems.
Research recommendation	
	towards higher mortality and reduced quality of life with psychiatric liaison both of which are key drivers of cost effectiveness. The committee believed that these results could have been due to imbalances in the patient groups rather than attributable to the intervention. The committee considered the impact that the included economic study had already had on current services and the increasing trend across the country towards psychiatric liaison services. They highlighted that, on the basis of the included economic study, the Department of Health have already started to support commissioners to introduce psychiatric liaison services across the country as a way of reducing unnecessary costs to the health service. Due to the conflicting clinical evidence, the committee felt that a strong recommendation could not be made. Further research would however be beneficial given that the economic evidence is based on a single hospital. Given that there is a study currently underway (LP – MAESTRO)[1] they decided it would be appropriate to recommend that psychiatric liaison services should be considered until the results of this study can be evaluated.
Quality of the evidence	Seven randomised controlled trials were included in this review. Quality of the evidence ranged from very low to moderate, this was mostly due to risk of bias and imprecision. The committee noted that one study that reported evidence for mortality used an older psychiatry liaison model which may not reflect current practice. Mortality could be confounded by case mix effects (age of patients in the studies and their health conditions). Only two studies examined models of liaison psychiatry resembling current practice. It was noted that usual care was poorly defined in these studies, making it difficult to distinguish intervention from control. None of the studies examined patients in the emergency department as they were all patients admitted to hospital. One cost-consequence analysis was included in this review and was assessed as partially applicable because it did not evaluate health outcomes. It was also considered to have potentially serious limitations because the unit costs were not described and because it was based on a single observational study.
Other considerations	Liaison psychiatry of some form is being provided by many hospitals in England, However, the make-up and the delivery of the services differs quite radically from place to place. The psychiatric liaison model called Rapid Assessment, Interface and Discharge (RAID) that involves the provision of a 24/7 psychiatric liaison service has been implemented in some hospitals. More hospitals are being encouraged to implement RAID; currently fewer than 50% currently offer this service. The next steps on the NHS five year forward view[42] reports that specialist mental health care teams working 24/7 in A&Es today should increase fivefold to 74 by March 2019. The service will be available in nearly half acute hospitals by March 2019 compared with under one-in-ten in March 2017. A research project is underway to evaluate the cost-effectiveness and efficiency of particular configurations of liaison psychiatry for specified target populations (Liaison Psychiatry: Measurement and Evaluation of Service Types, Referral Patterns and Outcomes [LP-MAESTRO]).[1] This study may be useful to inform future updates of this guideline. The studies included in this review did not investigate liaison psychiatry in the

Recommendations	12. Provide access to liaison psychiatry services for people with medical emergencies who have mental health problems.
Research recommendation	
	emergency department (ED) population. Consideration should be given to evaluating the utility of liaison psychiatry at this earlier stage of the pathway where interventions might have the potential to improve admission avoidance and reduce delays in discharge. The Royal College of Psychiatrists and the British Association of Accident and Emergency Medicine London produced an advisory document on how to deliver psychiatric services to accident emergency departments. Although the document was written in 2003 more of the advice still holds true and could form a framework on to which services could be developed. Of note are the ideal response times (first line attendance 30 minutes and Section-12 Approved doctor attendance 60 minutes in urban areas) which although published 14 years ago are far from being reached in many areas. The service also needs to be more proactive (that is, seek out the issues early) rather than the reactive nature in which it can be delivered. It is important that the service has the capacity to deal with demand and patients of all ages in a timely fashion if it is to benefit the healthcare system.
NICE's considerations	The Committee proposed that its consultation wording of the recommendation should be retained, i.e. 'consider providing access to liaison psychiatry services for people with medical emergencies who have mental health problems.' Final approval prior to publication is required from NICE. NICE noted that stakeholder comments received on the committee's draft wording advocated strengthening it and gave good reasons for this. NICE also noted that NHS England's seven day service standards require that: *Liaison mental health services should be available to respond to referrals and provide urgent and emergency mental health care in acute hospitals with 24/7 Emergency Departments 24 hours a day, 7 days a week.* Accordingly, NICE decided to strengthen the wording of the recommendation by changing it to 'provide access to liaison psychiatry services for people with medical emergencies who have mental health problems.'

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Appendices

Appendix A: Review protocol

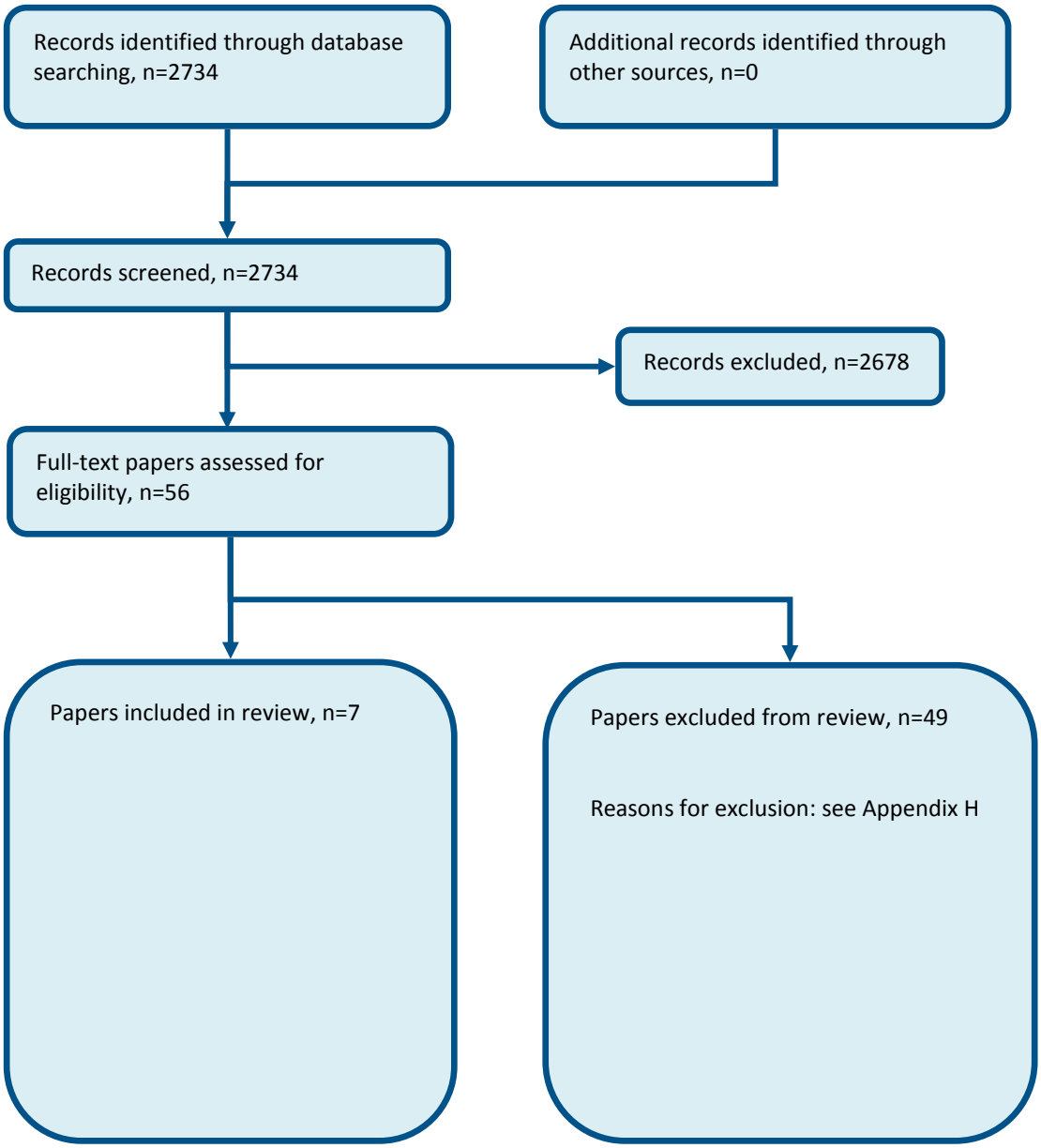
Table 5: Review protocol: Liaison psychiatry

Review question: Do acute psychiatric services such as liaison psychiatry improve outcomes for patients with mental health disturbance presenting with an acute medical emergency?	
Objective	Liaison Psychiatry 'is a critical service…(comprising) multidisciplinary teams skilled to integrate mental and physical healthcare in people whose mental health problems arise in, or have an impact on, management of physical illness and symptoms' [*Working Group. Liaison psychiatry for every acute hospital. Royal College of Psychiatrists; Dec 2013*]. Mental health problems occur in 30–60% of in-patients and outpatients (*Academy of Medical Royal Colleges, 2010*) and are the presenting feature in 5% of all emergency department attendances (*Royal College of Psychiatrists & British Association for Accident and Emergency Medicine, 2004*). In acute hospitals the liaison psychiatry service addresses 'the mental health needs of people being treated primarily for physical health problems and symptoms'. The Royal College report states that liaison psychiatry services 'improve quality of care, dignity and quality of life for patients, improve mental health skills in non-mental health professionals and reduce adverse events and other risks to the acute hospital' and that 'Financial benefits come from reduced avoidable costs and ineffective or inappropriately located management of mental health problems by reduced length of stay, readmissions and investigations, and improved care of medically unexplained symptoms, dementia and long-term conditions'. The purpose of this review therefore is to evaluate the utility of providing this service specifically for patients with acute medical illnesses.
Population	Adults and young people (16 years and over) with a suspected or confirmed AME with a mental health disturbance (for example, delirium, drug overdose or attempted self-harm).
Intervention	Liaison psychiatry consultation (psychiatric teams based in acute hospitals [anywhere in acute hospital], service specifically in acute hospital). Terms: psychiatric liaison, consultation liaison and psychological medicine. Terms are internationally recognised, RAID - Rapid assessment interface discharge (Birmingham Study).
Comparator	No liaison psychiatry consultation.
Outcomes	Patient outcomes: Early diagnosis and treatment IMPORTANT Earlier hospital discharge (reduced length of stay) CRITICAL Discharge destination (home versus care home – back to usual place of residence better) Admission prevention CRITICAL Readmission up to 30 days IMPORTANT Quality of life CRITICAL Mortality CRITICAL Reduced avoidable adverse events CRITICAL

Review question: Do acute psychiatric services such as liaison psychiatry improve outcomes for patients with mental health disturbance presenting with an acute medical emergency?	
	Patient and/or carer satisfaction CRITICAL Staff outcomes: Staff satisfaction IMPORTANT
Exclusion	Patients who do not have an AME. Non-OECD countries.
Search criteria	The databases to be searched are: Medline, Embase, the Cochrane Library, PsycINFO. Date limits for search: 1990. Language: English.
The review strategy	Systematic reviews (SRs) of RCTs, RCTs, observational studies only to be included if no relevant SRs or RCTs are identified.
Analysis	Data synthesis of RCT data. Meta-analysis where appropriate will be conducted. Studies in the following subgroup populations will be included in subgroup analysis: • Frail elderly (difficult to manage – likely to stay longer). • Dementia (difficult to manage – likely to stay longer). • Substance abuse (drug and alcohol, difficult to manage – likely to stay longer). In addition, if studies have pre-specified in their protocols that results for any of these subgroup populations will be analysed separately, then they will be included in the subgroup analysis. The methodological quality of each study will be assessed using the Evibase checklist and GRADE.

Appendix B: Clinical study selection

Figure 1: Flow chart of clinical study selection for the review of liaison psychiatry



Appendix C: Forest plots

C.1 Liaison psychiatry consultation versus usual care/control

Figure 2: Mortality

Study or Subgroup	Liaison psychiatry Events	Total	Control Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Baldwin 2004	17	77	13	76	24.9%	1.29 [0.67, 2.47]
Cole 2002	25	113	22	114	41.7%	1.15 [0.69, 1.91]
Cullum 2007	20	62	12	59	23.4%	1.59 [0.85, 2.95]
Talley 1990	6	47	6	60	10.0%	1.28 [0.44, 3.70]
Total (95% CI)		**299**		**309**	**100.0%**	**1.30 [0.94, 1.79]**
Total events	68		53			

Heterogeneity: Chi² = 0.63, df = 3 (P = 0.89); I² = 0%
Test for overall effect: Z = 1.59 (P = 0.11)

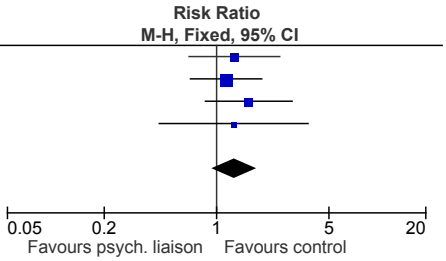


Figure 3: Length of stay (days)

Study or Subgroup	Liaison psychiatry Mean	SD	Total	Control Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
Baldwin 2004	27.8	27.1	77	29.5	31.4	76	8.4%	-1.70 [-11.00, 7.60]
Cole 2002	19.7	17.1	106	19.1	16.8	112	36.0%	0.60 [-3.90, 5.10]
Levenson 1992	14.7	27.6	256	16.6	29.8	252	29.2%	-1.90 [-6.90, 3.10]
Slaets 1997	19.7	14.1986	140	24.8	23.6373	97	26.4%	-5.10 [-10.36, 0.16]
Total (95% CI)			**579**			**537**	**100.0%**	**-1.83 [-4.53, 0.87]**

Heterogeneity: Chi² = 2.61, df = 3 (P = 0.46); I² = 0%
Test for overall effect: Z = 1.33 (P = 0.18)

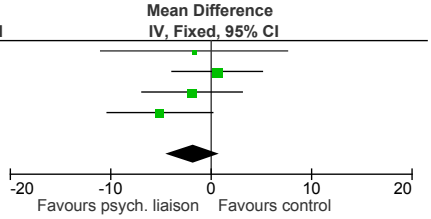


Figure 4: Quality-adjusted life weeks

Study or Subgroup	Liaison psychiatry Mean	SD	Total	Control Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
Cullum 2007	8.4	5.47	45	9.9	3.96	41	100.0%	-1.50 [-3.51, 0.51]
Total (95% CI)			**45**			**41**	**100.0%**	**-1.50 [-3.51, 0.51]**

Heterogeneity: Not applicable
Test for overall effect: Z = 1.47 (P = 0.14)

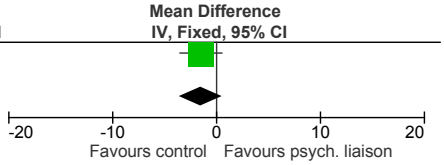


Figure 5: Patient satisfaction

Study or Subgroup	Liaison psychiatry Events	Total	Control Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Cullum 2007	38	41	29	43	100.0%	1.37 [1.10, 1.72]
Total (95% CI)		**41**		**43**	**100.0%**	**1.37 [1.10, 1.72]**
Total events	38		29			

Heterogeneity: Not applicable
Test for overall effect: Z = 2.77 (P = 0.006)

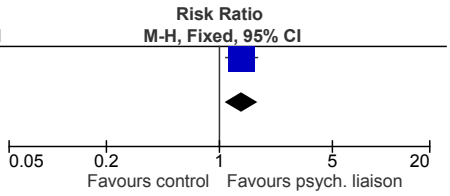


Figure 6: Health of the Nation Outcome score 65+ (HoNOS65+) (scale 0-48)

Study or Subgroup	Liaison psychiatry Mean	SD	Total	Control Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
Baldwin 2004	11.5	5.3	58	11.5	4.3	59	100.0%	0.00 [-1.75, 1.75]
Total (95% CI)			**58**			**59**	**100.0%**	**0.00 [-1.75, 1.75]**

Heterogeneity: Not applicable
Test for overall effect: Z = 0.00 (P = 1.00)

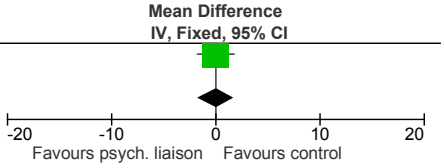


Figure 7: Number of re-hospitalisations (6-21 months)

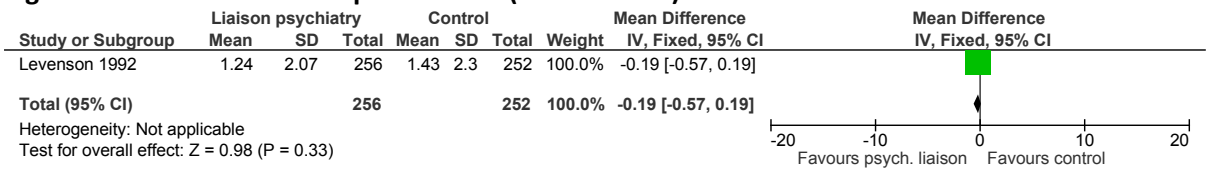


Figure 8: Readmissions at 3 months

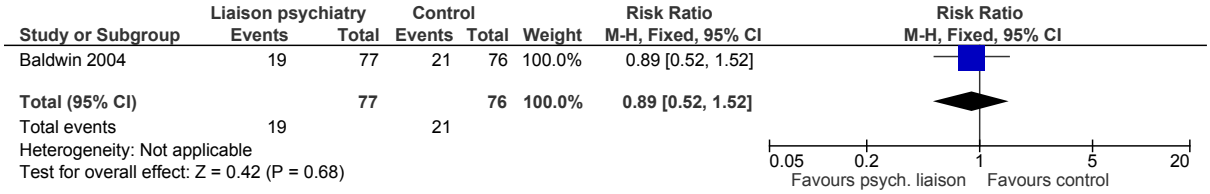


Figure 9: Time to next hospitalisation (days)

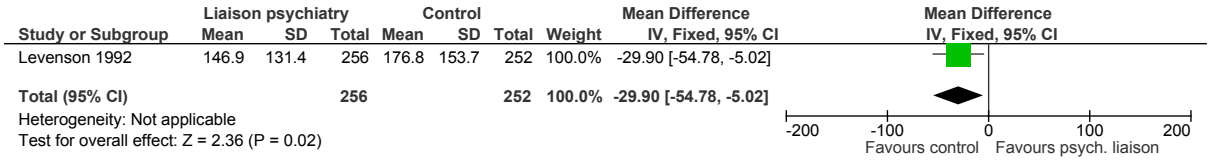
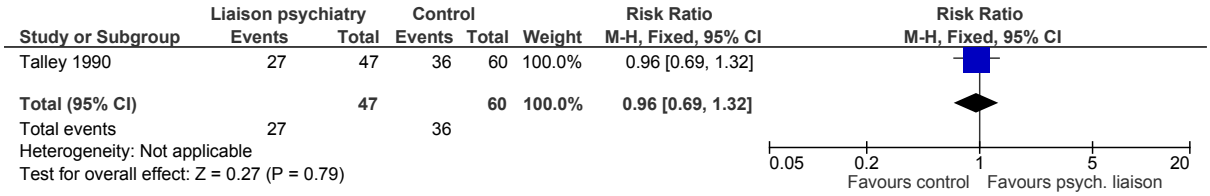


Figure 10: Discharge to home



Appendix D: Clinical evidence tables

Study	Baldwin 2004[10]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=153)
Countries and setting	Conducted in United Kingdom; setting: 4 acute medical wards of Tameside General Hospital, Ashton-under-Lyne, a semi-rural area of Northern England.
Line of therapy	Not applicable
Duration of study	Intervention time: 6 weeks
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: Admitted to acute medical wards
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Score of 2 or above on the GDS4 and/or above 10 on the OMC.
Exclusion criteria	Discharge within 3 days of admission, inability to complete the research schedules (due to either medical instability or profound sensory loss) or acute risk of self-harm.
Recruitment/selection of patients	Subjects were aged 65 years or over. Screening was at 3-5 days after admission and took place between June 2001 and September 2002. Comprised the 4-iten Geriatric Depression Scale (GDS4) and 6-item Orientation-Memory-Concentration test (OMC)
Age, gender and ethnicity	Age - Mean (range): 80.0-80.6 years. Gender (M:F): 64%/36%. Ethnicity: Not stated
Further population details	1. Dementia: Patients without dementia 2. Frail elderly: Frail elderly (65+ years and over). 3. Substance abuse: No substance abuse
Indirectness of population	No indirectness
Interventions	(n=77) Intervention 1: Liaison psychiatry consultation (psychiatric teams based in acute hospital) - Liaison psychiatry consultation. The intervention group received a multi-faceted intervention from a registered mental nurse with 3 years post-qualification experience. Three components to the intervention model: assessment (including risk), direct interventions and liaison support. Duration: 6 weeks. Concurrent medication/care: liaison support comprised encouragement of person-centred care, education about mental disorder, nutrition and safety issues, and sign-posting to relevant services. Interventions were tailored to the patient. (n=76) Intervention 2: No liaison psychiatry consultation. Usual care was defined as care and treatment delivered by

Study	Baldwin 2004[10]
	the acute ward staff. This could include referral to the local old age psychiatry team and/or psychiatrist. Duration: 6 weeks. Concurrent medication/care: no other information provided.
Funding	Academic or government funding (Grant from the North West Research and Development arm of the Department of Health, UK)
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: LIAISON PSYCHIATRY CONSULTATION versus USUAL CARE Protocol outcome 1: Quality of life - Actual outcome: Health of the Nation Outcome Scale for Older People (HoNOS65+) at 6-8 weeks; Group 1: mean 11.5 (SD 5.3); n=58, Group 2: mean 11.5 (SD 4.3); n=59; HoNOS65+ 0-48 (12-item scale, each score range: 0 = absent and 4 = very severe Top=High is poor outcome; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Comments - ; Indirectness of outcome: No indirectness ; Group 1 Number missing: 19, Reason: Lost to follow up; Group 2 Number missing: 17, Reason: Lost to follow up Protocol outcome 2: Length of stay - Actual outcome: Length of stay in hospital (days) at 6-8 weeks; Group 1: mean 27.8 (SD 27.1); n=77, Group 2: mean 29.5 (SD 31.4); n=76; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Comments - ; Indirectness of outcome: No indirectness Protocol outcome 3: Readmission - Actual outcome: Readmission at 3 months at 3 months; Group 1: 19/77, Group 2: 21/76; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Comments - ; Indirectness of outcome: No indirectness Protocol outcome 4: Mortality - Actual outcome: Mortality at 3 months at 3 months; Group 1: 17/77, Group 2: 13/76; Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Comments - ; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Discharge destination; Admission prevention; Avoidable adverse events; Staff satisfaction; Patients and/or carer satisfaction; Early diagnosis and treatment

Study	Cole 1991[18]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=80)

Study	Cole 1991[18]
Countries and setting	Conducted in USA; setting: conducted at St. Mary's Hospital, Montreal, a 400-bed university-affiliated primary acute care hospital.
Line of therapy	Not applicable
Duration of study	Intervention time: 8 weeks
Method of assessment of guideline condition	Unclear method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients were enrolled in the study if they met at least 1 of the following inclusion criteria: score of 3 or more on the Short Portable Mental Status Questionnaire, score of 52 or more on the Geriatric Depression Scale, or score of 50 or more on the Anxiety Status Inventory.
Exclusion criteria	Does not speak English or French, admitted to the ICU, or has received a psychiatric consultation within the month prior to referral.
Recruitment/selection of patients	Hospitalised patients aged 65 and over referred to the Multidisciplinary Geriatric Team (MGT) for consultation.
Age, gender and ethnicity	Age - Mean (SD): 83 years old. Gender (M:F): 27.8%/72.2%. Ethnicity: Not stated
Further population details	1. Dementia: 58% of patients had dementia 2. Frail elderly: Frail elderly 3. Substance abuse: No substance abuse
Indirectness of population	No indirectness
Interventions	(n=41) Intervention 1: Liaison psychiatry consultation (psychiatric teams based in acute hospital) - Liaison psychiatry consultation. Patients in the treatment group received a psychiatric consultation, and when appropriate, follow-up at least once per week for 8 weeks. The MGT included a consultant geriatric psychiatrist, geriatrician, nurse, social worker and physiotherapist. Duration: 8 weeks. Concurrent medication/care: geriatric psychiatry consultation was completed within 2 days of referral and involved interviews with the patient, family, and staff to determine medical history, mental status, all leading to a DSM III diagnosis and treatment recommendations. When appropriate, patients were reassessed at least once per week for at least 8 weeks, and additional findings or recommendations were recorded in progress notes. (n=39) Intervention 2: No liaison psychiatry consultation. Patients in the control group did not receive a geriatric psychiatry consultation. Duration: 8 weeks. Concurrent medication/care: no other information provided.
Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: LIAISON PSYCHIATRY CONSULTATION versus NO LIAISON PSYCHIATRY CONSULTATION (CONTROL GROUP)	

Study	Cole 1991[18]
Protocol outcome 1: Length of stay - Actual outcome: Length of stay at 8 weeks– 39.9 days (No SD); control- 35 days (No SD); Risk of bias; NR (narrative result only); Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Quality of life; Discharge destination; Admission prevention; Readmission; Mortality; Avoidable adverse events; Staff satisfaction; Patients and/or carer satisfaction; Early diagnosis and treatment

Study	Cole 2002[19]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=299)
Countries and setting	Conducted in USA; setting: St. Mary's Hospital, Montreal; a 400-bed university-affiliated primary acute care facility.
Line of therapy	Not applicable
Duration of study	Intervention time: 8 weeks
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: General medical units admissions
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients aged 65 or more admitted to the 5 general medical units between, March 15, 1996, and 31st January, 1999.
Exclusion criteria	Patients who met 1 or more of the following exclusion criteria: primary diagnosis of stroke, duration of stay on the intensive care unit or cardiac monitoring unit of more than 48 hours, admission to geriatric or oncology service, inability to speak English or French, or residence other than on the island of Montreal.
Recruitment/selection of patients	Eligible patients were screened within 24 hours after admission by the study nurse using the Short Portable Mental Status Questionnaire. Those who scored 3 to 9 errors on this instrument or had symptoms of delirium recording in the nursing notes were assessed by means of the Confusion Assessment Method.
Age, gender and ethnicity	Age - Mean (range): 82.0-82.7 years old. Gender (M:F): 59%/41%. Ethnicity: Not stated
Further population details	1. Dementia: Patients without dementia 2. Frail elderly: Frail elderly 3. Substance abuse: No substance abuse
Indirectness of population	No indirectness
Interventions	(n=113) Intervention 1: Liaison psychiatry consultation (psychiatric teams based in acute hospital) - Liaison psychiatry consultation. Intervention consisted of 2 parts: consultation and follow-up by the geriatric internist or psychiatrist, and follow-up in hospital by the study nurse. The consultation (within 24 hours after enrolment) determined the

Study	Cole 2002[19]
	probable factors of delirium and resulted in management that was recorded on a regular hospital consultation form. Follow-up by the study nurse involved daily visits to conduct a brief structured mental status exam and monitor consultant's reports. Duration: 8 weeks. Concurrent medication/care: consultation not only assessed but also followed the patients as required. The study nurse visited the patients 5 days per week. The intervention team (comprising 2 geriatric psychiatrists, 2 geriatric internists and the study nurse) met after every 8-10 patients were enrolled in the intervention group to discuss delirium management problems. Finally, the primary investigator met weekly with the study nurse to discuss problems of diagnosis, enrolment and interventions. (n=114) Intervention 2: No liaison psychiatry consultation. Standard hospital services. Referrals (by attending physicians) for geriatric or psychiatric consultation were honoured consistent with usual practice, but patients in the usual care group did not receive systematic consultation by the geriatric specialists, follow-up by the study nurse or the nursing intervention protocol. Duration: 8 weeks. Concurrent medication/care: no other information provided.
Funding	Academic or government funding (Grant from the National Health Research Development Program of Health Canada)
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: LIAISON PSYCHIATRY CONSULTATION versus USUAL CARE Protocol outcome 1: Length of stay - Actual outcome: Length of stay at 8 weeks; Group 1: mean 19.7 (SD 17.1); n=106, Group 2: mean 19.1 (SD 16.8); n=112; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 7, Reason: Patients withdrew from study; Group 2 Number missing: 2, Reason: Patients withdrew from study Protocol outcome 2: Mortality - Actual outcome: Mortality at 8 weeks; Group 1: 25/106, Group 2: 22/112; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 7, Reason: Patients withdrew from study; Group 2 Number missing: 2, Reason: Patients withdrew from study	
Protocol outcomes not reported by the study	Quality of life; Discharge destination; Admission prevention; Readmission; Avoidable adverse events; Staff satisfaction; Patients and/or carer satisfaction; Early diagnosis and treatment

Study	Cullum 2007[21]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=121)
Countries and setting	Conducted in United Kingdom; setting: UK district general hospital in rural East Anglia
Line of therapy	Not applicable

Study	Cullum 2007[21]
Duration of study	Intervention time: 16 weeks
Method of assessment of guideline condition	Adequate method of assessment/diagnosis
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Aged 65+, current residence within the area covered by the PCT and in hospital 3 to 6 days at time of screening. Participants were eligible for trial entry if they scored ≥8 (positive) on the 15-item geriatric depression scale (GDS-15).
Exclusion criteria	Patients had severe dysphasia, severe deafness, current alcohol dependency or were too physically unwell or confused to participate.
Recruitment/selection of patients	Over a period of 15 months consecutive acute medical admissions were screened by the first author for eligibility (inclusion criteria). A 50% random sample was examined.
Age, gender and ethnicity	Age - Mean (range): 79.7-80.1 years old. Gender (M:F): 41%/59%. Ethnicity: Not stated
Further population details	1. Dementia: Patients without dementia 2. Frail elderly: Frail elderly (65+ patients). 3. Substance abuse: No substance abuse
Indirectness of population	No indirectness
Interventions	(n=62) Intervention 1: Liaison psychiatry consultation (psychiatric teams based in acute hospital) - Liaison psychiatry consultation. Management by a liaison psychiatric nurse (LPN) supervised in the local Community Mental Health Team for Older People (CMHTOP) plus usual medical care. The LPN assessed patients within 5 days of allocation to intervention arm and formulated a care/treatment plan. The plan addressed psychological and social needs of the patient, and need for antidepressant medication. The LPN monitored the participant's mood, mental state and response to treatment every 2-3 weeks for up to 12 weeks, after which the patient was either discharged back to sole care of their GP or to the CMHTOP. Duration: 12 weeks. Concurrent medication/care: LPN role was not to provide all treatments herself, but to liaise with the medical team, primary care, social services and other agencies as well as informal carers to ensure implementation of appropriate management of the patient in hospital and in the community after discharge. (n=59) Intervention 2: No liaison psychiatry consultation. Participants in the control arm of the trial received usual care. If the medical team recognised that a patient had depressive disorder possible courses of action would include commencement of antidepressants and/or referral to the mental health service or GP for further assessment and monitoring. Duration: 12 weeks. Concurrent medication/care: no other information.
Funding	Academic or government funding (MRC Health Services Research Training Fellowship and a NHS Executive Eastern Research and Development Project Grant)

Study	Cullum 2007[21]
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: LIAISON PSYCHIATRY CONSULTATION versus NO LIAISON PSYCHIATRY CONSULTATION (CONTROL GROUP) Protocol outcome 1: Quality of life - Actual outcome: Quality-adjusted life weeks (QALWs) at 12 weeks; Group 1: mean 9.9 (SD 3.96); n=41, Group 2: mean 8.4 (SD 5.47); n=45; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - High, Outcome reporting - Low, Measurement - Low, Crossover - Low, Comments - Treatment was allocated by block randomisation, stratified by cognitive function and whether or not the patient was already known to the local old age psychiatry service, as these factors may influence outcome.; Indirectness of outcome: No indirectness ; Group 1 Number missing: 21, Reason: 20 patients died and 1 refused; Group 2 Number missing: 14, Reason: 12 died, 1 refused, 1 lost to follow-up Protocol outcome 2: Mortality Actual outcome: Mortality at 12 weeks; Group 1: 20/62, Group 2: 12/59; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Comments - Treatment was allocated by block randomisation, stratified by cognitive function and whether or not the patient was already known to the local old age psychiatry service, as these factors may influence outcome.; Indirectness of outcome: No indirectness Protocol outcome 3: Patients and/or carer satisfaction - Actual outcome: Patient satisfaction at 12 weeks; Group 1: 38/41, Group 2: 29/43; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low, Comments - Treatment was allocated by block randomisation, stratified by cognitive function and whether or not the patient was already known to the local old age psychiatry service, as these factors may influence outcome.; Indirectness of outcome: No indirectness ; Group 1 Number missing: 21, Reason: 20 patients died and 1 refused; Group 2 Number missing: 16, Reason: 12 died, 1 refused, 1 lost to follow-up, partial completion of follow-up interview	
Protocol outcomes not reported by the study	Early diagnosis and treatment; Discharge destination; Admission prevention; Readmission; Avoidable adverse events; Staff satisfaction; Length of stay

Study	Levenson 1992[38]
Study type	RCT (Ward randomised; Parallel)
Number of studies (number of participants)	(n=508)
Countries and setting	Conducted in USA; setting: a large urban academic medical centre
Line of therapy	Not applicable
Duration of study	Intervention time: 15 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: Admitted to general medical teams

Study	**Levenson 1992[38]**
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients with a high Medical Inpatient Screening Test score (high levels of psychopathology or pain)
Exclusion criteria	Unavailable because of early discharge, transfer or death. Did not speak English, too physically ill to undergo a brief interview, unable to give informed consent.
Recruitment/selection of patients	Potential subjects were all patients consecutively admitted between July 1, 1987 and April 30, 1989 to general medical teams. Patients were approached during the first 24-48 hours after admission and asked to participate in a study of the psychological effects of physical illness. After agreeing to participate, subjects were given the Medical Inpatient Screening Test. Anxiety and depression was measured with the 23 questions from the Hopkins Symptom Checklist (SCL-90-R).
Age, gender and ethnicity	Age - Mean (range): 47.8-49.9 years. Gender (M:F): 50%/50%. Ethnicity: Not stated
Further population details	1. Dementia: Patients without dementia 2. Frail elderly: Not frail elderly 3. Substance abuse: No substance abuse
Indirectness of population	No indirectness
Interventions	(n=256) Intervention 1: Liaison psychiatry consultation (psychiatric teams based in acute hospital) - Liaison psychiatry consultation. All high-scoring patients on the intervention teams were assigned to receive a psychiatric consultation which usually occurred with 24 hours. Experimental consultations were provided by 6 different psychiatrists. The consultations were not highly structured but followed a standard clinical format that included chart review, patient interview, and contact with physicians, nurses, and family as appropriate. A standard consultation note was placed in each patient's chart including DSM-III diagnosis. Duration: 15 months. Concurrent medication/care: consulting psychiatrists were not part of the research team and were not informed about the hypotheses of the study. Regular (naturalistic) psychiatric consultation remained available to patients' physicians. If the patient's physician requested a regular consultation and the Medical Inpatient Screening Test triggered an experimental consultation, the patient was seen by the consultant who arrived first. (n=253) Intervention 2: No liaison psychiatry consultation. No liaison psychiatric consultation. Duration: 15 months. Concurrent medication/care: 2 control groups: baseline (high MIST score) and contemporaneous control group. Patients who had high test scores from the intervention and were randomised not to receive consultation were in the contemporaneous control group.
Funding	Academic or government funding (NIMH grant MH-41567)
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: LIAISON PSYCHIATRY CONSULTATION versus CONTROL GROUP (CONTEMPORANEOUS)	

Study	Levenson 1992[38]
Protocol outcome 1: Length of stay - Actual outcome: Length of hospital stay (days) at 15 months; Group 1: mean 14.7 (SD 27.6); n=256, Group 2: mean 16.6 (SD 29.8); n=253; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness Protocol outcome 2: Readmission - Actual outcome: Number of re-hospitalisations at 6-21 months; Group 1: mean 1.24 (SD 2.07); n=256, Group 2: mean 1.43 (SD 2.3); n=253; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness - Actual outcome: Time to next hospitalisation (days) at 15 months; Group 1: mean 146.9 (SD 131.4); n=256, Group 2: mean 176.8 (SD 153.7); n=253; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Quality of life; Discharge destination; Admission prevention; Mortality; Avoidable adverse events; Staff satisfaction; Patients and/or carer satisfaction; Early diagnosis and treatment

Study	Slaets 1997[52]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=237)
Countries and setting	Conducted in Netherlands; setting: Leyenburg Hospital in The Hague, a teaching hospital with 600 beds. The department of general medicine consisted of 4 similar units each with 40 beds. The study was done on 2 units located on different floors in the hospital
Line of therapy	Not applicable
Duration of study	Intervention time: 12 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: General medical wards
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Patient must be 75 years old or older and have been referred to the department of general medicine.
Exclusion criteria	Patients admitted for day treatments
Recruitment/selection of patients	From October 1989 to October 1990
Age, gender and ethnicity	Age - Range: 75-96. Gender (M:F): 29.5%/70.5%. Ethnicity: Not stated

Study	Slaets 1997[52]
Further population details	1. Dementia: Patients without dementia 2. Frail elderly: Frail elderly (75 years and over). 3. Substance abuse: No substance abuse
Indirectness of population	No indirectness
Interventions	(n=140) Intervention 1: Liaison psychiatry consultation (psychiatric teams based in acute hospital) - Liaison psychiatry consultation. Multidisciplinary joint treatment by a geriatric team in addition to the usual care. A team of experts including a geriatrician trained in geriatric psychiatry and a specialised geriatric liaison nurse. The main task of the team was assessment of admission, generating and implementing the treatment plans, and planning and management of discharge. Duration: 12 months. Concurrent medication/care: staff-to-patient ration was increased by 3 nurses in the intervention unit. A weekly multidisciplinary meeting was held, attended by the geriatric team, the nurses, social worker, dietician, psychiatrist, and other occasionally invited consultants. In addition, the geriatric team had their own ward rounds every week. (n=97) Intervention 2: No liaison psychiatry consultation. Usual care consisted of services provided by physicians and nurses in another general medical unit in the same hospital but on a different floor. The staff of the usual care unit (including the attending physicians and resident physicians) were not involved in the care of the patients in the intervention. Duration: 12 months. Concurrent medication/care: due to financial restrictions the collection of data in the usual care unit was limited to 100 consecutive admissions.
Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: LIAISON PSYCHIATRY CONSULTATION versus NO LIAISON PSYCHIATRY CONSULTATION (USUAL CARE) Protocol outcome 1: Length of stay - Actual outcome: Length of stay (days) at 12 months; Group 1: mean 19.7 (SD 14.2); n=140, Group 2: mean 24.8 (SD 23.6); n=97; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Quality of life; Discharge destination; Admission prevention; Readmission; Mortality; Avoidable adverse events; Staff satisfaction; Patients and/or carer satisfaction; Early diagnosis and treatment

Study	Talley 1990[57]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	(n=107)

Study	Talley 1990[57]
Countries and setting	Conducted in USA; setting: conducted at a large, north eastern, urban university hospital where psychiatric liaison nursing had been established for over 14 years.
Line of therapy	Not applicable
Duration of study	Intervention time: 3 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: Admission to an adult medical, surgical, obstetrical or gynaecological unit
Stratum	Overall
Subgroup analysis within study	Not applicable
Inclusion criteria	Assignment of a sitter for at least 1 shift on 2 consecutive days, and admission to an adult medical, surgical, obstetrical or gynaecological unit.
Exclusion criteria	Not stated (assumption: if they did not meet the inclusion criteria)
Age, gender and ethnicity	Age - Mean (range): 20-90+years old. Gender (M:F): 60%/40%. Ethnicity: 77% White, 15% Black, 8% Hispanic
Further population details	1. Dementia: Patients without dementia 2. Frail elderly: Frail elderly (60-90+ years - 60% of patient sample group). 3. Substance abuse: 42% patients suffered with substance abuse
Extra comments	61% of patients admitted was because of an acute medical/surgical event
Indirectness of population	No indirectness
Interventions	(n=47) Intervention 1: Liaison psychiatry consultation (psychiatric teams based in acute hospital) - Liaison psychiatry consultation. Patients assigned to the intervention/experimental group were seen by the psychiatric liaison nurse specialist for the duration of the sitter order. The consultation was individualised to the particular patient situation, and typically began with the reason for sitter request, a review of the chart, and exploration of the staff nurse's view of the patient problem. The patient was then seen for an assessment of: mental status, suicidality, behaviour that harmed others, self or was generally unpredictable. Duration: 3 months. Concurrent medication/care: patients were allocated according to suicidal state: suicidal and non-suicidal. (n=60) Intervention 2: No liaison psychiatry consultation. No PLNS consultation. Duration: 3 months. Concurrent medication/care: patients were allocated according to suicidal state: suicidal and non-suicidal. If PLNS consultation was ordered for a control subject, she or he was dropped from the study in order to receive consultation.
Funding	Study funded by industry (Part funded by Sigma Theta Tau, Melta Mu Chapter)
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: LIAISON PSYCHIATRY CONSULTATION (NON-SUICIDAL) versus NO LIAISON PSYCHIATRY CONSULTATION (NON-SUICIDAL)	

Study	Talley 1990[57]
Protocol outcome 1: Length of stay - Actual outcome: Length of stay (days) – narratively at 3 months; Risk of bias: Narrative data only; Indirectness of outcome: No indirectness Length of stay according to the patient groups investigated (non-suicidal and suicidal). Non-suicidal patients who received the intervention (psychiatric liaison nurse specialist consultation) had a mean length of stay of 21.44 days compared to 25.33 days for non-suicidal patients in the control group. Suicidal patients who received the intervention had a mean length of stay of 16.0 days compared to 9.7 days for suicidal patients in the control group. Protocol outcome 2: Discharge destination - Actual outcome: Discharge to home at 3 months; Group 1: 27/47, Group 2: 36/60; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness Protocol outcome 3: Mortality - Actual outcome: Mortality at 3 months; Group 1: 6/47, Group 2: 6/60; Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness	
Protocol outcomes not reported by the study	Quality of life; Admission prevention; Readmission; Avoidable adverse events; Staff satisfaction; Patients and/or carer satisfaction; Early diagnosis and treatment

Appendix E: Health economic evidence tables

Study	Tadros 2013[56] and Parsonage 2011[44]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CCA **Study design:** Retrospective before and after cohort analysis. **Approach to analysis:** Data was analysed to measure the effect of the intervention on patient length of stay, readmission rates and patient survival post discharge. Case matching was used to control for confounders. Subgroups were analysed by those who had been referred to the intervention and those who were not referred but were managed while the new service was in place and therefore were considered to be influenced by the service. **Perspective:** UK NHS **Time horizon:** 12 months **Treatment effect duration:** Data were measured over 8 months and extrapolated to 12 months. **Discounting:** Costs: NR; Outcomes: NR	**Population:** All emergency admissions aged over 16 with a mental health diagnosis and a length of stay greater than 1 day. **Cohort settings:** N (intervention 1): 2873 N (intervention 2): 3540 Mean age: 36.4 Male: 53% **Intervention 1:** No psychiatric liaison. **Intervention 2:** Rapid Assessment, Interface and Discharge (RAID)	**Total costs (mean per year):** Incremental (2−1)[(a)]: Intervention +£0.8m Bed days: -£3.5m Total: -£2.7m **Currency & cost year:** UK pounds. Year not reported. **Cost components incorporated:** Cost of RAID service and bed days.	**Length of stay (mean per patient):** Incremental (2−1): Saves 38 beds per day. (95% CI: 21 to 42; p=NR) **Length of stay for readmissions (mean per patient):** Incremental (2−1): Saves 22 beds per day. (95% CI: NR; p=NR) **Readmission (RAID referrals only):** Intervention 1: 15 per 100 patients Intervention 2: 4 per 100 patients. Incremental (2−1): Saves 11 admissions per 100 patients. **Readmission (RAID influenced group only):** Intervention 1: 15 per 100 patients Intervention 2: 12 per 100 patients. Incremental (2−1): Saves 3 admissions per 100 patients.	**ICER:** n/a **Analysis of uncertainty:** Monte Carlo sampling was used to estimate a 95% confidence interval of bed days saved. The lower estimate was used as a conservative estimate in the analysis presented. This included bed days saved from readmissions
Data sources				
Health outcomes: Length of hospital stay and readmissions measured using data from City Hospital, Birmingham. **Cost sources:** NR				
Comments				
Source of funding: NR **Applicability and limitations:** Based on a single observational study. The cost analysis results were referenced from another paper, which was not accessible. The number of bed days used in their calculations is reported but cost sources are not. Time horizon is only 1 year and is based on				

extrapolating effects from data captured over 8 months. Mortality and quality of life were not measured and so health benefits are not measured using QALYs.	
Overall applicability:[c] Partially applicable	**Overall quality**[d] Potentially serious limitations

Abbreviations: CCA: cost-consequence analysis; 95% CI: 95% confidence interval; ICER: incremental cost-effectiveness ratio; NR: not reported; QALYs: quality-adjusted life years.

(a) Based on annual bed day savings of £3.5 million and the annual cost of the service of £800,000.

(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: Liaison psychiatry versus control/usual care

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Liaison psychiatry consultation	Control	Relative (95% CI)	Absolute		
Mortality (follow-up 3 months, 8 weeks, 12 weeks, 6-8 months)												
4	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	68/299 (22.7%)	53/309 (17.2%)	RR 1.30 (0.94 to 1.79)	51 more per 1000 (from 10 fewer to 136 more)	⊕OOO VERY LOW	CRITICAL
Length of stay (days) (follow-up 8 weeks. 6-15 months; Better indicated by lower values)												
4	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	579	537	-	MD 1.83 lower (4.53 lower to 0.87 higher)	⊕⊕OO LOW	CRITICAL
Quality-adjusted life weeks (QALWs) (follow-up 12 weeks; Better indicated by lower values)												
1	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	45	41	-	MD 1.5 lower (3.51 lower to 0.51 higher)	⊕OOO VERY LOW	CRITICAL
Patient satisfaction (follow-up 12 weeks)												
1	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	38/41 (92.7%)	29/43 (67.4%)	RR 1.37 (1.1 to 1.72)	250 more per 1000 (from 67 more to 486 more)	⊕OOO VERY LOW	CRITICAL
Health of the Nation Outcome Scale 65+ (score 0-48) (follow-up 6-8 weeks; Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	58	59	-	MD 0 higher (1.75 lower to 1.75 higher)	⊕⊕⊕O MODERATE	CRITICAL
Number of re-hospitalisations (follow-up 6-21 months; Better indicated by lower values)												

1	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	256	252	-	MD 0.19 lower (0.57 lower to 0.19 higher)	⊕⊕OO LOW	CRITICAL
Time to next hospitalisation (days) (follow-up 15 months; Better indicated by lower values)												
1	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	256	252	-	MD 29.9 lower (54.78 to 5.02 lower)	⊕⊕OO LOW	CRITICAL
Readmission at 3 months (follow-up 3 months)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	19/77 (24.7%)	21/76 (27.6%)	RR 0.89 (0.52 to 1.52)	30 fewer per 1000 (from 133 fewer to 144 more)	⊕OOO VERY LOW	IMPORTANT
Discharge to home (follow-up 3 months)												
1	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	27/47 (57.4%)	36/60 (60%)	RR 0.96 (0.69 to 1.32)	24 fewer per 1000 (from 186 fewer to 192 more)	⊕OOO VERY LOW	IMPORTANT

[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.

Appendix G: Excluded clinical studies

Table 7: Studies excluded from the clinical review

Study	Exclusion reason
Abidi 2003[2]	Observational study
Alaja 1995[6]	Observational study
Alaja 1997[4]	Observational study and no extractable outcomes
Alaja 1998[5]	Observational study
Alaja 1999[3]	Observational study
Alberdi 2011[7]	Observational study
Anderson 2005[8]	Observational study
Aoki 2004[9]	Comparison of 2 observational studies
Brakoulias 2006[11]	Observational study
Buckley 1994[12]	Narrative of an observational study
Burton 1991[13]	Incorrect comparison – comparing results after a primary and second consultation
Caduff 2004[14]	Narrative study
Callaghan 2002[15]	Observational study
Carson 1998[16]	Observational study
Clarke 1995[17]	Observational study
Collinson 1998[20]	Observational study
De Giorgio 2015[22]	Observational study
De Jonge 2003[23]	Observational study
Desan 2011[24]	Incorrect study design – quasi-experimental study
Draper 2005[25]	Low quality systematic review
Elisei 2013[26]	Observational study
Fritzsche 2005[27]	Observational study
Gala 1999[28]	Observational study
Gater 1995[29]	Incorrect study design – qualitative with no extractable outcomes
Goulia 2009[30]	Incorrect comparison
Hosaka 1999[31]	Incorrect intervention, observational study
Koopmans 1995[32]	Incorrect intervention – outpatient clinical referral by a general practitioner
Koopmans 1996[33]	Incorrect intervention – outpatient clinical referral by a general practitioner
Kratz 2015[34]	Observational study
Kurlowicz 2001[35]	Observational study
Lamdan 1997[36]	Observational study
Lamprecht 2005[37]	Observational study
Mayou 1991B[39]	Observational study

McCulloch 2007[40]	Observational study
Newton 1990[41]	Incorrect study design – qualitative study
Nogueira 2013[43]	Observational study
Priami 1997[45]	Observational study
Sampson 2009[46]	Observational study
Sampson 2013[47]	Author reply about an irrelevant study
Saravay 1996[48]	Narrative of studies
Schellhorn 2009[49]	Observational study
Schrader 2005[50]	Incorrect intervention
Shepherd 2012[51]	Observational study
Stiefel 2008[53]	No extractable outcomes - outcome reported in study not in protocol
Swanwick 1994[55]	Observational study
Su 2010[54]	Observational study
Tsai 2012[58]	Observational study
Verbosky 1993[59]	Observational study with an incorrect comparison (patients suffering from depression compared with patients without depression)
Wood 2014A[60]	Low quality systematic review

Appendix H: Excluded health economic studies

No health economic studies were excluded.