

BMJ Open Behavioural mental health interventions delivered in the emergency department for suicide, overdose and psychosis: a scoping review

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ABSTRACT

Objective To identify and describe evidence on brief emergency department (ED)-delivered behavioural and care process interventions among patients presenting with suicide attempt or acute ideation, substance overdose or psychosis.

Design We employed a scoping review design and searched multiple data sources, clinical trial registries and references lists through March 2023. We included English-language trials and rigorously designed observational studies. In alignment with scoping review guidelines, we did not assess the quality of included studies or rate the strength of evidence of intervention effectiveness.

Population Our population of interest was adults presenting to the ED with suicidality (eg, attempt or acute ideation), any substance overdose or acute psychosis from a primary mental health condition.

Intervention We included studies of brief behavioural or care process interventions delivered in the ED.

Outcome measures Health outcomes (eg, symptom reduction), healthcare utilisation and harms.

Results Our search identified 2034 potentially relevant articles. We included 40 studies: 3 systematic reviews and 39 primary studies. Most studies (n=34) examined ED interventions in patients with suicide attempt or suicidal ideation, while eight studies examined interventions in patients with opioid overdose. No studies examined ED interventions in patients with acute psychosis. Most suicide prevention studies reported that brief psychological, psychosocial or screening and triage interventions reduce suicide and suicide attempt following an ED visit. Most clinical trial interventions were multicomponent and included at least one follow-up. All substance overdose studies focused on opioids. These studies often contained medication and referral or consultation components. Multiple studies reported increases in substance use disorder treatment utilisation; evidence on repeat overdose events was limited.

Conclusions A wide range of multicomponent ED-delivered behavioural health interventions for suicidality and opioid use disorder show short-term improvement on primary outcomes such as suicide reattempt. Few studies on non-opioid substances and psychosis are available.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This scoping review summarises behavioural and care process emergency department (ED) interventions for acute mental health events not covered in previous systematic or scoping reviews.
- ⇒ This scoping review updates evidence summaries on brief ED suicide interventions from outdated systematic reviews.
- ⇒ Practising ED clinicians guided the research questions so that this review could inform ongoing care improvement.
- ⇒ The broad range of populations, interventions and outcomes included in this scoping review allows us to identify opportunities for targeted systematic reviews and knowledge gaps for future primary studies.
- ⇒ The scoping review design did not include risk of bias assessment, preventing us from synthesising the reported effectiveness of relevant interventions.

BACKGROUND

Suicide and substance overdose are major public health concerns,^{1 2} for which care from the emergency department (ED) is frequently sought. As of 2020, a mental health emergency was among the ten most common reason for an ED visit in the USA.³ In 2022, the rates of non-fatal overdose presenting the ED were 180 per 100 000 and the rate of suicidal ideation was 400 per 100 000.^{4 5} In addition to suicide and substance overdose, psychosis is an acute mental health event for which emergency services are often needed.⁶ The ED is a critical healthcare touchpoint for individuals experiencing these events, and for some, it serves as their initial contact with healthcare services.

Discharge from the ED following an acute mental health event is considered a high-risk period during which symptoms may reemerge.⁷ To limit this risk assessment, brief screening and/or referral interventions delivered or initiated in the ED are

used to more effectively link individuals from inpatient to outpatient services.^{8,9} Given the high priority of suicide prevention and substance use disorder (SUD) treatment in many health systems, including the US Department of Veterans Affairs (VA),^{10,11} and the dire public health need to provide both medical and mental health services in the ED context, we aimed to identify and describe available evidence on brief ED-delivered interventions among patients presenting with suicide attempt or acute ideation, substance overdose or psychosis. Because there is a large and methodologically complex evidence based on this topic and a need to understand the landscape of emergency behavioural health, we chose to conduct a scoping review that could identify opportunities for targeted systematic reviews, as well as knowledge gaps to be addressed with future research efforts.

METHODS

This review is derived from a report produced by the VA Evidence Synthesis Programme that was intended to inform VA policy-making in the area of emergency medicine.¹² The following questions, which were developed in consultation with a panel of clinicians and researchers in emergency medicine and mental health, were the focus of the review:

1. What studies have examined the effectiveness and harms of ED and urgent care centre screening, referral and management interventions for adults with acute mental health events (eg, suicidality, substance overdose or psychosis)?
2. What patient factors (eg, demographics, comorbidities, symptom severity), intervention features (eg, modality, duration, family involvement), or ED and urgent care centre setting characteristics have been identified as moderators of intervention effectiveness?

As a scoping review, the review protocol was not registered. We followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews guidelines (see online supplemental table S1) for a checklist of reporting items.

Patient and public involvement

No patients or members of the public were involved in the conception or completion of this review.

Study eligibility criteria

We included studies enrolling adults presenting to the ED or urgent care centre with suicidality (ie, attempt or acute ideation), substance overdose (opioids, alcohol, methamphetamine, kratom or benzodiazepines), or acute psychotic symptoms for conditions which psychosis which was primary diagnosis and was not secondary or due to another medical condition or medication. We included brief mental health intervention that included screening or risk assessment; triage; referral to inpatient, residential or outpatient settings; behavioural interventions (eg, safety planning, lethal means counselling, caring

contacts); or treatment of agitation related to substance withdrawal. Included studies must have reported on engagement in outpatient, residential or inpatient mental healthcare; severity of acute symptoms (suicidality, severity of psychosis, etc); ED or urgent care centre outcomes (eg, boarding times, ED utilisation), patient or staff safety outcomes (eg, self-directed violence attempts in ED) or adverse events or harms of interventions. We included studies of randomised clinical trials and observational research which examined the aforementioned interventions and outcomes.

Legal hold interventions, medication comparative effectiveness trials, primary medical interventions and cardio-pulmonary stabilisation (eg, airway management), and critical care management of use of reversal agents (eg, naltrexone) were excluded because they were outside the scope of this behavioural and care process focused review.

Data sources and searches

To identify articles relevant to the key questions, a research librarian searched Ovid MEDLINE, Ovid PsycINFO, CINAHL and ClinicalTrials.gov, as well as Agency for Healthcare Research and Quality, Cochrane Database of Systematic Reviews and Health Services Research and Development databases through March 2023 using terms for emergency department, suicide, overdose and psychosis (see online supplemental table S2 for complete search strategies). We limited the search to published and indexed articles involving human subjects available in the English language. We limited the search of systematic reviews within the last 7 years, while the primary literature was unlimited by publication date. Study selection was based on the eligibility criteria described above. Titles, abstracts and full-text articles were reviewed by one investigator and checked by another.

Data abstraction and synthesis

All data abstraction was first completed by one reviewer and then checked by another; disagreements were resolved by consensus or discussion with a third reviewer. We used a standardised format to abstract relevant data, including details on the study population (ie, mental health condition, treatment setting, timing and demographics), intervention (ie, description of experimental practice, mode of delivery and interventionist/provider), comparator and outcomes (ie, description of outcomes reported and results for studies with comparators). Because we did not synthesise the findings of included studies, studies were not assessed for risks of bias. We analysed evidence narratively and in tables, describing patterns in available evidence and knowledge gaps to be filled by future research.

RESULTS

The literature flow diagram (online supplemental figure S1) summarises the results of the study selection process.

Table 1 Systematic reviews on ED interventions for suicide attempt

Study	Population	Intervention(s)	Included studies	Conclusions/recommendations
Inagaki 2015 ¹³	Patients admitted to the ED for suicidal behaviour	Any intervention to prevent repeat suicidal behaviour	24 RCTs	Active contact and follow-up type interventions were effective in preventing a repeat suicide within 12 months (N=5319; pooled RR=0.83, 95% CI (0.71 to 0.97)). However, the effect at 24 months was not confirmed (N=925; pooled RR=0.98, 95 CI (0.76 to 1.22)). The effects of the other interventions on preventing a repetition of suicidal behaviour remain unclear.
McCabe, 2018 ¹⁴	People at risk of suicide	Brief interventions (up to three sessions delivered in/soon after presenting in/soon after presenting episode) in the healthcare setting with two-way communication between at least one professional or paraprofessional and one patient. Interventions focus on suicidal thoughts and plans rather than diagnostic conditions and focus on routine clinical encounters.	4 studies (2 RCTs, 1 pilot RCT, 1 quasi-experimental)	Brief psychological interventions appear to be effective in reducing suicide and suicide attempts. It is unclear to what extent the effect is due to specific psychological techniques/components or to more frequent contacts.
Nazarian, 2017 ¹⁵	Adult patients presenting to the ED with suicidal ideation	Tools screening for risk of suicide	4 case series	The best approach to determine risk is an appropriate psychiatric assessment and good clinical judgement, taking patient, family and community factors into account.

ED, emergency department; RCT, randomised controlled trial; RR, risk ratio.

Literature overview

Our search identified 2042 potentially relevant articles. We included 42 studies: 3 systematic reviews and 39 primary studies. Most studies (N=34) examined ED interventions in patients with suicide attempt or suicidal ideation, while eight studies examined interventions in patients with opioid overdose. No studies examined ED behavioural or care process interventions in patients with acute psychosis. We identified six underway studies: four in patients with suicide attempt or suicidal ideation, one in patients with opioid dependence and one in patients with psychosis.

Suicide

We identified three systematic reviews that examined interventions among patients admitted to the ED following a suicide attempt (table 1). The first review examined the effects of interventions aimed at preventing repeat suicidal behaviour.¹³ This meta-analysis included 24 randomised controlled trials (RCTs) and found that active contact and follow-up interventions (ie, attempts by providers to stay in contact with patients after ED visits through home visits, telephone calls, postcards or letters) were effective in preventing a repeat suicide within 12

months (N=5319; pooled risk ratio (RR) = 0.83, 95% CI (0.71 to 0.97)). However, the effect did not appear to be maintained at 24 months (N=925; pooled RR=0.98, 95 CI (0.76 to 1.22)), although considerably fewer studies followed patients to this time point.

Another systematic review more broadly examined the effectiveness of brief psychological interventions delivered in the ED in reducing suicidal thoughts and behaviour.¹⁴ This review defined brief interventions as ‘up to three sessions delivered in or soon after the presenting episode which can be supplemented by further follow-up contact’, and included two RCTs, one pilot RCT and one quasi-experimental study. The authors concluded that brief psychological interventions appear to be effective in reducing suicide and suicide attempt, though they could not determine the number of sessions or interventional components that were most effective. An additional review¹⁵ that, in part, investigated whether risk assessment tools can identify patients who are safe to be discharged, concluded that risk assessment tools should not be used in isolation but instead in conjunction with clinical judgement, communication with the patient and their family

and awareness of community context (eg, availability of postdischarge care resources).

We also identified 10 RCTs of interventions delivered or initiated in the ED to reduce suicide attempts and other related outcomes among those who presented with a suicide attempt (tables 2 and 3).^{16–26} Across most studies, interventions were multicomponent, consisting of assessment and/or intervention and follow-up. Interventions included a single-session web-based lethal means counselling decision aid focused on reducing access to firearms and medications,¹⁸ safety planning in the ED with a peer recovery specialist,²⁶ a single telemedicine mental health consultation for risk stratification and connection to services,²⁷ a single telephone contact by a trained psychiatrist,²⁵ a 10-session cognitive-behavioural therapy (CBT) intervention,¹⁹ a 6-session CBT intervention,²⁴ a 6-session abandonment psychotherapy programme with an antidepressant medication protocol,¹⁷ mobile crisis team assessment and triage,²⁰ 5 structured consultations with the patient's general practitioner,²² a single brief information session followed by telephone follow-up²¹ and 3 brief therapy sessions followed by regular personalised letters over 24 months.²³ Interventions with a postdischarge component varied greatly in timing, delivering this component at 48 hours²⁰ or 24 months²³ after discharge. Nine^{17–25} out of 10 RCTs compared intervention effectiveness to that of usual care, while the remaining RCTs compared safety planning with a peer specialist to safety planning with an ED clinician.²⁶ Of the six trials that examined suicide reattempt, which was the most common primary outcome assessed, five found a treatment effect^{19 21 23–25} and the other found no difference between the intervention and treatment as usual (see tables 2 and 3).¹⁷ Treatment effect on suicide reattempt over time were mixed: one study²⁴ no longer detected a difference at 12 months, while another¹⁹ still detected an effect at 18 months. Additional outcomes assessed across the studies were related to healthcare utilisation (eg, ED readmission and mental health consultation), symptom severity (eg, depression) and feasibility (table 2).

Finally, we identified 21 relevant observational studies (online supplemental table S3). Two larger comparative cohort studies measuring the same outcomes, and with similar findings, are notable. The first²⁸ (N=1376) consisted of a universal suicide risk screening, coupled with provision of resources and post-ED telephone calls delivered by a physician or psychologist, and found a reduction in suicide attempts at 1-month postintervention compared with usual care (12% vs 22%, $p=0.03$). The second study,²⁹ which included 1640 Veterans and was composed of a safety planning behavioural intervention in the ED with 2 follow-up monitoring calls completed by social workers or psychologists, also found a reduction in suicidal behaviour over 6 months (OR=0.56, 95% CI (0.33 to 0.95), $p=0.03$).

Among the observational studies, there were many different interventions tested (see online supplemental table S3). Although some consisted of a single encounter

such as a psychiatry ED consultation,^{29–32} psychosocial assessment³² or observation in the ED using a mobile audio-visual device,³³ most were more involved with multiple telephone or in-person risk assessment and service linkage follow-ups over many months postdischarge.^{27–30 34–44} Several of the multicomponent interventions included a safety planning or lethal means training component delivered by trained mental health professionals.^{29 39 43 44} Other examples of interventions included brief solution focused therapy³⁸ and a 'caring contacts' intervention that sent personalised expressions of kindness over the course of 12 months postdischarge.³⁷ There was a large range of follow-up times from time of ED discharge²⁹ to 10 years postdischarge.³⁰ The outcomes assessed across studies also varied and included intervention feasibility and acceptability, suicide reattempt, suicidal ideation, knowledge of safety plan, depression, inpatient and outpatient mental health treatment utilisation and ED-related outcomes such as length of stay, return to ED and wait times (see online supplemental table S4). Across all included primary studies, harms or adverse events of interventions were either not reported or not assessed. Of note, several observational studies were focused on Veterans.^{29 37 43 44}

Among the four underway studies identified on ED-based interventions for individuals with suicide attempt or suicidal ideation, two studies examine psychotherapy or psychosocial interventions, one study examines a mobile phone application and one investigates a safety planning intervention. Two of these studies are completed with results posted to ClinicalTrials.gov but no identified publication, one is completed with no posted or published results, and another is in progress (see online supplemental table S5).

Overdose

All studies examining ED interventions for overdose included patients with opioid overdose, and we did not find anything specific to alcohol, methamphetamine, benzodiazepines, nor cannabis. We identified two RCTs^{45 46} addressing behavioural interventions for this population. One 2019 RCT (N=256)⁴⁵ examined the effects of a multicomponent intervention featuring one brief behavioural change counselling session (using motivational interviewing), overdose education, and provision of a naloxone kit compared with an informational flyer. The second RCT (N=648)⁴⁶ compared ED behavioural interventions and follow-up care (daily for 10 days and then weekly for 3 months) delivered by a peer recovery specialist to a brief ED intervention delivered by a licensed clinical social worker (table 4). The 2019 study⁴⁵ examined subsequent ED visits, subsequent overdose event, and time to first overdose event for 12 months following the intervention, while the 2022 study⁴⁶ measured enrolment in treatment within 30 days of their ED visit. Neither study found significant group differences for any of the primary outcomes (table 5).

Table 2 Characteristics of included randomised controlled trials for suicide attempt

Study	Sample size follow-up	Population and setting	Intervention characteristics	Comparator
Andreoli, 2016 ¹⁷	N=170 3 months	Patients with deliberate self-harm with MDD and BPD 1 ED in Switzerland Age: 31.9 years. 15.9% male Race NR	Abandonment psychotherapy with antidepressant medication protocol delivered by psychotherapist or nurse	Intensive community treatment as usual (psychiatric crisis intervention unit with nurse visits, medication adjustment, group therapy, social worker support and hospitalisation services)
Betz, 2020 ¹⁸	N=49 1 month	Suicidal adults who reported at least 1 firearm at home 4 large EDs in Colorado Age: 38.7 years. 53.3% male 67.7% white	Web-based lethal means counselling decision aid	Website with general suicide prevention information
Brown, 2005 ¹⁹	N=120 18 months	Individuals who attempted suicide seen at the ED 1 ED in Pennsylvania 35 years. 39% male 65% minority race/ethnicity	Cognitive therapy intervention (10 sessions on a weekly or biweekly basis)	Enhanced usual care with tracking and referral services
Currier, 2010 ²⁰	N=120 3 months	Patients with suicidal thoughts, plans, or behaviours presenting to ED one large ED in New York Mean age: 32.7 years. 43.3% male 60% white	Clinical assessment by mobile crisis team within 48 hours of discharge	Usual referral to hospital-based clinic
Grimholt, 2015 ²²	N=202 6 months	Patients with deliberate self-poisoning 5 EDs in Norway Mean age: 38.2 years. 25.5% male Race NR	Regular follow-up with general practitioner (minimum of 5 consultations over 6 months using structured follow-up guide)	Usual care
Gysin-Mailart, 2016 ²³	N=120 2 years	Patients admitted to ED following attempted suicide 1 ED in Switzerland Mean age: 37.9 years. 45% male Race NR	Attempted Suicide Short Intervention Programme: 3 brief therapy sessions followed by regular contact via personalised letters	Usual care with single assessment interview
Fleischmann, 2008 ²¹	N=1867 18 months	Patients presenting to ED with suicide attempt 8 EDs across five countries Median age: 23 years. 42% male Race NR	Brief intervention informational session pre-discharge and 9 follow-up sessions (telephone or in-person) over 18 months	Usual care
Lin, 2020 ²⁴	N=147 12 months	Patients with suicide attempt and current suicidal ideation 1 ED in Taiwan Mean age: 33 years. 27.9% male Race NR	Brief cognitive-based psychotherapy plus case management	Usual care

Continued



Table 2 Continued

Study	Sample size follow-up	Population and setting	Intervention characteristics	Comparator
Vaiva, 2006 ²⁵	N=605 13 months	Individuals who attempted suicide seen at the ED 13 EDs in France Age: 35.8 years. 27.1% male Race NR	Telephone contact 1 or 3 months after discharge	Usual care
Wilson, 2022 ²⁶	N=31 3 months	Patients presenting to an urban ED because of suicidal ideation or suicide attempt 1 ED in Arkansas Age: 41 years. 47% female Race NR	Peer-led safety planning with the Stanley and Brown Patient Safety Plan Template	Safety planning with ED medical or mental health provider

BPD, borderline personality disorder; ED, emergency department; MDD, major depressive disorder; NR, not reported.

The remaining six studies were case series^{47–50} or interrupted time series (online supplemental tables S6 and S7)^{51 52} using multicomponent interventions. A medication component (eg, take-home naloxone,^{51 52} naloxone training,⁴⁷ in-ED naloxone⁵⁰ or a buprenorphine prescription⁴⁸) was common, often accompanied by a referral to consultation with a peer recovery specialist^{47 48 51 52} and/or and referral for substance use treatment.^{48 49 51 52} Interventions were delivered by a range of ED providers (eg, physicians) or other staff (nurses, peer recovery specialists and social workers) who had training in addiction counselling and/or motivational interviewing. Commonly assessed outcomes across observational studies included receipt of take-home naloxone, agreement to being connected to recovery support, referral to substance use treatment and participation in substance use treatment. Only one study assessed hospital admission and death.⁵⁰ Four studies reported only postintervention outcome data, while two included pre–post intervention data^{51 52} (online supplemental table S7). Of studies with pre–post data, one reported⁵¹ an increase in patients receiving take-home naloxone, consultation with recovery coach, and discharge with referral to treatment after implementation of programme. The second⁵² reported an increase in number of patients discharged with naloxone after implementation of the intervention while fewer patients received behavioural counselling or referral to treatment after SUD treatment programme implementation. Again, no studies reported on or assessed adverse events from the interventions.

Finally, one observational study examined a combination of buprenorphine and referral for substance use treatment among individuals who had co-occurring suicidal ideation and opioid use disorder (OUD), and found it was feasible to initiate buprenorphine and have patients remained engaged in outpatients OUD treatment for 30 days.^{31 53} A single underway study was identified on an ED-based case management intervention with screening,

assessment and referral for opioid dependent patients presenting to the ED. This study was completed in 2020 with results posted to ClinicalTrials.gov but no identified publication (see online supplemental table S5).

Psychosis

We did not identify any eligible literature examining brief interventions for psychosis that were delivered or initiated in the ED. A single underway study was identified, focusing on ED-based text messaging to engage young people with psychosis while waiting for an ED consultation with a non-ED psychiatrist after the patient has been discharged from the ED. All patients were then referred to an early psychosis intervention programme. This study appears to be in progress (see online supplemental table S5).

Intervention effect moderators

Suicide

A single study compared intervention effects of a manualised six-session abandonment therapy intervention delivered by a nurse to the same intervention delivered by a psychotherapist, finding no significant differences in rates of suicide attempt, suicidal relapse, and suicidal ideation between groups 3 months after the intervention.¹⁷ Both the nurse-delivered and psychotherapist-delivered intervention groups showed improvements on the aforementioned outcomes compared with treatment as usual (table 3). Another observational study of a four-session case management programme to link patients to services compared completers (defined as those who completed all four sessions) to non-completers (those who completed fewer than four sessions) and found that completers were more likely to have decreased suicide risk (65.3% vs 46.9%, Adjusted OR (AOR) 2.13 (95% CI 1.42 to 3.20)) and fewer untreated stressors (49.8% vs 61.1%, AOR 0.64 (95% CI 0.43 to 0.96)), but no difference

Table 3 Intervention details and findings of included randomised control trials for suicide attempt

Study	Intervention characteristics	Mode of delivery/ interventionist	Primary findings	Secondary outcomes
Andreoli, 2016 ¹⁷	3 months, 2x/week manualised cognitive abandonment psychotherapy with antidepressant medication protocol delivered by psychotherapist (AP-P) or nurse (AP-N)	Certified psychotherapists or nurses with experience with patients with BPD	Suicide attempt repetition: 8.6% AP-P vs 4.3% AP-N vs 13.3% tau (NSD) Suicidal relapse: 14.3% AP-P vs 12.9% AP-N vs 40% tau (p<0.005) Suicidal ideation (mean): 0.4 AP-P vs 0.3 AP-N vs 1.0 tau (p<0.01)	Hospitalisation, Global Assessment Scale, Clinical Global Impression, Hamilton Depression Rating Scale
Betz, 2020 ¹⁸	Single viewing of 'lock to live' web-based decision aid covering reducing access to firearms or medications	Self-administered	Decisional conflict scale (mean): 12.6 intervention vs 9.7 control (NSD) Likelihood of changing storage (mean): firearms: 3.5 intervention vs 4.2 control; medications: 3.6 intervention vs 4.1 control (NSD)	None
Brown, 2005 ¹⁹	CBT, 10 sessions on a weekly or biweekly basis	CBT therapists	18 month reattempt-free probability: 0.76 CBT vs 0.58 usual care (HR=0.51, 95% CI (0.26 to 0.997)) Hamilton Rating for Depression Scale (mean): 13.09 CBT vs 14.55 usual care (p=0.19) Scale for Suicide Ideation: 45% of CBT group scored >0 vs 40% of usual care (p=0.41) Beck Depression Inventory (mean): 14.51 CBT vs 18.18 usual care (p=0.046)	Hopelessness
Currier, 2010 ²⁰	Clinical assessment within 48 hours of discharge	Mobile crisis team (MCT) clinician	First clinical contact: 69.6% MCT vs 29.6% usual care (RR=2.35, 95% CI (1.55 to 3.56)) ED revisit: 65.5% MCT vs 60.1% usual care (NSD) Scale for suicidal ideation (change from baseline to 3 months): -5.91 (p<0.001) MCT vs -6.66 (p<0.001) usual care (NSD between groups)	Brief Psychiatric Rating Scale, Hamilton Depression Scale, BASIS-32 Functional Scale
Grimholt, 2015 ²²	Minimum of 5 consultations with a general practitioner over 6 months using structured follow-up guide	General practitioner	Number of consultations (mean): 6.7 int. vs 4.5 control (p=0.004) Patient satisfaction (satisfied with treatment): 79% int. vs 51% control (p=0.026)	Components of patient satisfaction with care
Gysin-Mailart, 2016 ²³	3 manual-based brief therapy sessions followed by regular contact through personalised letters over 24 months	Therapist	Suicide risk (mean): Intervention group had an 83% reduced risk (HR=0.17, 95% CI (0.07 to 0.46))	Suicidal ideation, healthcare utilisation and depression
Fleischmann, 2008 ²¹	1 brief informational psychosocial counselling session pre-discharge with 9 telephone or in-person follow-up sessions	Clinician (physician, nurse, psychologist, etc)	Death from suicide: 0.2% int. vs 2.2% control (p<0.001).	All-cause death
Lin, 2020 ²⁴	6 CBT sessions over 4 months	Case manager	Suicide reattempts (6 months): Intervention group had reduced risk (OR=0.47, 95% CI (0.20 to 1.0)) NSD at 12 months	Depression, psychiatric outpatient follow-up, death by suicide

Continued

Table 3 Continued

Study	Intervention characteristics	Mode of delivery/interventionist	Primary findings	Secondary outcomes
Vaiva, 2006 ²⁵	Telephone contact at 1 or 3 months	Psychiatrists with at least 5 years' experience managing suicidal crises	Suicide reattempt: 16% 1 month vs 14% 3 months vs 19% control group (p=0.37). Among those with contact established: 12% 1 month vs 22% control group (p=0.03) Death by suicide: 0% 1 month, 1% 3 months, 1% control (no significance test reported)	Loss to follow-up, adverse outcomes
Wilson, 2022 ²⁶	Safety planning in the ED with the Stanley and Brown Patient Safety Plan Template	Peer recovery specialist with state certification who received 12 additional training hours	Change in number of ED visits (3 months before vs after intervention: Decrease in ED visits among participants who made a safety plan with a peer (Wald×257.75, p. 0.01), but not those who made a plan with a provider (Wald×250.50, p.0.48)	Quality of safety plan, adverse outcomes

BPD, borderline personality disorder; CBT, cognitive-behavioural therapy; ED, emergency department; Int., intervention; NSD, no significant difference.

in lack of a support system (35.4% vs 45.7%, AOR 0.68 (95% CI 0.45 to 1.03)).⁴⁰

No other studies examined patient, intervention or setting characteristics as moderators of intervention effectiveness. Across studies Veterans were a commonly represented population, though no study compared effectiveness of intervention in Veterans compared with non-Veterans.

Overdose and psychosis

We did not find any studies in overdose or acute psychosis populations that directly examined moderation effects.

DISCUSSION

The present scoping review identified a wide range of behavioural and care process interventions for suicidality, ranging from interventions delivered only during the ED stay to more complex, multicomponent interventions that were initiated during the ED stay and continued for several visits after discharge. Common components of the interventions included risk assessment, psychiatric

consultation, safety planning and lethal means counselling. Most available RCTs reported a treatment effect in the form of decreased rates of suicide reattempt within a short time following an intervention. There were also several interventions that did not involve in-person contact (eg, were delivered via telephone or web-based video); most commonly this applied to follow-up visits rather than the ED-delivered intervention component. Although outcomes of various modalities were not directly compared, this flexibility in intervention delivery may assist in reaching a broader population and the ability to be implemented in EDs where trained mental health professionals may not be present.

Importantly, we also identified several qualitative studies that explored barriers and facilitators to implementing ED suicide prevention interventions including screening/risk assessment,^{43 54 55} psychiatry consultation and referral,⁵⁶ and lethal means counselling.⁵⁷ Across these studies, common themes of successful implementation of these strategies included the clinician having sufficient time and privacy, the screening protocol or

Table 4 Characteristics of included randomised controlled trials for overdose

Study	Sample size follow-up	Population	Intervention characteristics	Comparator
Banta-Green, 2019 ⁴⁵	N=256 12 months	Opioid overdose 2 EDs in Washington Age: 41.3 years. 71% male 53% white	Single session, motivational interviewing (overdose education, brief behavioural change counselling, naloxone kit)	Informational flier
Beaudoin, 2022 ⁴⁶	N=648 30 days	Opioid overdose 2 EDs in Rhode Island Age: 36.9 years. 68.2% male 68.5% White	Range of evidence-based interviewing and intervention techniques delivered in the ED with follow-up daily for first 10 days and then weekly for 3 months	Brief behavioural intervention from licensed clinical social worker delivered in ED, no follow-up

ED, emergency department; NR, not reported.

Table 5 Intervention details and findings of included randomised controlled trials for overdose

Study	Intervention characteristics	Mode of delivery/interventionist	Primary findings	Secondary outcomes
Banta-Green, 2019 ⁴⁵	Single session, motivational interviewing	Masters-level interventionist	Annual ED visit rate: 4.96 int. vs 4.85 control (NSD) Overdose: 23.7% of participants had overdose event, NSD between groups. Time to first overdose event: HR=0.83, 95% CI (0.49 to 1.40)	None
Beaudoin, 2022 ⁴⁶	Range of evidence-based interviewing and intervention techniques delivered in the ED with follow-up daily for first 10 days and then weekly for 3 months	Peer recovery specialist with at least 2 years of recovery and 45 hours of training and 500 hours of supervised work experience	Enrolment in an SUD treatment programme within 30 days of the ED visit: 98 of 325 participants in the social worker group (30%) vs 103 of 323 participants in the peer group (32%), NSD between groups	Types of treatment received

ED, emergency department; NSD, no significant difference; SUD, substance use disorder.

intervention being integrated into the ED workflow, and the provider possessing rapport with patients and collaborating with colleagues. This final implementation strategy—collaboration with colleagues—should not be overlooked in its significance, as lack of trained mental health providers is a barrier across EDs to the provision of behavioural interventions.⁵⁸ Additionally, to our knowledge, there are at least three prior systematic reviews focused exclusively on ED-delivered behavioural interventions for suicidality,^{13–15} the most recent of which was conducted in 2018. A main finding across the studies examined in these reviews were that repeated contacts with someone trained in suicide prevention decreased post-ED discharge suicidality.^{13 14} This kind of high touch intervention requires the support of additional resources or better integration with mental health, that are not readily available in many EDs, yet are needed.

Several behavioural interventions for opioid overdose were associated with successful linkage to specialty outpatient care. Most interventions studies were multi-component, with the most common components being provision of naloxone and referral to SUD treatment. Although several interventions appeared to have promising effects on outcomes, only one RCT was identified that investigated these interventions, suggesting the need for additional rigorous studies in this population. There appeared to be several other gaps, including a need for additional research on brief ED-delivered interventions for non-opioid substances, such as alcohol.

We did not identify any primary studies that met our criteria for psychosis-focused behavioural or care process interventions delivered in the ED. Recommended

practices of care for emergency management of psychosis are available, though they are based on primary and community care research. These guidelines state that safety and violence assessment is the first priority, followed by provision of medication (antipsychotic or others, depending on aetiology of psychosis).⁵⁹ These guidelines also emphasise the importance of early intervention during the first psychotic episode to improve clinical outcomes.^{60 61}

Limitations

Overall, this scoping review adds to previously conducted reviews by including a broader array of acute mental health events and intervention types. Nonetheless, this review is limited in that it does not offer a synthesis of available evidence, including medication only interventions and psychosis related to medication or other medical conditions. This was largely due to inconsistency in intervention components and characteristics and in the timing of outcome assessment across included studies. Studies themselves also had important limitations, particularly infrequent use of randomisation and comparison groups.

CONCLUSIONS

Existing evidence on the effectiveness of brief ED-delivered behavioural or care processes interventions among patients presenting with suicide attempt or acute ideation, substance overdose or psychosis is limited by methodological inconsistency, ethical challenges related to randomisation and setting level barriers to implementation. Future studies in suicide could examine differences

in effectiveness by patient sociodemographic and clinical factors, intervention features (eg, modality such as telemedicine-delivered vs in-person, duration of intervention, family involvement), and ED setting characteristics (eg, rural vs urban, staffing models, bed capacity). Future research in opioid overdose should employ more rigorous research designs that feature comparison groups, such as treatment as usual. When a comparator is not feasible or ethical, studies should compare outcomes before and after the intervention is delivered (ie, a pre–post design). More generally, consistent assessment and reporting of adverse events is recommended. Finally, there appears to be a paucity of research on ED behavioural and care process interventions for psychosis and non-opioid substances, such as alcohol. Future research could examine brief interventions for these conditions that are initiated in the ED and continued in outpatient or community mental healthcare settings.

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Table S1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	5
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	6
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	6
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	6-7
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	7-8
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Table S2
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	7-8
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	8

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	8
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	8
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	8
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Figure S1
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	8-9; Tables 1-2 & 4
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	NA
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Tables 2-5 & S3-S7
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	8-22
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	23-24
Limitations	20	Discuss the limitations of the scoping review process.	24-25
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	26
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	27-28

JB1 = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473. doi: [10.7326/M18-0850](https://doi.org/10.7326/M18-0850).

Table S2. Search Strategy Details

Search strategy for current systematic reviews (limited to last 7 years)			
Date Searched: 08-24-21			
A. Bibliographic Databases:	#	Search Statement	Results
MEDLINE: Systematic Reviews	1	Suicidal Ideation/ OR Drug Overdose/ OR exp Psychotic Disorders/ OR Suicide, Attempted/ OR ((suicidality OR suicide OR suicidal) OR ((drug OR substance) adj1 overdose\$1) OR (((psychotic OR schizoaffective OR schizophreniform) adj1 disorder\$1) OR psychoses OR psychosis)).ti,ab.	177828
Ovid MEDLINE(R) ALL 1946 to August 23, 2021	2	exp Emergency Medical Services/ or exp Ambulatory Care/ OR Emergency Medicine/ OR Emergency Nursing/ OR ((emergency medical service\$1) or (prehospital emergency care) or (emergicenter\$1) or (emergency care) or (emergency health service\$1) or (ambulatory care) or (outpatient care) or (outpatient health service\$1) or (outpatient service\$1) or (urgent care\$1) OR ED OR emergency department OR acute care OR emergency unit OR emergency ward\$1 OR emergency room\$1 OR trauma unit\$1 OR trauma center\$1).ti,ab.	359382
	3	exp Risk Assessment/ OR Triage/ OR exp Referral and Consultation/ OR Counseling/ OR Preventive Psychiatry/ OR Patient Discharge/ OR ((risk adj1 assessment\$1) OR (risk adj1 analysis) OR (risk adj1 analyses) OR (risk-benefit adj1 assessment\$1) OR triage\$1 OR referral\$1 OR consultation\$1 OR safety planning OR lethal means counseling OR (caring adj1 contact\$1) OR (behavioral adj1 intervention\$1) OR preventive psychiatry OR (patient adj1 discharge*) OR (discharge adj1 plan*) OR (stimulant adj1 intoxication)).ti,ab.	410410
	4	1 AND 2 AND 3	1252
	5	<u>(systematic review.ti. or meta-analysis.pt. or meta-analysis.ti. or systematic literature review.ti. or this systematic review.tw. or pooling project.tw. or (systematic review.ti,ab. and review.pt.) or meta synthesis.ti. or meta-analy*.ti. or integrative review.tw. or integrative research review.tw. or rapid review.tw. or umbrella review.tw. or consensus development conference.pt. or practice guideline.pt. or drug class reviews.ti. or cochrane database syst rev.jn. or acp journal club.jn. or health technol assess.jn. or evid rep technol assess summ.jn. or jbi database system rev implement rep.jn. or (clinical guideline and management).tw. or ((evidence based.ti. or evidence-based medicine/ or best practice*.ti. or evidence synthesis.ti,ab.) and (((review.pt. or diseases category/ or</u>	471158

		<u>behavior.mp.) and behavior mechanisms/) or therapeutics/ or evaluation studies.pt. or validation studies.pt. or guideline.pt. or pmcbook.mp.) or (((systematic or systematically).tw. or critical.ti,ab. or study selection.tw. or ((predetermined or inclusion) and criteri*).tw. or exclusion criteri*.tw. or main outcome measures.tw. or standard of care.tw. or standards of care.tw.) and ((survey or surveys).ti,ab. or overview*.tw. or review.ti,ab. or reviews.ti,ab. or search*.tw. or handsearch.tw. or analysis.ti. or critique.ti,ab. or appraisal.tw. or (reduction.tw. and (risk/ or risk.tw.) and (death or recurrence).mp.)) and ((literature or articles or publications or publication or bibliography or bibliographies or published).ti,ab. or pooled data.tw. or unpublished.tw. or citation.tw. or citations.tw. or database.ti,ab. or internet.ti,ab. or textbooks.ti,ab. or references.tw. or scales.tw. or papers.tw. or datasets.tw. or trials.ti,ab. or meta-analy*.tw. or (clinical and studies).ti,ab. or treatment outcome/ or treatment outcome.tw. or pmcbook.mp.)) not (letter or newspaper article).pt.</u>	
	6	4 AND 5	32
	7	limit 6 to english language and last 7 years	17
CDSR: Protocols and Reviews	1	Suicidal Ideation OR Drug Overdose OR Psychotic Disorders OR Suicide.kw.	347
EBM Reviews - Cochrane Database of Systematic Reviews 2005 to August 18, 2021	2	((suicidality OR suicide OR suicidal) OR ((drug OR substance) adj1 overdose\$1) OR (((psychotic OR schizoaffective OR schizophreniform) adj1 disorder\$1) OR psychoses OR psychosis)).ti,ab.	207
	3	1 OR 2	448
	4	(Emergency Medical Services OR Ambulatory Care OR Emergency Medicine OR Emergency Nursing).kw.	103
	5	((emergency medical service\$1) or (prehospital emergency care) or (emergicenter\$1) or (emergency care) or (emergency health service\$1) or (ambulatory care) or (outpatient care) or (outpatient health service\$1) or (outpatient service\$1) or (urgent care\$1) OR ED OR emergency department OR acute care OR emergency unit OR emergency ward\$1 OR emergency room\$1 OR trauma unit\$1 OR trauma center\$1).ti,ab.	177
	6	4 OR 5	254
	7	(Risk Assessment OR Triage OR Referral Consultation OR Counseling OR Preventive Psychiatry OR Patient Discharge).kw.	127

	8	((risk adj1 assessment\$1) OR (risk adj1 analysis) OR (risk adj1 analyses) OR (risk-benefit adj1 assessment\$1) OR triage\$1 OR referral\$1 OR consultation\$1 OR safety planning OR lethal means counseling OR (caring adj1 contact\$1) OR (behavioral adj1 intervention\$1) OR preventive psychiatry OR (stimulant adj1 intoxication)).ti,ab.	292
	9	7 OR 8	395
	10	3 AND 6 AND 9	1
Search strategy for systematic reviews currently under development (includes forthcoming reviews & protocols)			
Date Searched: 08-24-21			
D. Under development:	Evidence:		Results:
AHRQ topics in development (EPC Status Report)	Email Charli Armstrong carmstrong.src@gmail.com		<u>0</u>
PROSPERO (SR registry)	http://www.crd.york.ac.uk/PROSPERO/ <u>Search: psychosis;suicide;substance abuse;intervention;emergency department</u> Amanda Vandyk, Ian Graham, Catherine Goldie, Jeremy Kronick, Matthew Gilmour, Yehudis Stokes, Amanda Ross-White, Mark Kaluziński, Colleen MacPhee. A knowledge synthesis and integrated knowledge translation project on interventions to improve emergency department use for mental health reasons. PROSPERO 2018 CRD42018087430 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42018087430 Ana Paula Silva, Margarida Henriques, Inês Rothes, Pim Cuijpers, José Carlos Santos, Tiago Zortea. Effects of psychosocial interventions among people cared for in emergency departments after a suicide attempt: a Systematic Review. PROSPERO 2019 CRD42019131040 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42019131040	<u>5</u>	

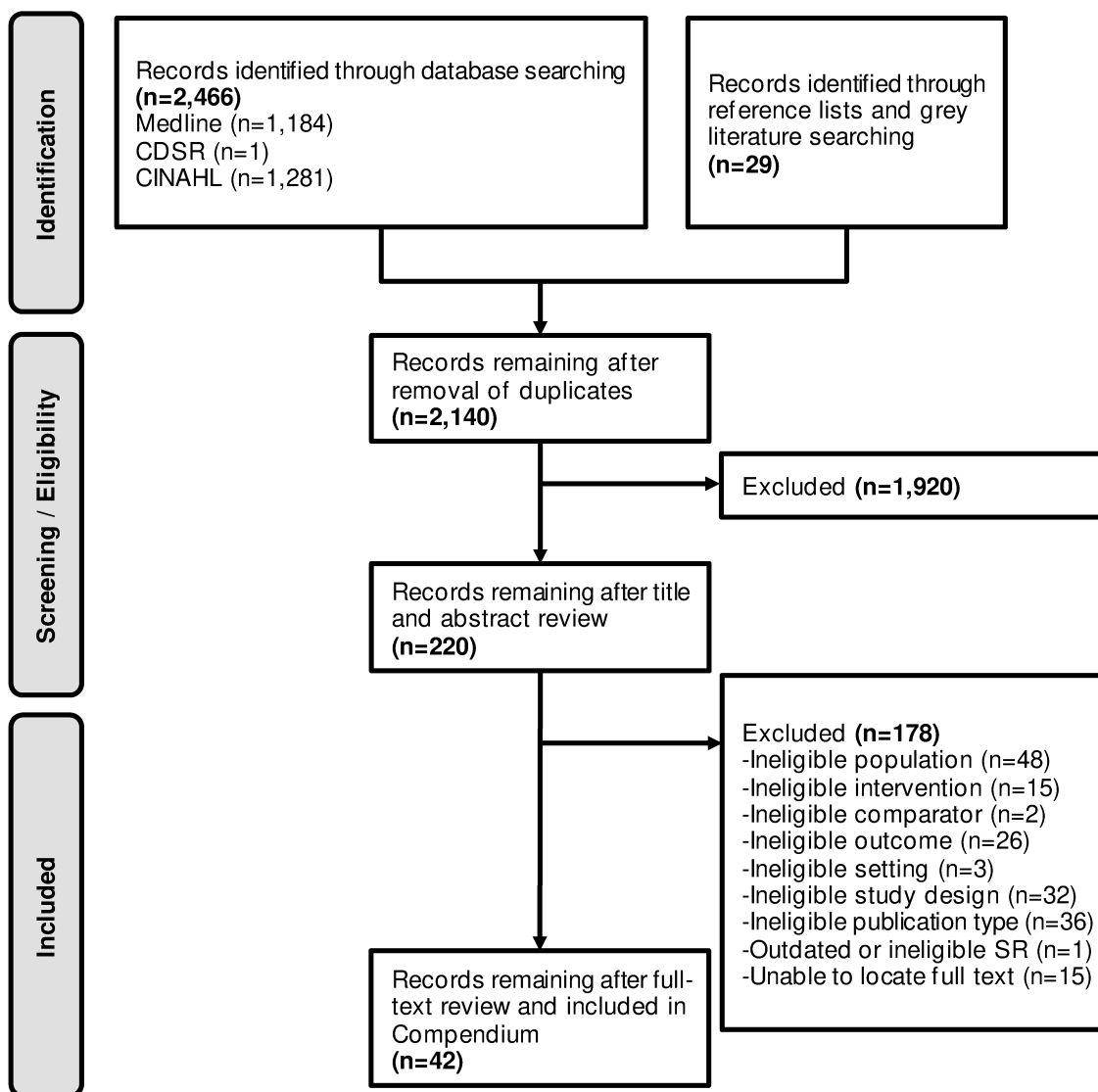
	<p>Michael Wilson. Emergency department practices for suicide prevention. PROSPERO 2018 CRD42018106448 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42018106448</p> <p>Amy Hunter, Steven Rogers, Susan DiVietro, Danielle Chenard, Megan Boyer, Kristin Burnham. Evaluation of lethal means restriction counselling and education: a systematic review. PROSPERO 2018 CRD42018076734 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42018076734</p> <p>Elizabeth Spitzer, Kelly Stearns-Yoder, Adam Hoffberg, Christopher Miller, Joseph Simonetti. Examining Lethal Means Safety Counseling Interventions across Settings: A Systematic Review. PROSPERO 2021 CRD42021230668 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021230668</p>	
Search Strategy for Primary Literature		
Date searched: 08-24-21		
MEDLINE		
#	Search Statement	Results
<u>1</u>	Suicidal Ideation/ OR Drug Overdose/ OR exp Psychotic Disorders/ OR Suicide, Attempted/ OR ((suicidality OR suicide OR suicidal) OR ((drug OR substance) adj1 overdose\$1) OR ((psychotic OR schizoaffective OR schizophreniform) adj1 disorder\$1) OR psychoses OR psychosis).ti,ab.	179185
<u>2</u>	exp Emergency Medical Services/ or exp Ambulatory Care/ OR Emergency Medicine/ OR Emergency Nursing/ OR ((emergency medical service\$1) or (prehospital emergency care) or (emergicenter\$1) or (emergency care) or (emergency health service\$1) or (ambulatory care) or (outpatient care) or (outpatient health service\$1) or (outpatient service\$1) or (urgent care\$1) OR ED OR emergency department OR acute care OR emergency unit OR emergency ward\$1 OR emergency room\$1 OR trauma unit\$1 OR trauma center\$1).ti,ab.	362719
<u>3</u>	exp Risk Assessment/ OR Triage/ OR exp Referral and Consultation/ OR Counseling/ OR Preventive Psychiatry/ OR Patient Discharge/ OR ((risk adj1 assessment\$1) OR (risk adj1 analysis) OR (risk adj1 analyses) OR (risk-benefit adj1 assessment\$1) OR triage\$1 OR referral\$1 OR consultation\$1 OR safety planning OR lethal means counseling OR (caring adj1 contact\$1) OR (behavioral adj1 intervention\$1) OR preventive psychiatry OR (patient adj1 discharge*) OR (discharge adj1 plan*) OR (stimulant adj1 intoxication)).ti,ab.	415130

4	1 AND 2 AND 3	1272
5	Limit 4 to English language	1146
CINAHL [CINAHL Plus with Full Text]		
#	Search Statement	Results
1	(MH "Suicidal Ideation") OR (MH "Overdose+") OR (MH "Psychotic Disorders+") OR (MH "Suicide, Attempted")	154769
2	TI (((suicidality OR suicide OR suicidal) OR ((drug OR substance) N1 overdose*) OR (((psychotic OR schizoaffective OR schizophreniform) N1 disorder*) OR psychoses OR psychosis)))) OR AB (((suicidality OR suicide OR suicidal) OR ((drug OR substance) N1 overdose*) OR (((psychotic OR schizoaffective OR schizophreniform) N1 disorder*) OR psychoses OR psychosis))))	53825
3	1 OR 2	183033
4	(MH "Emergency Medical Services+") OR (MH "Emergency Services, Psychiatric") OR (MH "Emergency Service") OR (MH "Ambulatory Care") OR (MH "Ambulatory Care Nursing") OR (MH "Emergency Nursing")	133797
5	TI (((emergency medical service*) or (prehospital emergency care) or (emergicenter*) or (emergency care) or (emergency health service*) or (ambulatory care) or (outpatient care) or (outpatient health service*) or (outpatient service*) or (urgent care*) OR emergency department OR acute care OR emergency unit OR emergency ward* OR emergency room* OR trauma unit* OR trauma center*)) OR AB (((emergency medical service*) or (prehospital emergency care) or (emergicenter*) or (emergency care) or (emergency health service*) or (ambulatory care) or (outpatient care) or (outpatient health service*) or (outpatient service*) or (urgent care*) OR emergency department OR acute care OR emergency unit OR emergency ward* OR emergency room* OR trauma unit* OR trauma center*))	112348
6	4 OR 5	195912
7	(MH "Risk Assessment") OR (MH "Triage") OR (MH "Referral and Consultation") OR (MH "Counseling") OR (MH "Psychiatry") OR (MH "Psychiatric Emergencies") OR (MH "Patient Discharge+")	240160
8	TI (((risk N1 assessment*) OR (risk N1 analysis) OR (risk N1 analyses) OR (risk-benefit N1 assessment*) OR triage* OR referral* OR consultation* OR safety planning OR lethal means counseling OR (caring N1 contact*) OR (behavioral N1 intervention*) OR preventive psychiatry)) OR AB (((risk N1 assessment*) OR (risk N1 analysis) OR (risk N1 analyses) OR (risk-benefit N1 assessment*) OR triage* OR referral* OR consultation* OR safety planning OR lethal means counseling OR (caring N1 contact*) OR (behavioral N1 intervention*) OR preventive psychiatry OR (patient N1 discharge*) OR (stimulant N1 intoxicat*))	144108
9	7 OR 8	339685
10	3 AND 6 AND 9	1234
11	Limit 10 to English language	1213
6. Search for primary literature, updated		
Date searched: 03-01-23		
MEDLINE		

#	Search Statement	Results
1	Suicidal Ideation/ OR Drug Overdose/ OR exp Psychotic Disorders/ OR Suicide, Attempted/ OR ((suicidality OR suicide OR suicidal) OR ((drug OR substance) adj1 overdose\$1) OR ((psychotic OR schizoaffective OR schizophreniform) adj1 disorder\$1) OR psychoses OR psychosis).ti,ab.	192820
2	exp Emergency Medical Services/ or exp Ambulatory Care/ OR Emergency Medicine/ OR Emergency Nursing/ OR ((emergency medical service\$1) or (prehospital emergency care) or (emergicenter\$1) or (emergency care) or (emergency health service\$1) or (ambulatory care) or (outpatient care) or (outpatient health service\$1) or (outpatient service\$1) or (urgent care\$1) OR ED OR emergency department OR acute care OR emergency unit OR emergency ward\$1 OR emergency room\$1 OR trauma unit\$1 OR trauma center\$1).ti,ab.	393426
3	exp Risk Assessment/ OR Triage/ OR exp Referral and Consultation/ OR Counseling/ OR Preventive Psychiatry/ OR Patient Discharge/ OR ((risk adj1 assessment\$1) OR (risk adj1 analysis) OR (risk adj1 analyses) OR (risk-benefit adj1 assessment\$1) OR triage\$1 OR referral\$1 OR consultation\$1 OR safety planning OR lethal means counseling OR (caring adj1 contact\$1) OR (behavioral adj1 intervention\$1) OR preventive psychiatry OR (patient adj1 discharge*) OR (discharge adj1 plan*) OR (stimulant adj1 intoxication)).ti,ab.	460494
4	1 AND 2 AND 3	1434
5	Limit 4 to English language	1305
6	limit 5 to dt=20220823-20230301	38
CINAHL [CINAHL Plus with Full Text]		
#	Search Statement	Results
1	(MH "Suicidal Ideation") OR (MH "Overdose+") OR (MH "Psychotic Disorders+") OR (MH "Suicide, Attempted")	167326
2	TI (((suicidality OR suicide OR suicidal) OR ((drug OR substance) N1 overdose*) OR (((psychotic OR schizoaffective OR schizophreniform) N1 disorder*) OR psychoses OR psychosis)))) OR AB (((suicidality OR suicide OR suicidal) OR ((drug OR substance) N1 overdose*) OR (((psychotic OR schizoaffective OR schizophreniform) N1 disorder*) OR psychoses OR psychosis))))	59900
3	1 OR 2	198882
4	(MH "Emergency Medical Services+") OR (MH "Emergency Services, Psychiatric") OR (MH "Emergency Service") OR (MH "Ambulatory Care") OR (MH "Ambulatory Care Nursing") OR (MH "Emergency Nursing")	142799
5	TI (((emergency medical service*) or (prehospital emergency care) or (emergicenter*) or (emergency care) or (emergency health service*) or (ambulatory care) or (outpatient care) or (outpatient health service*) or (outpatient service*) or (urgent care*) OR emergency department OR	125198

	acute care OR emergency unit OR emergency ward* OR emergency room* OR trauma unit* OR trauma center*) OR AB (((emergency medical service* or (prehospital emergency care) or (emergicenter*) or (emergency care) or (emergency health service*) or (ambulatory care) or (outpatient care) or (outpatient health service*) or (outpatient service*) or (urgent care*) OR emergency department OR acute care OR emergency unit OR emergency ward* OR emergency room* OR trauma unit* OR trauma center*))	
6	4 OR 5	212155
7	(MH "Risk Assessment") OR (MH "Triage") OR (MH "Referral and Consultation") OR (MH "Counseling") OR (MH "Psychiatry") OR (MH "Psychiatric Emergencies") OR (MH "Patient Discharge+")	271827
8	TI (((risk N1 assessment*) OR (risk N1 analysis) OR (risk N1 analyses) OR (risk-benefit N1 assessment*) OR triage* OR referral* OR consultation* OR safety planning OR lethal means counseling OR (caring N1 contact*) OR (behavioral N1 intervention*) OR preventive psychiatry)) OR AB (((risk N1 assessment*) OR (risk N1 analysis) OR (risk N1 analyses) OR (risk-benefit N1 assessment*) OR triage* OR referral* OR consultation* OR safety planning OR lethal means counseling OR (caring N1 contact*) OR (behavioral N1 intervention*) OR preventive psychiatry OR (patient N1 discharg*) OR (stimulant N1 intoxicat*)))	161600
9	7 OR 8	383396
10	3 AND 6 AND 9	1455
11	Limit 10 to English language	1429
12	limit 11 to Published Date: 20220801-20230331	68

Figure S1. Literature Flowchart



Abbreviations. CDSR=Cochrane Database of Systematic Reviews; SR=systematic review.

Table S3. Characteristics of Included Observational Studies for Suicide Attempt

Study	Sample Size <i>Follow-up</i>	Population & Setting	Intervention Characteristics	Comparator
Albuixech-Garcia, 2020(1)	N=213 <i>NR</i>	Patients presenting to ED with suicide attempt in Spain 1 ED in Spain Age: NR 39.2% male 85.9% Spanish nationality	Mental health care continuity-chain protocol including nurse care coordinator with mental health unit notification and telephone contact after discharge	Usual discharge protocol: written ED discharge letter given to patient upon discharge
Catanach, 2019(2)	N=2,644 <i>1 month</i>	Patients evaluated for suicidal behavior and discharged home from EDs in Colorado 15 EDs in Colorado Age: 12.0% <18 yrs.; 19% 18-24 yrs.; 37% 25-44 yrs.; 19% 45-64 yrs.; 2.5% >= 65 yrs.; 10% unknown 45% male Race NR	Rocky Mountain Crisis Partners program including follow-up calls after discharge to reassess risk, review ED discharge plan, identify resources, and review outpatient appointment attendance	None
Cebria, 2015(3)	N=514 <i>5 years</i>	Patients evaluated for suicidal behavior in Spain 2 EDs in Spain Age: 40.7-41.9 yrs. 29.5-36.4% male Race NR	Post-discharge follow-up calls and follow-up appointment scheduling	Usual care (no follow-up calls)
Costemale-Lacoste, 2017(4)	N=107 <i>3 months</i>	Patients not currently receiving psychiatric ambulatory care 4 EDs in France Mean age: 36.8 yrs. 32.5% male Race NR	Booking specialized outpatient therapy follow up while in ED	Patients who received contact information to book ambulatory care but who did not schedule follow up while in ED
Costanza, 2020(5)	N=40 <i>24 hours</i>	Patients seen in ED with intentional CO poisoning 1 ED in Switzerland Demographics NR	Safety protocol with suicide risk assessment prior to HBOT	Pre- vs post-adoption of safety protocol

Study	Sample Size Follow-up	Population & Setting	Intervention Characteristics	Comparator
Exbrayat, 2017(6)	N=436 1 year	Patients admitted to department of emergency psychiatry for suicide attempt 1 psychiatric ED in France Mean age: 40.0 yrs. 30.4% male Race NR	Follow-up phone calls (3 calls at 8, 30, and 60 days after ED discharge) for risk assessment	Patients who presented to ED before implementation of intervention and received usual care
Fairchild, 2019(7)	N=440 (118 suicide attempt) Until ED discharge	Rural patients presenting to ED 4 EDs in Indiana Age: 31.4% 18-24 yrs.; 40.7% 25-44 yrs., 24.1% 45-64 yrs.; 2.3% 65-74 yrs.; 1.6% 75+ yrs. 57.5% male 98.5% white	Telehealth consultation with psychiatrist	Matched controls from period prior to implementation of telehealth program
Hickey, 2001(8)	N=246 1 year	Patients in ED with deliberate self-harm 1 ED in the United Kingdom Age: 28.0% <=19 years; 53.7% 20-34 years; 16.7% 35+ years; 1.6% unknown 43.9% male Race NR	Psychosocial assessment by psychiatric team	Patients who did not receive assessment
Knox, 2012(9)	N=438 6 months	Veterans at risk for suicide 5 EDs at US VA hospitals Demographics NR	SAFE VET: multicomponent intervention including tailored safety planning, internal coping strategies, identification of contacts who can offer crisis assistance (including VA's Suicide Hotline) plus intensive follow up	None
Kroll, 2020(10)	N=12 32 hours	Patients with suicide precautions and psychiatric consultation 1 ED in Massachusetts Demographics NR	Virtual monitoring for suicide risk in ED	None

Study	Sample Size Follow-up	Population & Setting	Intervention Characteristics	Comparator
Landes, 2021(11)	N=348 6 months	Veterans seen in the ED with positive suicide risk assessment 1 ED at a Southern US VA hospital Mean age: 52.5 yrs. 90.2% male Race NR	Caring contacts (sending patients at risk of suicide 11 brief, non-demanding expressions of care over 1 year)	Pre- vs post-intervention
Mansfield, 2021(12)	N=149 3 months	Patients in ED with suicide risk Multiple EDs in Australia Mean age: 31.5 yrs. 39.6% male Race NR	Referral from ED to clinic (first visit scheduled within 3 days of ED visit) and up to 4 weekly sessions of solution-focused brief therapy model	Pre- vs post-intervention
Miller, 2017(13)	N=1,376 1 year	Patients in the ED with suicidal ideation or recent attempt 8 EDs across the US Median age: 37 yrs. 44.1% male 67.4% non-Hispanic White	Universal suicide risk screening and telephone follow up	Usual care or usual care and suicide risk screening
Mueller, 2020(14)	N=166 48-72 hours	Suicidal patients (51% access to firearms or substance use) 1 ED in Missouri Mean age: 38 yrs. 61.4% male 38.6% white	CALM (Counseling on Access to Lethal Means): bedside assessment of access to lethal means, single counseling session related to safe storage, and telephone follow up 48-72 hours after ED discharge	None
Shin, 2019(15)	N=349 1 month	Patients with suicide risk in South Korea 1 ED in South Korea Median age: 42 yrs. 44% male Race NR (All South Korean)	Case management linking patients to psychiatric services and rehabilitation centers: 4 follow-up sessions, once per week for 4 weeks	Those who did not complete all 4 sessions were treated as the control group
Son, 2020(16)	N=2,144 10 years	Patients with suicide risk (62.2% had previous psychiatric visit)	Emergency psychiatric consultation	Those who did not have a consultation

Study	Sample Size Follow-up	Population & Setting	Intervention Characteristics	Comparator
		6 EDs in Korea Age: 25.3% 30-39 yrs. 32 % Male Race NR		
Spaderna, 2021(17)	N=14 1 month	Those with OUD and possibly other substance use disorders or overdose who had suicidal ideation	Buprenorphine and a referral for outpatient SUD treatment	None
		1 ED in Maryland Age: 41.36 yrs. 86% male 86% white		
Stanley, 2015(18)	N=95 3 months	Veterans who had 2 or more ED visits within 6 months for suicide concerns	Safety planning behavioral intervention	ED visit in same population without intervention
		5 EDs at US VA hospitals Age: 75% 35 yrs. or older 86% male 66% white		
Stanley, 2018(19)	N=1,640 6 months	Veterans with ED visits for suicide concerns	Safety planning behavioral intervention	Usual care
		9 EDs at US VA hospitals Mean age: 47.76 yrs. 88% men 58% white		
Vakkalanka, 2019(20)	N=278 6 months	Rural patients with suicide risk	Telemedicine consultation	Usual care (no telemedicine follow up)
		13 EDs across 12 US states Mean age: 30.5 yrs. 37.8% male 62.6% White		
Wilhelm 2007(21)	N=456 NR	Individuals presenting to ED with deliberate self-harm or suicidal ideation	Green Card Clinic providing intervention strategies to improve compliance with psychiatric follow-up and referrals	None
		2 EDs in Australia		

Study	Sample Size	Population & Setting	Intervention Characteristics	Comparator
	<i>Follow-up</i>			
		Age: 31.6 yrs. 43% male Race NR		

Abbreviations. BPD=borderline personality disorder; CC=caring contacts; CO=carbon monoxide; ED=emergency department; HBOT=hyperbaric oxygen therapy; MDD=major depressive disorder; NR=not reported; OUD=opioid use disorder; SUD=substance use disorder; US=United States; VA=Veterans Affairs; yrs.=year.

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Table S4. Intervention Details and Findings of Observational Studies for Suicide Attempt

Study	Intervention Characteristics	Mode of delivery/ Interventionist	Primary Findings	Secondary Outcomes
Albuixech-Garcia, 2020(1)	Nurse care coordinator is engaged, and mental health unit is notified of the patient after ED visit. Telephone contact established within 24-48 hours of discharge	Nurse with training in protocol	<i>Attendance at follow-up visit:</i> 57.5% int. vs 42.5% control (significance NR) <i>ED re-visit:</i> 27.6% intervention vs 72.4% intervention ($p=0.01$)	None
Catanach, 2019(2)	Telephone follow-up with at least 5 phone calls: 3 within 24 hours of discharge, additional calls at 1 week and 1 month after discharge	Staff with at least a BS in a counseling-related field trained in crisis intervention and management. Masters-level mental health clinician available 24/7 for support.	<i>Contacts:</i> 90.2% of accepted referrals had a contact with staff <i>Among participants having conversation with staff:</i> <i>Return ED visit:</i> 2.4% <i>Suicide attempt:</i> 0.4%	None
Cebria, 2015(3)	Follow-up calls at 1 week, and 1, 3, 6, 9, and 12 months after discharge focusing on changes in behaviors and crisis intervention	Nurse with training in suicidal behavior	<i>Suicide reattempt (incidence rate):</i> 0.839, 95% CI [0.557, 1.264] int. vs 0.864, 95% CI [0.624, 1.195] (NSD between groups) <i>Time to recurrence (mean):</i> 1,429 days, 95% CI [1.347, 1.512] int. vs 1,332 days, 95% CI [1,223, 1,440] control (NSD between groups).	None
Costemale-Lacoste, 2017(4)	Booking specialized outpatient therapy follow-up while in the ED	Mental health professional	<i>Outpatient treatment engagement:</i> Adjusted OR=4.2, 95%CI [1.4, 12.6] at month 1 and adjusted OR=4.2, 95% CI [1.5, 12.3] at month 3	None
Costanza, 2020(5)	Risk assessed with the Risk, Urgency, and Dangerousness (RUD) scale; medication (lorazepam, olanzapine, and/or haloperidol) administered when concerns about suicide attempts in HBOT chamber	Multidisciplinary team	<i>Psychomotor agitation:</i> 29% pre-int. vs 8% post-int. <i>Suicide attempt in HBOT chamber:</i> 21% pre-int. vs 0% post-int.	Stress and subjective perceptions of safety of hyperbaric medicine unit teams
Exbrayat, 2017(6)	3 follow-up calls (8, 30, and 60 days after ED discharge) for risk assessment	Nurse	<i>Repeat attempt:</i> 12.6% int. vs 17.8% control ($p=0.037$), Adjusted OR: 0.45, 95% CI [0.26, 0.78]	None
Fairchild, 2019(7)	Therapeutic behavioral health interviews by video chat from a private room in the ED	Psychiatrist (via video chat) with in-person support from ED nurses and physicians	<i>Mean wait time (among suicide and intentional self-harm patients):</i> 14 min telehealth, 95% CI [11, 18] vs 18 min control, 95% CI [11, 30] ($p=0.436$)	Length of ED stay and cost of visit

Study	Intervention Characteristics	Mode of delivery/ Interventionist	Primary Findings	Secondary Outcomes
Hickey, 2001(8)	Psychosocial assessment by psychiatric team	Team of psychiatric nurses, psychiatrists, and social worker	<i>Repeated self-harm</i> : 37.5% non-assessed vs 18.2% assessed patients (within 1 year)	Psychiatric follow-up treatment
Knox, 2021(9)	SAFE VET: multicomponent intervention including tailored safety planning, internal coping strategies, identification of contacts who can offer crisis assistance (including VA's Suicide Hotline), plus intensive follow up	Acute services coordinator	<i>Acceptability</i> : 93% of those eligible agreed to be enrolled <i>Outpatient mental health visits</i> : 9.2 in 6 months after SAFE VET vs 4.9 in 6 months before SAFE VET ($p < 0.001$)	None
Kroll, 2020(10)	Select patients on suicide precautions in the ED received virtual monitoring throughout stay via mobile audiovisual device	Technicians supervised by nurses	<i>Verbal intervention (median)</i> : 1 (range 0-11) <i>Stat alarm (median)</i> : 0 (range 0-2)	Nurse preferences, discontinuation of virtual monitoring
Landes, 2021(11)	Sending patients at risk of suicide 11 brief, non-demanding expressions of care over 1 year	ED Team	<i>ED visits</i> : 2.5 post-int. vs 1.3 pre-int. ($p < 0.001$) <i>Outpatient mental health visits</i> : 1.0 post-int. vs 0.6 pre-int. ($p < 0.05$) <i>Inpatient admissions</i> : 1.4 post-int. vs 0.7 pre-int. ($p < 0.001$).	Reach
Mansfield, 2021(12)	Referral from ED to clinic with first visit scheduled within 3 days of ED visit; up to 4 weekly sessions (90 minutes at 1st session, 60 minutes thereafter); solution-focused brief therapy model	Mental health clinicians	71% of referred patients attended at least 1 outpatient therapy session <i>Among attenders with pre/post data</i> : <i>Suicidal ideation</i> : 44% post int. vs 80% at baseline ($p = 0.002$) <i>Among clinic attenders</i> : <i>ED utilization</i> : 9.4% post-int. vs 94.3% pre-int. ($p < 0.0001$) <i>Among attenders completing feedback survey</i> : <i>Mean scale item score</i> : 4.5/5	None
Miller, 2017(13)	Universal suicide risk screening plus secondary suicide risk screening by the ED physician, discharge resources, and post-ED telephone calls focused on reducing suicide risk	ED physicians, psychologists, and fellows	<i>Suicide attempts (incidence ratio intervention phase vs pre-intervention)</i> : 0.72, 95%CI [0.52, 1.00]	None
Mueller, 2020(14)	Bedside assessment of access to lethal means, 1 counseling session related to safe storage, and telephone follow up	Non-physician personnel (RN, etc)	75% of pts. implemented a specific storage plan	Psychiatry consults, distribution of gun locks

Study	Intervention Characteristics	Mode of delivery/ Interventionist	Primary Findings	Secondary Outcomes
	48-72 hours after ED discharge			
Shin, 2019(15)	4 case management sessions, once per week for 4 weeks, with links to psychiatric services and communicate rehabilitation centers	Social workers, nurses, and clinical counselors	<i>Decrease in suicide risk:</i> 65.3% completers vs 46.9% non-completers, adjusted OR=2.13, 95% CI [1.42, 3.20]	Untreated stressor and lack of support system
Son, 2020(16)	ED psych consult for a prior suicide attempt	Not specified who provided the consult	<i>Mortality:</i> 2.5% psychiatric consultation group vs 5.8% non-consultation group ($p<0.01$). Adjusted OR=0.41, 95% CI [0.23, 0.72] <i>Selecting non-fatal suicide methods:</i> Adjusted OR=0.47, 95% CI [0.36, 0.61]	None
Spaderna, 2021(17)	Buprenorphine (dose range from 2-16 mg) and referral for substance use disorder treatment	Prescriber not specified; assessment done by psychiatrist	<i>Treatment engagement:</i> All pts. remained engaged in outpatient substance use treatment for 30 days post-ED discharge	None
Stanley, 2015(18)	2-stage behavioral intervention that included (1) development of a safety plan intervention, and (2) brief structured telephone follow-up calls after ED discharge	Not specified	<i>Outpatient behavioral health attendance:</i> Increased post-int. vs pre-int. ($p=0.004$)	None
Stanley, 2018(19)	Brief clinical intervention that combined evidence-based strategies to reduce suicidal behavior through a prioritized list of coping skills and strategies. Telephone follow up with patients at least 2 times to monitor suicide risk and support treatment engagement	Social workers or psychologists and trained and supervised by senior project staff	<i>Engagement in suicidal behavior:</i> 3.03% int. vs 5.29% usual care during the 6-month follow-up period, OR=0.56, 95%CI [0.33, 0.95] <i>Attending at least 1 outpatient mental health visit:</i> OR=2.06, 95%CI [1.57, 2.7]	None
Vakkalanka, 2019(20)	Mental health telemedicine consultation with a mental health professional with expertise in crisis evaluation to provide (1) risk stratification, (2) placement services, and (3) specific ED-based care recommendations	Mental health professional	<i>ED LOS (mean):</i> not associated with telemedicine consultation <i>Hospital admission:</i> 2.35, (95%CI [1.10, 5.00]) times greater among intervention patients compared to control patients. <i>Involuntary hold:</i> Adjusted OR=0.48, (95%CI [0.23, 0.97])	None

Study	Intervention Characteristics	Mode of delivery/ Interventionist	Primary Findings	Secondary Outcomes
Wilhelm 2007(21)	Brief intervention delivered at 3 appointments	Clinician	<i>Clinic attendance rate: 75%</i> <i>Depression (among patients completing first session and post-intervention CES-D measure [mean]): 35.7 pre- vs 17.9 post-test (p<0.001)</i>	None

Abbreviations. ASSIP=attempted suicide short intervention program; BPD=borderline personality disorder; BUP=buprenorphine; CC=caring contacts; CBT=cognitive behavioral therapy; CO=carbon monoxide; DSP=direct support professional; ED=emergency department; GP=general practitioner; HBOT=hyperbaric oxygen therapy; Int.=intervention; LOS=length of stay; MHP=mental health professional; NR=not reported; NSD=no significant difference; OUD=opioid use disorder; RN=registered nurse; RT=respiratory therapist; SPI=safety plan interventions; SUD=substance use disorder; TAU=treatment as usual.

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Table S5. Relevant Studies in Progress

Author/sponsor	NCT #	Title	Intervention	Completion date/status
<i>Suicide attempt/Suicidal Ideation</i>				
Phillippe Birnes / University Hospital, Toulouse	NCT00641498	Effectiveness of Standard Emergency Department Psychiatric Treatment Associated with Treatment Delivery by a Suicide Prevention Center	Individual supportive psychotherapy initiated in the emergency department vs usual therapy	Completed (2015) No posted or published results
Da Silva, 2021	None	Effects of psychosocial interventions among people cared for in emergency departments after a suicide attempt: a systematic review protocol	All types of psychosocial interventions initiated and/or carried out worldwide in emergency departments after suicide attempts	In progress
Simon Hatcher / University of Ottawa Hospital	NCT02718248	Pilot Study of a Smart Phone Assisted Problem Solving Therapy for Men Who Have Presented With Intentional Self-harm to Emergency Departments + Face to face problem solving therapy every week for 6 weeks	CHESS Mobile Health smart phone application	Completed (Aug. 2018) Results posted but not published
Beatriz Rodriguez Vega / La Paz University Hospital	NCT04230434	Safety-Planning Intervention for Suicidal Behavior in an Emergency Department: an Effectiveness-implementation Hybrid Design	The Safety Plan Intervention (SPI) performed in ED or in ambulatory appointment	Completed (Feb. 2020) No posted or published results
<i>Opioid Overdose</i>				
Michael P Bogenschutz NYU Langone Health Wright State University	NCT02586896	Comparing Interventions for Opioid Dependent Patients Presenting in Medical Emergency Departments	Behavioral: Strengths-based Case Management (SBCM) Behavioral: Screening, Assessment, and Referral (SAR)	Completed (May 2020) Results posted but not published
<i>Psychosis</i>				
Polillo, 2020	NCT04298450	ED to EPI: protocol for a pragmatic randomized controlled trial of an SMS (text) messaging intervention to improve the transition from	SMS text intervention to engage patients during the waiting period for consultation	In progress

the emergency department to appointment -
early psychosis intervention randomized to receive
for young people with either sham or active
psychosis SMS intervention.

Abbreviations. CHES=Comprehensive Health Enhancement Support System; ED=emergency department; EPI=early psychosis intervention.

Table S6. Characteristics of Observational Studies for Overdose

Study	Sample Size Follow-up	Population & Setting	Intervention Characteristics	Comparator	Outcomes Assessed
Liebling, 2021(1)	N=1,893 8 weeks	Opioid overdose 13 EDs in New Jersey Age: 41.4 yrs. 69.2% male 53.3% white	Recovery specialists deployed to EDs to provide support and consultation	None	Acceptance of recovery support services, acceptance of patient navigator services
Monico, 2020(2)	N=2,382 90 days	Opioid overdose 23 EDs in Maryland Demographics NR	Brief intervention with motivational interviewing with follow up and referral to services	None	Engagement with peer recovery specialist, referral to treatment, linkages to treatment
Samuels, 2019(3)	N=555 NR	Opioid overdose 2 EDs in Rhode Island Age: 83.4% <50 yrs. 63.6% male 82% white	Motivational interviewing and stages of change behavioral framework	Pre-implementation vs post- implementation vs maintenance	Take-home naloxone, recovery coach consolation, referral to treatment
Samuels, 2021(4)	N=1,585 NR	Opioid overdose 10 EDs in Rhode Island Age: 42.5% 25-34 yrs. 69.3% male 72.2% white	Levels of care standards, including take-home naloxone, behavioral counseling and referral to treatment	Pre-implementation vs post- implementation of levels of care standards	Take-home naloxone, behavioral counseling, referral to treatment or inpatient admission
Scheuermeyer, 2018(5)	N=1,009 NR	Opioid overdose (fentanyl) 1 ED in Canada Age: 34	Physician assessment, monitoring, triage and discharge	None	Hospital admission, death

Study	Sample Size Follow-up	Population & Setting	Intervention Characteristics	Comparator	Outcomes Assessed
		75.9% male Race NR			
Waye, 2019	N=1,392 10 days	Opioid overdose 10 EDs in Rhode Island Age: 45.5% 40-64 yrs. 69.1% male 81.9% white	Peer recovery specialist consult in the ED with overdose education and naloxone training and distribution and referral to services	None	Receipt of naloxone training, engagement with recovery specialist, service referral

Abbreviations. ED=emergency department; NR=not reported; yrs.=years.

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Table S7. Intervention Details and Findings of Observational Studies for Overdose

Study	Intervention Characteristics	Mode of delivery/ Interventionist	Summary of Primary Findings	Primary Findings	Secondary Outcomes
Liebling, 2021(1)	Recovery specialists consult with patients for at least 8 weeks, with minimum contact of 1x/week	Recovery Specialists: certified Peer Recovery Specialists with ≥ 2 yrs. lived experience in principles of recovery and high school diploma/ equivalent, with clinical/ nonclinical supervision	About half of referred patients with opioid overdose accepted recovery support services.	<i>Accepted recovery support: 51.5%</i> <i>Accepted Patient Navigator services: 26.9%</i>	None
Monico, 2020(2)	Brief intervention with motivational interviewing with follow up and referral to services	Peer recovery specialist trained in motivational interviewing	Of patients with a suspected opioid overdose, over half were referred to the intervention program and over half were successfully engaged.	<i>Engagement: 63.2%</i> <i>Referral to treatment: 25.7%</i> <i>Linkage to treatment: 19%</i>	None
Samuels, 2019(3)	Motivational interviewing and stages of change behavioral framework	ED nurse and peer recovery coach (individuals in addiction treatment ≥ 2 yrs. with 36-hour peer recovery coach training)	Take-home naloxone, consultation with recovery coach, and discharge with referral to treatment all increased after implementation of program.	<i>Take-home naloxone: 0% pre vs 56.5% post</i> <i>Recovery coach consultation: 0% pre vs 49.1% post</i> <i>Referral to treatment: 1.9% pre vs 14.9% post</i>	Referral to treatment, specialty consultation
Samuels, 2021(4)	Levels of care standards, including take-home naloxone, behavioral counseling, and referral to treatment	ED provider, nurse, peer recovery coach, counselor, social worker, or psychiatrist	More patients were discharged with naloxone after implementation of the standards. Fewer patients received behavioral counseling and referral to treatment after implementation of the standards.	<i>Discharged with naloxone: 1.53, 95% CI [1.16, 2.02]</i> <i>Received counseling: 0.66, 95% CI [0.50, 0.87]</i> <i>Referred to treatment: 0.72, 95% CI [0.55, 0.95]</i>	Patient started medication for OUD in the ED
Scheuermeyer, 2018(5)	Physician assessment, monitoring, triage and discharge	ED physician and nurse	Few patients received additional naloxone in ED, were admitted, or died.	<i>Naloxone in ED: 1.6%</i> <i>Inpatient admission: 0.1%</i> <i>Death within 24 hrs: 0.1%</i>	Length of Stay
Waye, 2019(6)	Single consultation before discharge with targeted follow-up to 10 days	Peer recovery specialist (individuals in addiction treatment ≥ 2 yrs. certified by board peer recovery specialist exam)	A majority of patients contacted received naloxone training and agreed to see a recovery specialist.	<i>Receipt of naloxone training: 88.7%</i> <i>Agreed to see recovery specialist: 86.8%</i> <i>Agreed to services referral: 50.8%</i>	None

Abbreviations. ED=emergency department; OUD=opioid use disorder. PRCS=post rehab conditioning specialist; yrs.=years.

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