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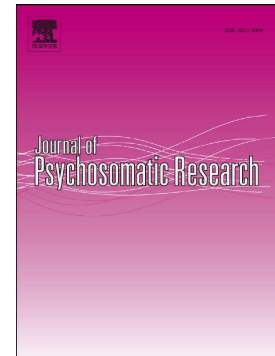


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The impact of different liaison psychiatry models on the Emergency Department: a systematic review of the international evidence

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4 Abstract

7.1 Objective

This review aimed to evaluate the current evidence for what impact different Liaison Psychiatry (LP) services are having on Emergency Departments (ED). Mental Health (MH) problems contribute to 12 million annual US ED attendances and 5% in the UK.

7.2 Methods

Databases were searched for articles describing LP services for adult MH patients attending EDs which reported ED care-related outcomes, published since 2000. Articles were screened and relevant articles quality assessed and narratively synthesized.

7.3 Results

3653 articles were identified and 17 included in the review. Study designs were overall of poor-moderate quality, using retrospective before-and-after study designs.

LP services were categorized into four models. Models with MH personnel integrated into the ED team or triage reduced patient waiting time to be seen, may reduce patients leaving without being seen and have high staff satisfaction. Co-located MH space or personnel reduced patient waiting times. Care agreements with existing psychiatry teams don't affect waiting times or ED length of stay. Transferring patients to external services reduces patients' time in the ED. There is insufficient evidence about patient satisfaction, costs, and onward care.

7.4 Conclusions

Waiting times are shortened by MH personnel integrated into the ED and are more satisfactory to staff than other LP models. The involvement of a psychiatrist in the LP team improves the care quality.

All models may improve safety for patients but most evaluations are of poor quality and therefore there is still insufficient evidence to recommend one service model over another and further robust research is required.

8 Keywords

- Liaison psychiatry
- Emergency department
- Mental health
- Effectiveness
- Evidence review

1 Introduction

Mental health (MH) problems represent an estimated 5% of all UK Emergency Department (ED) attendances¹ and contribute to 12.5% in the USA². The incidence of MH disorder in the US and the rate of presentation to the ED with a MH disorder substantially increased between 2006 and 2013³. Due to inadequate community resources and lack of insurance in the US⁴, for many patients the ED is the last resort or only option in times of MH crisis. It is typically not the most suitable place: staff may lack time, confidence or skill to assess and manage them effectively⁵, the available space is normally not appropriate for these patients' needs⁶ and improper care for these patients has safety implications for staff and patients⁴.

Liaison Psychiatry (LP) is a sub-specialty of multidisciplinary professionals who provide MH care and training in general hospitals, using a variety of staff, spaces and operation models⁷. Only 1/6 UK EDs have access to comprehensive 24/7 LP services as is recommended by the Centre for Mental Health⁷ and MH patients are not receiving care to the same standard as those with physical health problems^{1,9,10}.

Various models of international liaison psychiatry are summarised in table 1.

Table 1 - Table summarising various international models of liaison psychiatry services. US models taken from Halmer et al⁴

Model	In use in....	Operation	Advantages	Disadvantages
ED boarding with psychiatry	USA	Patient evaluated by ED staff for organic cause and then evaluated by psychiatry consultant.	Low cost, easy to implement	Delay in patient evaluation and delivery of care, ED is unsuitable "holding" environment
Area in ED with specialist	USA	Patients can be evaluated by ED	Care delivered more quickly, less	May stigmatise patients, crowding

psychiatric staff		and/or psychiatry staff simultaneously	pressure to move patient on	in ED may impede care
Liaison psychiatry service	UK	Various multi-disciplinary staff see patients in ED following ED staff review and referral	Relatively simple to implement, can refer for onward care	Not always 24/7, can have long waits for care as serve whole general hospital
Psychiatric emergency service (PES)	USA	Facility separate from ED with specialist staff which receive patients from ED or community	Patients can receive care for longer periods (24 hours), potentially reducing admissions	Expensive (Staffed 24/7)

Callaghan et al reviewed the evidence for several of these international LP models in 2003, but concluded that due to poor quality evidence it was not possible to support one model over another¹¹. In 2017, Gopalanakrishna and Malwitz reviewed psychiatric nurses in the ED, finding that they reduced patient waiting times and increased patient and staff satisfaction¹². However, this systematic review did not consider other LP models and most of their articles were qualitative or did not report ED-relevant outcomes.

In order to improve LP services, as mandated by the Department of Health in 2014/15¹⁰, an up-to-date summary of the available evidence of the effectiveness of all LP services is needed to inform commissioners and service leaders about how to optimize LP care for patients.

This systematic review aimed to examine the current quantitative evidence for LP services in international EDs treating adult patients with MH problems in terms of their outcomes impact on EDs and ED patient care.

2 Methods

2.1 Study design

A systematic review of international literature was undertaken, designed based upon Centre for Reviews and Dissemination guidance¹³. The protocol was not registered.

Articles were eligible for inclusion in the review if they studied services for adult patients attending the ED with any mental health problem. Mental health services for paediatric patients are different from those for adults in the UK and USA and therefore paediatric services were outside the scope of

this review. Services were eligible if they evaluated specialist personnel additional to routine ED staff providing care for ED patients – consistent with liaison psychiatry definitions^{7,14} – either in or out of the ED. Studies of relevant EM improvements such as training interventions, new guidelines or assessment tools or other ED based practice were excluded, along with services treating inpatients or focussing on specific patient groups. Studies of telepsychiatry/telemental health interventions for these patients were excluded as this is an increasingly significant body of research which requires a systematic review in its own right.

Articles were included which reported quantitative data on outcomes directly relevant to the ED (e.g. length of stay, time to assessment/disposition), and compared these to control data. Outcomes relating to the patients' ongoing care such as admission rates, follow-up treatments and future patient events were excluded.

Only OECD countries were eligible for inclusion as these were thought to have comparable healthcare systems.

Qualitative and non-English language studies were excluded. It was thought that primary quantitative data would be unlikely to be published in grey literature.

A highly sensitive search strategy was designed in consultation with an information specialist to identify relevant international articles. Scoping searches of the literature helped identify various terms for MH, LP services and EDs.

Data sources included Medline, EMBASE, CINAHL, PsychINFO, Cochrane Database of Systematic Reviews, Cochrane Library of Abstracts of Reviews of Effect and the Cochrane Central Register of Controlled Trials. The initial database search was carried out on 27.09.16, limited to 2000 onwards in order to identify evidence published since and therefore updating on the Callaghan et al review (2003). The resultant articles were screened by one author and any queries were reviewed by two additional authors. An updating search was performed on 30.04.18, excluding articles published before 27.09.16 as these would have been included in the earlier search. No other filters were

applied. Articles from the second search were screened by two authors and queries reviewed by two additional authors.

A full example search strategy is available in Supplementary Materials. Reference lists of included articles were hand-searched by one of the authors. The PRISMA diagram (see Figure 1) and PRISMA checklist **Error! Reference source not found.**) were used to summarise the flow of articles through the review.

Data extraction forms using Microsoft Excel were piloted and refined using three articles. Two independent and blinded authors extracted details of the model's structure and operation, primary and secondary outcomes and conclusions as well as study design, controls used and types of analysis.

2.2 Risk of bias assessment

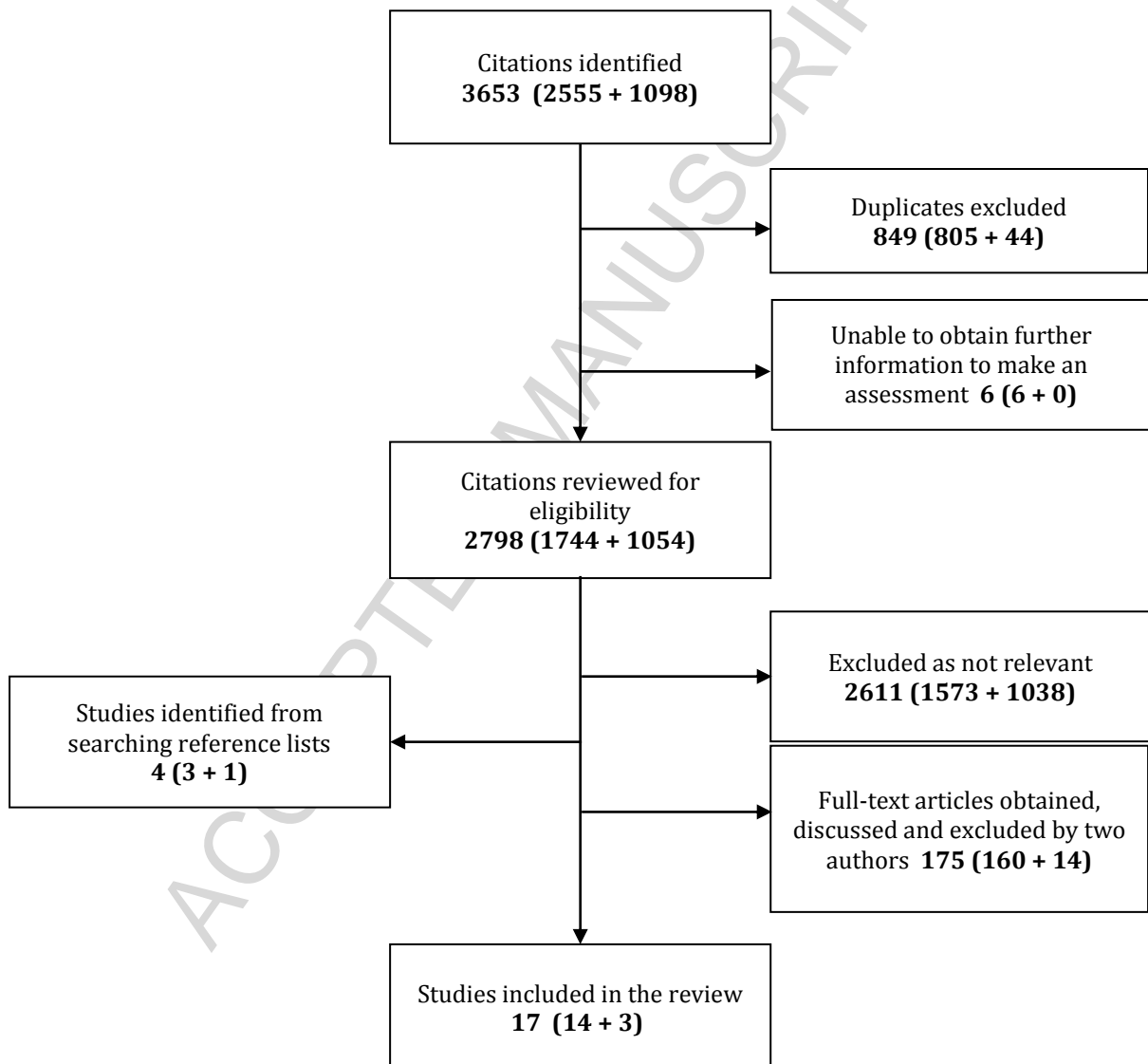
A risk of bias assessment was performed by one author using study-design appropriate Critical Appraisal Skills Programme tools¹⁵. Studies were consequently rated as good/moderate/poor and this was used to determine the significance of their reported outcomes. External validity was judged subjectively by the authors in relation to UK EDs.

3 Results

3.1 Study selection

A total of 3653 articles were identified (2555 from initial searches and 1098 from updating searches). 17 articles describing 17 separate studies of 15 different services were found to be relevant (14 from initial searches and 3 from updating searches, see Figure 1).

Figure 1- PRISMA diagram summarising flow of articles through review



Eight studies utilized before-and-after designs, six studies utilized uncontrolled cohort designs, one cohort design used matched control data. One study was a natural experiment design, one study a cross-over design, and one study reported uncontrolled descriptive statistics. Studies were identified from Australia, Canada, the UK and the USA. Sample sizes ranged from 100 patients to 2715, and study durations ranged from 30 days to 6 years.

One study was found to be of good quality because of robust methodology, large sample size and appropriate statistical analysis¹⁶. Seven studies were moderate quality and nine were poor quality. The results of the risk of bias assessments are summarized in Table 2 (see 8.1).

The 15 services could be categorized into 4 model types: seven services (eight articles) utilized additional personnel integrated into the ED; three services were co-located psychiatry liaison personnel or spaces for patients, three services were novel shared care agreements with existing psychiatric services and two service (three articles) were external specialist units to which MH patients were referred.

Studies used a range of ED-specific outcomes to evaluate the service: waiting times, satisfaction, number of attendances for MH reasons, onward destinations for patients, treatments used, management plans formulated and costs. Waiting times were the most commonly reported outcome (in 13 articles). Outcomes are summarized in Table 3, section 8.2), subdivided by LP model type.

Neither direct comparison between models nor meta-analysis were possible due to model variation, methodological variation and the heterogeneity of reported outcomes. Findings were narratively synthesized.

3.2 Additional personnel integrated into the ED

Eight articles described services with extra specialist mental health staff as part of the full time ED team, who could be called upon to provide mental health care for relevant patients but participated

in ED activities when no patients were in the departments. These were not upskilled ED-trained staff, but were most often mental health nurses. These models incorporated between 1 and 4 staff, working 7-24 hours/day and being involved in patient triage, MH patient assessment, management and referral and liaison with other services. Integrated means they were considered part of the ED team.

Overall, most studies reported positive effects on patient waiting times with integrated personnel in the ED. The largest reduction in average waiting time was seen with a MH care coordinator involved as standard with all referrals to the psychiatry team (reduced by 9.5 hours/patient, $p < .001$)¹⁷. An advanced nurse practitioner in the ED overnight reduced waiting time from 235 to 36 mins¹⁸. This model also integrated the MH professional into the ED patient triage, which may have hastened referrals. A new MH component in the ED patient triage together with an integrated crisis counsellor was found to statistically significantly reduce waiting time for a consultant ($F=13.9$, $df=3$, $p < .001$), 74 to 53 mins (evening), 60 to 52 mins (other hours)¹⁹. It is not clear whether this waiting time reduction of 11-12 minutes was clinically significant (i.e. significant for patients). Three studies reported waiting times but with no control data, therefore no inferences of effectiveness could be made²⁰⁻²².

The only study which found no significant influence on waiting times was community psychiatric nurses responsible for patient assessment, intervention and referral in the UK¹⁶. No inter-study comparisons could be made as studies used different definitions of waiting time.

Two studies reported increases in MH patient attendance post intervention: a care coordinator making referrals and coordinating follow-up reduced median ED visits per patient by 1 in 6 months ($p < .001$)¹⁷ and joint LP/ED staff triage and a MH advanced nurse practitioner noted increased MH presentations 2.9-3.75/night¹⁸. It was not clear if this was a consequence of the intervention or a reflection of changes in the wider ED/society population.

Five studies measured patient or staff satisfaction with the service using questionnaires: all reported high levels of satisfaction. 95% of psychiatrists and 100% of ED staff rated a psychiatric nurse providing patient assessment, management decisions and psychiatrist support “helpful” or “very helpful”²³. >90% ED staff reported that psychiatric nurses providing information and referral/transfer support as well as assisting the psychiatrist with patient evaluations and treatment helped them “a great deal” and 85% reported that the service enhanced patient care “a great deal”²².

Questionnaires showed a reduction in staff perception on unmet MH care needs in the ED with the joint triage and advanced nurse practitioner model (e.g. unmet access needs 79.8%-26.8%, unmet care planning needs 68.5%-6%)¹⁸.

ED staff highly valued the MH liaison nurse referred to from triage management of patients with challenging behaviour (3.7-3.8/4) and their performing mental health assessments (3.8/4) but this did not change significantly post intervention²⁰. ED nurses thought that joint case discussions with the nurses improved their skills²³. Two studies of psychiatric nurses in the ED reported high levels of satisfaction^{16 22} but Sinclair et al noted no significant differences in satisfaction before and after the intervention¹⁶.

Several studies reported service effects on patients leaving without being seen, being discharged from the ED or admitted to various places. Although these do not directly affect the running of the ED, inpatient admissions affect the subsequent flow in the ED and therefore waiting times, and patients leaving without being seen or discharging themselves against medical advice are likely to re-attend or seek healthcare elsewhere and although are generally lower risk patients, their symptoms worsen and they are less satisfied with their care^{23 24} which may affect the ED later down the line.

The joint triage and advanced nurse practitioner service saw a reduction in patients leaving without being seen from 134 to 8 post-intervention, a reduction in patients leaving against medical advice ($\chi^2=5.72$, $df=1$, $p=.17$) and a reduction in the number of patients admitted ($\chi^2=103.49$, $df=2$, $p<.000$)¹⁹. Sinclair et al found that patients using the integrated community psychiatric nurse service

were more likely to be transferred to a MH unit than discharged against medical advice ($p=.001$) or admitted to the general medical ward ($p<.001$)¹⁶. This service also saw a reduction in admissions to the general hospital ward, increases in discharge to the GP and no change in patient re-attendance¹⁶. Wand et al reported that 10% of patients “left at own risk” with a service of MH liaison nurses seeing patients 7 days/week but no comparison data is presented to interpret this²¹.

Only two studies described their service’s impact onto patient safety and/or quality of care. Vingilis et al reported a significant reduction in security involvement post-intervention ($\chi^2=12.66$, $df=1$, $p<.001$) with their new triage tool and crisis counsellor, which may indicate safer care for the patient in the ED¹⁹. 92% of the formulated management plans by community psychiatric nurses in the ED were judged to be appropriate and of good quality (ICD-10 diagnosis provided for 62.5%)¹⁶.

3.3 Models with a co-located psychiatry liaison personnel or spaces for patients

Three studies described models in which a novel specialist team (not integrated into the normal ED team as previous) could be called upon to see mental health patients in the ED or in a bespoke space. These teams comprised mental health nurses, social workers and/or psychiatrists to whom ED staff refer.

A study of the Access Centre, a separate specialised space for MH patients within the ED reported a reduction in mean patient waiting time from 122.5 to 15.1 mins²⁵. 91% of ED referrals to the Rapid Assessment, Intervention and Discharge (RAID) team, which covered the whole hospital including the ED, were seen within 1 hour, on average 24 mins²⁶. However, there was no comparison data and the other reported outcomes pertain to the whole hospital, so evidence for this service’s impact on the ED is weak.

No data was reported for patient or staff satisfaction with these service models.

The number of MH attendances increased during the Crisis Assessment and Psychiatric Emergency Services (CAPES) unit intervention (188 to 231/month)²⁷ but as previously, it was not clear whether this was causally linked or due to confounding factors. Fewer patients were admitted to psychiatric

hospital with the CAPES unit intervention (777 to 573) although it was not clear whether the patient demographics/severity changed during the study period²⁷.

The CAPES unit was associated with reduced elopements from the ED and the Access Centre reported “increased access for MH patients”, though no quantitative evidence was presented for these claims^{25 27}. The RAID model was reported to reduce the “hazard” of readmission by 60% post-intervention for ED and general hospital patients²⁶.

The CAPES unit reported reduced restraint use (5.6/month to 3.2/month) and time in restraints (2.6 to 0.84 hours) in the ED with the CAPES unit²⁷. The appropriateness of restraint use was not clear, nor whether it was physical or pharmacological but this was assumed to mean safer care for patients due to the reduced risk.

3.4 Novel care agreements between ED and existing psychiatry services

Three studies evaluated novel arrangements between ED and existing in-hospital psychiatry specialist services to provide review and care for ED mental health patients. These in-hospital teams included social workers, psychiatrists and psychologists who came to the ED after referral from the ED staff.

These did not substantially affect patients’ length of ED stay²⁷⁻³⁰. Daily rounds by a Psychiatrist in the ED were not associated with significantly reduced lengths of stay for patients²⁸. ED MH patients had to wait for the round each day to see the department’s patients, therefore, waits could conceivably have been up 24 hours. A team of full-time social worker and part-time psychiatrist seeing ED patients on referral (“psychiatric fast-track service”) was associated with reduced time to triage (91.9 to 30.34 mins, 67%, $p=.0232$), non-significant reduction in ED boarding times by 8% and 9% and a reduced overall ED stay by 10 minutes²⁹. Patient co-management (Psychiatric Consultation and Liaison Service”) between ED and psychiatry staff (the psychiatry staff are fully responsible for all psychiatric care) was associated with reduced length of stay but only for patients who were admitted having been “on hold” (detained against their will) (26.1 hours, 95% CI -34.09-18.27,

$p=.001$)³⁰. There was no relationship between the duration of cover of the psychiatry service and waiting times.

No data was reported for patient or staff satisfaction with these service models.

The psychiatrist daily rounds were associated with an increase in patients admitted to hospital, fewer transferred elsewhere and a static number of discharges²⁸. The Co-management/Psychiatric Consultation and Liaison Service did not significantly affect the number of patients leaving without being seen ($n=-26$, $p=.106$, 95% CI -60-5.9)³⁰.

The “psychiatric fast-track service” significantly reduced restraint use ($\chi^2=5.549$, $p=.018$) and “length of stay in restraints” (13.89% decrease, $p=.029$)²⁹. As previous, this may indicate safer care but it had not been adjusted for case-mix.

3.5 External specialist unit

External specialist units are psychiatric services for any emergency mental health patient situated on an independent hospital site staffed by specialists (psychiatrists, nurses, social workers etc. 24 hours/day) to which ED staff (or pre-hospital practitioners) can refer patients. Patients must then wait in the ED for transfer by ambulance once space becomes available and no mental health care is provided in the ED.

Transferring MH patients from the ED to an external unit (Psychiatric Emergency Service, PES) where they receive specialist care was associated with reduced waiting time for psychiatric emergency care compared to the traditional “consultation” LP model ($p<.01$)³¹. Another study of the same service did not report the time to receiving psychiatric care so these results cannot be compared³². Patient transfer to the PES was reported to reduce total time in the ED, but these findings were poor quality because the times were compared to secondary data from another study³². The PES had no significant effect on time to general emergency care or re-attendance rates ($p=.52$)³¹.

The Crisis Assessment Linkage and Management (CALM) model of an MDT assessing and treating ED patients outside the ED reduced ED length of stay by 32% ($p<.001$)³³.

No data was reported for patient or staff satisfaction with these service models.

The CALM model was also reported to reduce admission to psychiatric hospital (58.8% to 50.9% and increase the number of psychiatric consultations (6.6% to 7.3%)³³. The PES did not affect readmission rates within 30 days ($\chi^2=0.42$, $df=1$, $p=.52$)³¹.

There was increased mental state examination completion (49-95%, $\chi^2=52.48$, $df=1$, $p<.01$) and reduced use of restraint and seclusion (15-6%, $\chi^2=4.31$, $df=1$, $p=.05$) and emergency medication (74.0-53.0%), $\chi^2=9.51$, $df=1$, $p=.01$) in the PES which may be indicators of improved quality of psychiatric care³¹. In the PES, care was provided by a specialist team of psychiatrists and nurses and therefore may be of improved appropriateness and safety compared to normal ED care.

Table 1 provides a visual summary of study outcomes compared to the model type.

Table 2 - Table summarising service/model outcomes by model type

Study outcomes	Liaison psychiatry service model			
	Additional personnel integrated into the ED	Co-located personnel or space for patients	Care agreements between ED and existing psychiatry services	External specialist unit
Time to MH assessment – “waiting time”	<p>No increase in patient waiting time was seen with any model of integrated MH personnel. Models with advanced nurses and a “crisis counsellor” respectively significantly reduced waiting time^{18 19}. Otherwise no comparison data reported.</p> <p>MH nurse involvement in undertaking triage or a MH component in the triage criteria was associated with reduced patient waiting time from arrival to being seen^{18 19}.</p> <p>No relationship between the number of hours worked and patient waiting times.</p>	<p>A social worker/MH therapist team reduced mean wait time²⁵.</p> <p>A hospital-wide 24/7 service of multi-disciplinary professionals responded to most ED referrals within 1 hour but there was no comparison data²⁶.</p>	<p>A team of social worker and psychiatrist on-call (“fast-track service”) reduced time to triage²⁹.</p> <p>No relationship between the duration of cover of the psychiatry service and the waiting times.</p>	<p>PES reduced waiting time to psychiatric evaluation compared to the consultation (LP) model³¹.</p>
ED total length of stay/boarding time	<p>A care coordinator as part of standard MH care reduced ED length of stay¹⁷.</p>	<p>No findings reported.</p>	<p>Psychiatrist and psychologist daily rounds in the ED did not significantly reduce length of stay²⁸.</p> <p>The “fast-track service” did not statistically significantly reduce ED boarding times²⁹.</p> <p>Psychiatry/ED staff co-management reduced length of stay for patients who were admitted/discharged having been “on hold” (detained against their will)³⁰.</p>	<p>The PES reduced ED boarding (waiting time) but this data was poor quality³².</p> <p>The CALM model reduced ED length of stay³³.</p>
Cost savings	<p>No findings reported.</p>	<p>No findings reported.</p>	<p>The “fast-track service” claimed to save costs “based on modelling” but no data was reported to support this²⁹.</p>	<p>No findings reported.</p>

Leaving without being seen	Additional psychiatric nurses in the ED overnight reduced the number of MH patients leaving against medical advice, but had no effect on repeat attendances ¹⁶ . A crisis counsellor reduced patients leaving without being seen ¹⁹ .	A specialised area with psychiatry staff reduced psychiatric hospitalisations but only “anecdotal” evidence of reduced leaving without being seen ²⁷ .	Psychiatrist and psychologist daily rounds reported more patients admitted to hospital and fewer transferred. No data for discharges ²⁸ . Psychiatry/ED staff co-management did not significantly reduce patients leaving without being seen ³⁰ .	The PES had no effect on leaving without being seen ³¹ . The CALM model reduced admission to psychiatric hospital ³³ .
Quality of care/use of psychiatric treatments	Additional psychiatric nurses in the ED overnight reviewed 90% patients and made good quality management plans ¹⁶ . A crisis counsellor reduced security involvement ¹⁹ .	A specialised area with psychiatry staff reduced restraint use and time in restraints ²⁷ .	The “fast-track service” significantly reduced “length of stay in restraints” ²⁹ .	Patients in the PES received increased rates of mental state examination and reduced use of restraint, seclusion and emergency medication ³¹ . The CALM model increased the number of psychiatric consultations ³¹ .
Patient satisfaction	Additional MH nurses in the ED overnight had no effect on patient satisfaction ¹⁶ but patients reported “overall” satisfaction with psychiatric nurses in the ED for varying times ²² .	No data reported. No data presented to support claims of patient/staff satisfaction with social worker/MH therapist model ²⁵ .	No findings reported.	No findings reported.
Staff satisfaction	Additional MH nurses in the ED during the day received positive feedback from psychiatry and ED staff ^{18 20 22 23} and may have improved ED staff skills/confidence ²³ . Staff perceived that MH patients’ needs were better met with the MH nursing triage and assessment 7 days/week model compared to no MH assessment service ¹⁹ and that integrated psychiatric nurses were “helpful” ^{22 23} .	No data reported. No data presented to support claims of patient/staff satisfaction with social worker/MH therapist model ²⁵ .	No findings reported.	No findings reported.

4 Discussion

This systematic review provides a contemporary summary of the current different ED LP services and the available quantitative evidence for their impact on EDs. This review supports Callaghan et al's 2003 statement that LP services are welcome additions to EDs¹¹. Specifically, there is evidence that some specific service features are positively effecting waiting times, patient care quality and staff satisfaction. All four service models reduced waiting times, particularly those with personnel integrated into the department, in ED triage or co-located, but not ED length of stay. All four models reduced restraint use or security involvement. Additional MH personnel in the ED were associated with high levels of staff satisfaction. There is weak evidence that additional MH personnel in the ED reduced the numbers of patients leaving without being seen.

Additional personnel in the ED and external specialist units had better outcomes than the other models. However the evidence is largely poor-moderate quality and it is not possible to endorse any model over another. There was insufficient data to determine cost implications of the models.

4.1 Waiting times

This review found the most evidence for LP services' effects on waiting times: almost all studies reported this outcome. This may be because it is relatively easy data to collect and/or statistically analyse or that some determine this outcome to be the service's most important effect. It is certainly important for patients: McCullumsmith et al reported that patients with MH problems spend 42% longer in EDs (on average > 11 hours) than those with physical problems³⁴.

Unfortunately, due to the heterogeneity in time definitions (arrival-triage, arrival-being seen, triage-being seen, etc.) meta-analysis or direct comparison was not possible. Integrated or co-located personnel or their involvement in triage may reduce waiting times because MH personnel can more quickly and accurately identify MH issues than typical ED triage staff. It is also logical that staff who have to be paged from outside the department would take longer to arrive and see the patient.

Dedicated personnel are likely to have greater expertise/experience and therefore evaluate emergency psychiatry problems more rapidly than ED staff. However, it may be costlier to have the personnel in the department at all times. Further, if there were multiple patients at any one time and only one practitioner, waiting times would increase regardless of practitioner integration.

Waiting times may also be affected by available space for assessment, not exclusively available staff. EDs generally lack appropriate space for MH patients⁶. In a literature review and focus group study Aitken et al recommended that LP teams be based in hospitals “close to EDs” to facilitate referrals and good working relationships¹. The UK National Institute for Health and Clinical Excellence recommends that for MH patients in the ED there should be “an environment that is safe, supportive and minimizes any distress...this may be a separate, quiet room”³⁵.

Services with specialised spaces (external or co-located) to take MH patients from the ED (CALM, PES, CAPES) reduced waiting times and improved patient care. Time spent in the ED is not an appropriate quality measure for external units as patients are simply moved elsewhere to wait. Time to psychiatric assessment is more useful. Improved care however may result from specialists (these services involved psychiatrist review) seeing patients in dedicated spaces. In the ED, staff do not have sufficient training or confidence to assess MH patients³⁶.

There was no discernible relationship between the number of hours worked and patient waiting time; for example, studies with the longest duration of practitioner cover did not have the greatest reduction in waiting times^{16 21}. Service models had varying effects on ED length of stay but these were not relevant to UK EDs because reported waits largely exceeded the four-hour target.

4.2 Care quality

Care for MH patients was safer and more appropriate when a psychiatrist was involved, regardless of venue. Restraint, seclusion or emergency medication are strategies for managing patients’ acute behavioural disturbance but should only be used as a last resort because of their potential to significantly harm the patient³⁷. Because of their increased experience, psychiatrists may be able to

employ alternative safer forms of de-escalation instead. Increased completion of mental state examinations and formation of “good quality” management plans suggest that patients receive a more complete assessment and more appropriate treatment, compared to care from ED clinicians. Notably, services incorporating non-medical staff such as social workers or care coordinators had favourable outcomes^{29 30} suggesting that a variety of disciplines within the LP team is of value. A significant amount of the LP service’s role is liaison with other services and this job may be done effectively and more cheaply by non-medical staff. There is insufficient evidence for the optimal composition of the LP team.

Some services with additional MH personnel reduced the number of MH patients leaving without being seen, which may have benefits for the patients’ symptoms and satisfaction with care²⁴. MH patients tend to arrive in the evenings and overnight³⁸ and so it may be expected that outcomes were better in models with out of hours’ provision. However, there was no discernible association between the number of MH liaison staff or the hours they work and outcomes.

4.3 Satisfaction

There is good evidence that ED and psychiatry staff value additional integrated MH personnel, which is consistent with Callaghan et al’s 2003 finding that staff value the LP service¹¹. in contrast to the variable response rates and mixed feedback found in the general hospital setting³⁵. ED staff may value MH professionals’ support in the ED as MH patients may be of higher acuity and volume compared to in the hospital, or that as the site is smaller staff get to know one another. Patient satisfaction was high but no different before and after the intervention¹³. Only one study reported patient satisfaction outcomes as in Callaghan et al’s review. Mental health service user satisfaction is notoriously difficult to measure: there are few accepted satisfaction scores, patient recruitment is difficult and responses may be biased^{39 40}. Patient satisfaction may be reduced by a lack of dedicated waiting/treatment area¹⁶. Callaghan et al also noted a lack of LP research incorporating users’ views in their review of earlier LP research¹¹.

4.4 Limitations

Overall, these pragmatic, largely retrospective, before-and after-study designs are of poor quality and the comparison service is rarely described. This limits the validity of each study's findings and therefore there is insufficient evidence for any particular LP model reducing patients' length of stay, providing cost savings or enhancing patient satisfaction. Other reviews and reports of LP psychiatry services have similar findings^{17 11 41 42}. This suggests that, despite the substantial amount of policy and guidance for LP services, particularly in the UK⁴², LP is not considered a research priority and the policy is not evidence based. We acknowledge that research in this field is hampered by inconsistent control groups, heterogeneous services, patients and outcome measures and by practical challenges of conducting high quality studies in the natural environment of EDs.

The deductions in this review are based only on narrative synthesis. Many articles only report descriptive statistics without statistical analysis for significance. Meta-analysis was not possible due to differences in measurements. This review is likely to have been influenced by reporting and publication bias: LP models with negative outcomes may not have been reported. This search strategy did not include any grey literature which may miss clinically important but not peer-reviewed data.

4.5 Recommendations for future research

There is widespread recognition and motivation to improve MH services for ED patients but the conclusions from this review are limited by the paucity and heterogeneity of data available. No one LP service is shown to be more effective than another. Callaghan et al found a similar lack of evidence 15 years ago¹¹. This is a disservice to the mental health patients using our emergency departments and should be a call to arms for the robust evaluation and quality improvement of LP services.

Future evidence-based improvements to LP depend upon continued evaluation of existing services but this needs to be uniform and comparable. It is recommended that further LP evaluations utilise

Fossey and Parsonage's guidance for evaluating LP services to ensure quality, rigorous evaluations that are comparable between service models⁷.

Studies of LP services and for example, guidance for implementing the UK "RAID" model focus heavily on workforce make-up and hours of service⁴³. What may lead to more effective services is a deeper understanding of which specific service components are of value to patients in crisis in the ED, for example a safe space or carer support. This could be achieved through in very feasible depth case study research. Further, qualitative exploration of the LP service and its patients, carers, MH staff and ED staff, in terms of their needs, wants and challenges would enhance These types of research would help to ensure that future services are appropriate and sustainable.

4.6 Conclusion

Although there is some evidence for patient waiting time and staff satisfaction benefits of MH staff working in EDs and that external psychiatric units deliver reduced waiting times and higher quality of care in the US, there is limited evidence to determine the most effective LP model. More high quality research (including qualitative and case study research) is required to robustly determine what structure (including staffing, hours, types of care provided, space, education and costs) of LP service is most effective in the ED.

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None to declare

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8 Tables

8.1 Table 2 – Summary of article risk of bias assessment

Table 3 - Table summarising the study designs and quality of the included studies

First author; year (citation number)	Clearly focused question?	Appropriate and robust methodology?	Study duration; patients receiving intervention	Identified and accounted for confounding?	How precise are the results; are they believable?	How useful are the results?	Quality rating
Burian; 2014	No. Very broad aims that were not answered by study	No. Questionnaire evaluation only.	12 months; 3784	No. Accounting for patient variation and questionnaire responses may be biased.	Descriptive statistics only.	Detailed description and applicable to UK but lack of detailed evaluation.	Poor
Blumstein; 2013	No. Hypothesis stated that intervention would reduce length of stay.	Yes. Natural experiment with “washout” period using routine hospital data	15 months; 512	No. Some attempt to keep other care constant.	Reduced length of stay. Adequate precision and consistent with other evidence.	Not applicable to UK as only for patients in the ED >10 hours and patients with ICD 10 diagnoses.	Moderate
Clarke; 2005	No. None stated.	No. Mixed methods cohort study with no plan given or control used.	12 months; 3147	No.	Descriptive statistics only and limited data presented.	Good service information given and applicable to UK.	Poor
Lauer; 2008	No. None stated.	No. Cohort study with few outcomes reported and no control.	12 months; 1161	No.	Descriptive statistics only.	Would be of value to have specialised area in ED for MH patients.	Poor
Lester; 2018	Yes. Achieved aims.	Yes. Retrospective before-and-after.	6 months; 2387	No.	Logarithmic transformation inappropriate.	Could be applied to UK EDs although lengths of stay are still over 7 hours.	Moderate

McDonough; 2004	Yes. Clear objectives.	Yes. Prospective before-and-after. Clear methods, long duration, small sample size.	12 months; 604 (803 occasions)	No.	Reduced time to being seen. Descriptive statistics only.	Incorporation of MH into triage may be of value and has no cost.	Moderate
Ngo; 2017	Yes, clear aim to evaluate by length of stay/ED visits	Yes. Retrospective before-and-after using patient's own data as control.	14 months; 524	No. Potential influence of regression to the mean	Reduced no of ED visits and length of stay using appropriate statistics.	Incorporation of a non-clinical team member (administrative duties) may improve patient care	Moderate
Nielson; 2008	No. None stated.	No. Cohort study with few outcomes reported and no control.	12 months; 38/month (mean)	No.	Reduced time to being seen. Descriptive statistics only.	Useful to reduce waiting time but poor study.	Poor
Okafor; 2016	No. Quality improvement only	Yes. Retrospective before-and-after. with intention to treat.	17 months; 4867	No.	Appropriate statistical analysis but not enough evidence for all claims.	Small reductions in length of stay unlikely to be clinically important.	Moderate
Polevoi; 2013	Aims to "evaluate model"	No. Secondary analysis of prospective cohort data, before-and-after.	41 months; 831	No.	Appropriate analysis but results not clinically important.	May not be representative population: long duration of stay in the ED (>13 hours) and many patients admitted.	Poor
Sinclair; 2005	Yes. Clear hypothesis.	Yes. Prospective cross-over study at two sites with large samples. Mixed methods evaluation.	12 months; 1627	Factors identified and attempts made to mitigate.	Appropriate statistical analysis, significant results.	Set in UK, shortened wait time statistically significantly associated with seeing MH nurse, therefore applicable.	Good
Tadros; 2013	Aimed to "evaluate", including for cost savings.	No. Retrospective before-and-after study.	16 months; 1372	Matched cohorts to avoid influence of poor coding/missing information	Reduced waiting times and increased MH problem detection (diagnostic bias?)	Not enough results specific to the ED so not very useful.	Poor

Vingilis; 2007	Aimed for an evaluation of "process and outcome"	Yes. Prospective before-and-after study, mixed methods. No control. Changed role of therapists during study.	6 years; 1532	Authors acknowledge a lack of adjustment for confounding.	Improved patient experience is supported by qualitative data.	Positive impact of counsellor in ED, may be more useful in the evenings.	Moderate
Wand; 2004	Aim to evaluate the nursing model.	No. Retrospective mixed-method cohort study over one year. No control.	12 months; 600	No.	Yes precise but no comparison group so cannot interpret.	Results are not meaningful and model is not novel.	Poor
Wand; 2015	Not clearly stated.	No. Cohort retrospective questionnaire, no control.	12 months; 1923	No. Selection bias: recruited only patients staff thought to be suitable.	Descriptive statistics but cannot be interpreted without comparison data.	Results are not meaningful and model is not novel.	Poor
Woo; 2007	Clear aim to evaluate outcome compared to "consultation model"	No. Retrospective review of notes, before-and-after. Small, specific patient group.	? 1 year – not clear; 3523 (results from sample of 100)	Patient sample matched by demographics to control group.	Clear results with appropriate statistical analysis.	Only "involuntary" patients – i.e. held against their will because seriously unwell.	Moderate
Zeller; 2014	Service evaluation only	No. Small sample, 30 day period only and control data collected for another study.	30 days; 144	No	Report time awaiting transfer only.	Specific patient group and model dissimilar to UK EDs	Poor

8.2 Table 3 – Study characteristics

Table 4 - Table summarising the Liaison Psychiatry models and their outcomes

Article, year, country	Model title Personnel	Referral Method <i>Integrated into ED team?</i>	Action <i>Hours worked</i>	Study duration <i>No of participants</i>	Outcomes (quantitative only)
Models with additional personnel integrated into the ED for MH patients					
Burian et al, 2014, Germany ²³	ED psychiatric consultation-liaison service <i>1 experienced psychiatric nurse</i>	Referred by ED staff or GPs <i>Yes</i>	Assessment of patients, management decisions with psychiatrist and support/education of ED staff <i>0800-1600 weekdays</i>	12 months <i>3784</i>	95% of psychiatrists and 100% of ED staff rated the service “helpful” or “very helpful”. 77% ED nurses thought that their skills had improved through joint case discussions.
Clarke et al, 2005, USA ²²	Psychiatric Emergency Nurses in the ED <i>2 nurses with psychiatric experience and 2 psychiatric nurses</i>	Referral from ED triage <i>Yes</i>	Patient communication and information provision, assisting psychiatrist with evaluations and treatment and organising referrals/admissions <i>12-20 hours/day over 5 sites</i>	12 months <i>6147</i>	ED staff: >90% reported that service helped them “a great deal”. 85% reported that service enhanced patient care “a great deal”. Patients: patients all reporting “overall satisfaction” with service. Patient wait time to be seen = 1.8 hours, length of ED stay 11.2±7.8 hours if admitted, 8±6.8 hours if discharged.
McDonough et al, 2004, Australia ¹⁸	ED MH triage and consultancy service <i>1 advanced nurse practitioner</i>	Joint MH & ED staff triage <i>Yes</i>	Triage, review and/or refer patients <i>2100-0730 7 nights</i>	12 months <i>604</i>	Increase in MH presentations 2.9 to 3.75 /night. Reduction in average waiting time for MH review 235 to 36 mins. Reduction in patients leaving without being seen: 134 to 8. Marked reduction in ED staff perception of unmet MH care needs post intervention: e.g. unmet access needs 79.8%-26.8%, unmet care planning needs 68.5-6%, unmet ongoing management needs 74.5-26.5%
Ngo et al, 2017,	Community and Hospital	Standard of care	Making referrals, coordinating	14 months	Reduction in median ED visit /patient by 1 (in 6 months,

USA ¹⁷	Medical Record Integration <i>1 care coordinator</i>	for those referred to psychiatry team Yes	placements and follow up <i>Not documented</i>	524	p<.001). Reduction in ED length of stay/patient by 9.5 hrs (p<.001). No significant change in number of hospitalisations.
Sinclair et al, 2006, UK ¹⁶	Specialist psychiatric nursing intervention <i>4 experienced community psychiatric nurses</i>	ED staff refer Yes	Assess patients, deliver intervention and refer <i>130 hours/week, mainly 1200-0800</i>	12 months 1627	90% of referred patients were reviewed. 92% of formulated management plans were judged to be appropriate and of good quality (ICD-10 diagnosis provided for 62.5%). No significant difference in average waiting times pre-post-intervention: reduction in waiting time to be seen at site 1 only (11mins, not clinically significant). ED attendance and seeing psychiatric nurse significantly associated with shorter waiting times for MH patients (p<.001). Increase in patients discharged to GP at 1 site. No significant differences in the number of repeat attendances to A&E by patients with mental health problems were detected between intervention and non-intervention periods of the study at either site. Reduction in admissions to general hospital ward, increase in discharge to GP. MH patients more likely to be transferred to MH unit than discharged against medical advice (p=.001), referred to an outpatient clinic (p=.027) or admitted to general hospital ward (p<.001). Patients satisfaction high and no significant difference pre-post intervention (no data reported).
Vingilis et al, 2007, Canada ¹⁹	New triage tool and MH crisis counsellors <i>1 MH crisis counsellor (nurse)</i>	New triage tool with MH component <i>Not clear, likely yes.</i>	Triage patients and provide social support and MH assessment <i>1600-2300 6 days/week</i>	6 years 1532	Reduction in mean wait times for a consultant (F=13.9, df=3, p<.001), 74 to 53 mins (evening), 60 to 52 mins (other hours). Significant reduction in security involvement post-intervention ($\chi^2=12.66$, df=1, p<.001). Reduction in patient leaving against advice ($\chi^2=5.72$, df=1, p=.017) and patients admitted, from 277 to 57 ($\chi^2=103.49$,

df=2, p<.001).

Wand, 2004, Australia ²⁰	MH liaison nurse <i>1 MH nurse</i>	ED staff refer from triage Yes	Review, manage and refer patients <i>0800-1630 5 days/week</i>	12 months <i>600</i>	ED staff highly value MH nurse management of patients with challenging behaviour (3.7-3.8/4) and performing mental state assessments (3.8/4), no significant change post-intervention. >78% of ED staff report that the MH nurse positively influences: readily available MH consultation, management of difficult presentations, support for patients, liaison with psychiatry teams and MH units. 40% patients seen within 1 hour, 54% < 3 hrs (from triage).
Wand et al 2015, Australia ²¹	MH liaison nurses <i>1 MH nurse practitioner and 3 nurse specialists</i>	ED staff refer from triage Yes	Review, manage and refer patients <i>0730-2200 7 days/week</i>	12 months <i>1923</i>	During MH nurse hours, patients seen within 1 hour 55%, 75% <2 hrs (from arrival). 70% patients referred for ongoing care on discharge. 10% "left at own risk" and n=7 patients did not wait to see a doctor after MH nurse review. No comparison data.
Models with a co-located psychiatry liaison personnel or spaces for patients					
Lauer et al, 2008, USA ²⁷	Crisis Assessment and Psychiatric Emergency Services units (CAPES) <i>Specialised area in ED for MH patients to go, 2 psychiatric nurses, MH associate and psychiatrist</i>	Not detailed Yes	Assess and manage MH patients and plan onward care <i>Not detailed</i>	5 months, but varied months <i>1161</i>	Reduction in elopements from ED (anecdotal evidence of association). Increased number of MH patients seen from 188/month to 231/month. Reduction in restraint use 5.6/month to 3.2/month. Reduction in time in restraints from 2.6 to 0.84 hours. Reduction in psychiatric hospital admissions from 777 to 573 in total.
Nielson and Klein, 2008, USA ²⁵	Access Center <i>2 social workers, 2 MH therapist, no detail about venue</i>	Patients self-refer or ED staff refer No	Complete assessments and referrals for patients <i>24/7 – staff not always on site</i>	12 months <i>Mean 38/month</i>	Reduction in mean patient wait time from 122.5 to 15.1 mins. No evidence presented for statements; "increased access for non-crisis MH patients" and "provision of services...now occurs within time limits acceptable to both patients and the medical staff".

Tadros et al 2013, UK ²⁶	Rapid Assessment, Intervention and Discharge (RAID) service <i>MDT of nurse, psychiatrist, psychologist and physician</i>	ED or hospital ward staff refer <i>Yes</i>	Supervise MH interventions and train staff <i>24/7</i>	16 months <i>1372</i>	91% of ED referrals were assessed within 1 hour, average 24 mins. Highly significant patient survival compared to control (p<.001) and RAID reduced "hazard" of readmission by 60% (4/110 from 15/100), relating to ED and general hospital patients.
Models with novel care agreements between ED and existing Psychiatry services					
Blumstein et al, 2013, USA ²⁸	Psychiatry daily rounds <i>Psychiatrist and psychologist</i>	No referral <i>No</i>	Medication and care plans for patients > 12hours in ED <i>Daily ward round</i>	15 months <i>512</i>	Non-significant reduction in ED length of stay for patients with longest boarding times. Increase in patients admitted to hospital, fewer transferred elsewhere, static number of discharges.
Okafor et al 2016, USA ²⁹	"Psychiatric fast-track service" <i>MDT of clinical social worker and psychiatrist</i>	No details reported <i>Yes</i>	Assess and manage patients and make follow up plans <i>Social worker "daytimes", psychiatrist 16 hours/week</i>	17 months <i>4867</i>	Reduced time to triage by 66.98% (p=.023) and ED length of stay by 4.31% (p=.248). Reduced psychiatry length of stay (9.37%, p=.043) and reduced restraint use ($\chi^2=5.549$, p=.018) and significantly reduced "length of stay in restraints" (13.89% decrease, p=.029) attributed to ED-initiated intervention. Non-significant reductions in time from admission disposition to departure, time from disposition to discharge and total ED length of stay. Estimated cost-saving from several factors based on modelling.
Polevoi et al, 2013, USA ³⁰	"Psychiatric consultation and liaison service" <i>MDT of ED social worker, psychiatrist and resident</i>	ED staff refer <i>No</i>	"Co-management" with ED staff: psychiatric team fully responsible for all aspects of psychiatric care <i>7 days/week, hours not reported</i>	41 months <i>831</i>	ED length of stay reduced by 22% for patients admitted for psychiatric care (p<.005, 95% CI 15-28%). No reduction in time to medical clearance. Reduction in ED length of stay for those on "hold" (sectioned) and then discharged from ED (26.1hours, p<.005, 95% CI -4.09 - -18.26). No significant reduction in patients leaving without being seen (n=26, p=.106, 95% CI -60-5.9) No change in patient dispositions.

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Models with an external specialist unit					
Lester et al, 2018, USA ³³	Crisis Assessment Linkage and Management (CALM) <i>Weekdays: 1 social worker, 1 psychiatric nurse with 1 supervising psychiatrist. Weekend: on-call psychiatry cover</i>	If medically clear, refer from ED triage. Clinician can refer once medically clear <i>No</i>	Patient assessments, treatments and planning for onward care	6 months 2387	Reduced ED length of stay by 32% (p<.001). Reduction in admission to psychiatric hospital 58.8% to 50.9%. Increased number of psychiatric consultations 6.6% to 7.3%.
Woo et al, 2007, USA ³¹	Psychiatric Emergency Service (PES) <i>External unit fully staffed with specialist psychiatric staff</i>	Not clearly described <i>No</i>	All aspects of care for acutely psychiatrically unwell. 24/7	? 1 year – not clear. 3523 (results from sample of 100)	Significantly reduced waiting time for psychiatric emergency care 639 to 330 mins ($\chi^2=5.00$, df=167, p<.01). Significantly increased completions of mental state examination (49-95%, $\chi^2=52.48$, df=1, p<.01), pregnancy testing (52.3-73.5%, $\chi^2=4.49$, df=1, p=.05) and reduced use of restraint and seclusion (15-6%, $\chi^2=4.31$, df=1, p=.05), emergency medication (74.0-53.0%), $\chi^2=9.51$, df=1, p=.01) and elopements (13-5%, $\chi^2=3.91$, df=1, p=.05) No significant difference in follow-up care (58-69%, $\chi^2=2.61$, df=1, p=.11) or readmission rates within 30 days (28-24%, $\chi^2=0.42$, df=1, p=.52).
Zeller et al, 2014, USA ³²	Psychiatric Emergency Service (PES) <i>Psychiatrists, nurses “and other affiliated personnel”</i>	ED staff refer or direct in ambulance <i>No</i>	As Woo et al 2007 and “patients receive intensive treatment”. 24/7	30 days 150	ED boarding time reduced from 10 hrs 03 min to 1 hr 48 min. No data for waiting times once patient arrives at PES. 24.8% admitted to inpatient psychiatric services.

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Title

“The impact of different liaison psychiatry models on the Emergency Department: a systematic review of the international evidence”

Highlights

- There is insufficient evidence for emergency department liaison psychiatry services
- Liaison psychiatry is of value to emergency department patients and staff
- Practitioners integrated into departments or in triage reduce waiting times
- Specialised spaces and psychiatrists in liaison psychiatry teams are also of value
- Routine rigorous evaluation of services using standardised outcomes is recommended