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Evidence Check

Management of suicidal behaviour – evidence for models of care: a rapid review

An **Evidence Check** rapid review brokered by the Sax Institute for the NSW Ministry of Health, March 2014.

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This report was prepared by:

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March 2014

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Management of suicidal behaviour – evidence for models of care: a rapid review

An **Evidence Check** rapid review brokered by the Sax Institute for the NSW Ministry of Health, March 2014.

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Contents

1 Executive Summary

Suicide is a prominent public health concern. For all ages, suicide is now the leading cause of death due to injury in Australia, ahead of motor vehicle accidents and homicide, equating to an average of six deaths by suicide in Australia each day. Many more people exhibit intentional self-harm, either as suicide attempts, or self-inflicted poisoning or injury. As a high proportion of people who commit or attempt suicide consult a health professional prior to committing these acts, it is believed that health staff ought to be able to identify people at risk of suicide, and prevent suicide by implementing effective management strategies. This review assesses the evidence for identification and management of people presenting to health services with suicidal behaviour or ideation.

Method

Searches were undertaken in February 2014 of Medline, Embase, PsycINFO, CINAHL and Scopus databases, and the Cochrane, Joanna Briggs Institute, and Campbell Collaboration libraries (limited to English language, published from 2003 to current). Hand searching of reference lists was also conducted. We prioritised inclusion by the quality of the available evidence. Large systematic meta-analyses were deemed the highest quality, followed by graded practice guidelines, then large, well-conducted primary studies (randomised controlled trials, prospective cohort studies), and lastly reviews with no pooled data. Expert opinion was taken into consideration if from a reputable source (usually guideline authors). Case studies were excluded as we were unable to objectively assess study quality.

The reporting transparency of reviews was assessed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement, and of observational studies using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement. The overall evidence was graded using the Recommendations Assessment, Development and Evaluation (GRADE) Working Group approach.

Results

We included 41 reviews, guidelines or primary studies. This review largely confirms suicide risk factors that have long been documented, such as having a history of suicide attempts or self-harm, depression or hopelessness (all rated moderate or moderate to low quality). More recent evidence suggests suicide risk for medications associated with emergent suicidality (moderate to high quality), sexual minority groups and war veterans (both moderate quality), and for Indigenous populations (low quality). While screening tools are recommended in several reviews and guidelines, they are given a moderate, or moderate to low, quality rating, and this, combined with their insufficient sensitivity and specificity, suggests they are not reliable for use in clinical practice for predictive purposes. Therefore, assessment should be based on a comprehensive clinical interview, involving family members if possible and when appropriate. Clinical assessment should encompass a detailed evaluation of suicidal behaviour and ideation, a full psychiatric diagnostic assessment, and determination of the psychosocial circumstances of the individual, and clinicians need to be trained in these areas to increase knowledge of suicidality, depression and distress.

There is also a notable lack of high quality evidence for management strategies for reducing suicidal behaviour while admitted to hospital, as well as post-discharge, with a substantial proportion of the evidence being derived from clinical or expert opinion. The highest quality evidence (moderate to high quality) comes from the Centre for Suicide Prevention, University of Manchester in the UK, which supports implementing the removal of non-collapsible curtain rails and low-lying ligature points in hospitals, providing single point of access 24-hour crisis teams, conducting seven-day post-discharge follow-ups, providing assertive outreach teams in the community, in addition to the implementation of specific policies for dual diagnosis (for comorbid substance and psychiatric disorders), patients who abscond, patients not taking medications, information sharing with criminal justice agencies, transfer from child and adolescent to adult units, training front-line clinical staff in suicide risk management at least every three years, and

postsuicide multidisciplinary reviews to provide feedback to families and health settings. Moderate to high quality evidence also suggests providing psychotherapy to adults in primary care settings (cognitive behavioural therapy, dialectical behavioural therapy, problem-solving therapy and psychodynamic therapy).

Conclusion

Moving away from screening checklists towards a more comprehensive clinical assessment, as the first step in clinical assessment of patients with suicidal ideation and behaviours, would provide a more clinically useful basis for decision-making in relation to management, as well as a more tailored or individual-oriented treatment pathway. Optimal management entails the provision of a range of clinical services and development of particular policies for certain clinical problems. Best practice involves general mental health practices, and not merely those focused on suicide and related self-harm behaviours.

2 Introduction

Suicide is a prominent public health concern. For all ages, suicide is now the leading cause of death due to injury in Australia, ahead of motor vehicle accidents and homicide.[1]

In Australia during 2011, 2237 (10.0 per 100,000) people committed suicide, and 76% of these were males (1727, 15.3 per 100,000; 546 females, 4.8 per 100,000). This equates to an average of six deaths by suicide in Australia each day, accounting for 1.5% of deaths from all causes. Averaged over the years 2007–2011, the highest state-based standardised suicide rates were in the Northern Territory (19.3 per 100,000) and Tasmania (14.1 per 100,000), followed by Western Australia (13.1 per 100,000). New South Wales (8.6 per 100,000) and Victoria (9.6 per 100,000) had the lowest standardised rates of suicide. For those of Aboriginal and Torres Strait Islander descent, the relative age standardised suicide rate is 2.5 times higher for males and 3.4 times higher for females than for the corresponding non-Indigenous population. Suicide rates for Australian men born outside Australia are slightly lower than for Australian-born men, whereas corresponding rates for women born overseas are very similar to those for Australian-born women.[2]

The highest age-specific suicide rate for males in 2011 was observed in the 85+ age group (32.1 per 100,000). The next highest age-specific suicide rate was in the 80–84 year age group (24.4 per 100,000) and the 45–49 year age group (23.8 per 100,000). The lowest age-specific suicide rate for males was in the 15–19 year age group (10.4 per 100,000), although suicide accounted for 25.8% of deaths among males in this age group and 29.0% of deaths among 20–24 year old males; the corresponding percentages for females are 21.0% and 25.0%, respectively. The highest age-specific suicide rate for females was observed in the 85+ age group (7.8 per 100,000), followed by the 40–44 age group (7.7 per 100,000) and the 30–39 age group (7.4 per 100,000). The lowest age-specific suicide rate for females was observed in the 65–69 year age group (3.5 per 100,000). Based on five-year aggregate scores from 2007 to 2011, child suicide (5–15 years) rates were low in both males (age-standardised 0.4 per 100,000) and females (0.3 per 100,000).[2]

Intentional self-harm involves both suicide attempts and purposely self-inflicted poisoning or injury without suicidal intention. Many more people exhibit this behaviour than suicide completion. In New South Wales during 2010–2011, the rate of hospitalisation for intentional self-harm in females was 154.4 per 100,000, and in males it was 101.1 per 100,000. Unlike completed suicides, the rate of self-harm is higher in females than males, particularly females aged 15–24 years (358.1 per 100,000 compared to 165.1 in males).[3]

It is generally believed that appropriate intervention at the right time ought to be able to prevent suicide from occurring. As a high proportion of people who go on to commit suicide consult a health professional prior to their suicide, it is also believed that health staff ought to be able to identify people at risk of suicide and prevent suicide by implementing effective management strategies.[4] The aim of this review is to summarise and quality assess the available evidence on risk factors, assessment and management of suicidal behaviour and ideation in NSW healthcare settings, and thereby address the questions put by the Sax Institute in the 'Proposal to Researchers'.

3 Method

Literature searches

Searches were undertaken in February 2014 of Medline, Embase, PsycINFO, CINAHL and Scopus databases, and the Cochrane, Joanna Briggs Institute, and Campbell Collaboration libraries (limited to English language, published from 2003 to current). Hand searching of reference lists was also conducted.

Search strategy for Medline, Embase and PsycINFO:

1. exp Primary Health Care/ or exp 'Delivery of Health Care'/ or models of care.mp.
2. treatment.mp. or exp Therapeutics/
3. exp Primary Prevention/ or prevention.mp. or exp Secondary Prevention/
4. access to care.tw.
5. models of care.tw.
6. patient?centred care.tw.
7. risk assess$.tw.
8. discharge plan$.tw.
9. screen$.tw.
10. assess$.tw.
11. experience of care.tw.
12. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11
13. exp Suicidal Ideation/ or suicide ideation.mp.
14. suicid$ behav$.tw.
15. suicid$ ideation.tw.
16. suicid$ thoughts.tw.
17. suicide risk$.tw.
18. self?harm.tw.
19. attempt$ suicide.tw.
20. 13 or 14 or 15 or 16 or 17 or 18 or 19
21. 12 and 20
22. slimit 21 to (english language and full text and yr='2003-Current')

Search strategy for Scopus and CINAHL:

TITLE-ABS-KEY(screening OR assessment OR risk OR care) AND TITLE-ABS-KEY((suicide AND (ideation ORbehaviour OR thoughts OR attempt)) OR self?harm) AND PUBYEAR > 2003 AND (LIMIT-TO(LANGUAGE,'English'))

Grey literature (including practice guidelines and policy directives) was identified via Google search and inspection of government health services websites.

Inclusion criteria

We prioritised inclusion by the quality of the available evidence for each question and sub-question. For example, there were several meta-analyses, systematic reviews and primary studies assessing antidepressant-emergent suicidality, but we included only the highest quality and most comprehensive meta-analyses. We have noted other good quality meta-analyses for reference.

Quality assessments

Large systematic meta-analyses were deemed the highest quality, followed by graded practice guidelines, then large, well-conducted primary studies (randomised controlled trials [RCTs], prospective cohort studies), and lastly systematic reviews with no pooled data. Expert opinion was taken into consideration if from a reputable source (usually guideline authors). Case studies were excluded as we were unable to objectively assess study quality.

The reporting transparency of reviews was assessed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.[5] Similarly, the reporting quality of primary studies wasassessed using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)

statement for observational studies.[6] No individual RCT was included. Where possible, data were quantified into 'small', 'medium', or 'large' effect sizes using standardised guidelines[7,8] and assessed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group approach[9,10], which includes appraisal of the consistency across study results, precision (narrow confidence intervals) and directness (direct assessment or comparisons) of the reported effects. Using this method, RCTs are intrinsically high quality, but may be downgraded if results are inconsistent, imprecise or indirect, or with small samples and effect sizes. Conversely, observational studies (cross-sectional, case-control, cohort) are intrinsically low quality due to potential confounding factors, but may be upgraded for consistency, precision, directness, dose-response relationships, and large samples or effect sizes. Given the topic, prospective cohort studies were not downgraded as they provide a good indication of which risk and assessment factors are related to suicide over the follow-up period. The evidence was also upgraded if the PRISMA or STROBE showed a low possibility of reporting bias. Results are reported as significant if $p<0.05$, and when p values are not reported, the studies have stated that results were statistically significant.

4 Results

Search results

The searches identified 4050 unique references, with 546 reviews or guidelines which were assessed first. Where no systematic review, meta-analysis, or guideline was available for a particular issue, we searched the remainder of the results for good quality primary studies. We have thus included a total of 41 reviews, guidelines or primary studies using these criteria (see tables 1–4).[11–51]

Review questions:

What are the features (components) of effective models of care for persons expressing suicidal ideation in the health setting? Please review this evidence base with a particular focus on:

Question 1a: Recognition of patients at risk (including patients who present in crisis and also those who are chronically ill (with a mental or other illness) who exhibit suicidal behaviour, including communication of identified risk to other parties, e.g. services, systems, team-based, and family/carer)

The most recent research largely supports the generally known risk factors for suicide, and therefore does not substantially advance our knowledge for identifying those at risk based on these factors. However, we present the evidence below in order of quality so that risk factors with higher quality might perhaps be given more weight in certain care settings (e.g. general emergency departments and mental health care settings). See Table 1.

The highest quality evidence available is rated moderate to high and identifies several drugs (antidepressants, antiepileptics, and the ADHD drug atomoxetine) that appear to have treatment-emergent risk for suicidal ideation or behaviour. First, young adults (<25 years) on antidepressants have a medium sized increased risk of suicidal behaviour, and children and adolescents have a small to medium sized increased risk of suicidal ideation or behaviour.[28] These findings stand regardless of class of drug, sex, or ethnicity. For children and adolescents, it also stands for stage of treatment, with no clustering in events at the beginning of antidepressant trials; this was an unexpected result.[17] Moderate to high quality evidence also suggests a small to medium sized increased risk of suicidal behaviour in people taking antiepileptic drugs, particularly for epilepsy as opposed to psychiatric disorders or for other reasons[21], and a medium sized increased risk of suicidal ideation in males aged 7–12 years who are taking atomoxetine, primarily for ADHD.[11] These findings suggest treatment-emergence because most studies have excluded those with suicidal ideation or behaviour prior to randomisation, and the randomisation process should distribute equally across drug and placebo groups those who had prior proneness to suicidality.

Moderate quality evidence suggests a large increased risk of suicide in people with substance use disorders (particularly women and people <35 years), mood disorders (particularly women and people >50 years), and those with a history of previous suicide attempts or self-harm.[29] There is also a medium to large effect of increased suicidality in homosexual youth, with risk highest in bisexual youth.[23] There is increased risk in war veterans with post-traumatic stress disorder (PTSD)[27], and a medium to large increased risk in schizophrenia patients in general, particularly those with higher education, recent loss, a family history of depression, feelings of worthlessness, impulsiveness, and non-compliance with treatment; there is a small effect for males with schizophrenia. People with borderline or antisocial personality disorder, and females with anorexia nervosa, are also at increased risk, as are people with a serious physical illness, recent stress, past experience of childhood abuse, or those who have recently been discharged from hospital (<7 days) after being admitted for suicidality.[19]

Moderate to low quality evidence suggests a medium sized increased risk of suicide among people who are divorced/single or unemployed[29], and a large increased risk for schizophrenia patients experiencing hopelessness or fear of mental disintegration.[18] For psychiatric patients during hospitalisation and for up to one year after discharge, moderate to low quality evidence suggests a medium effect of having a history of suicide attempts or self-harm, depressive symptoms or hopelessness, although their predictive value is low.[50, 51] There is a medium effect of increased suicide in ADHD males (particularly those with comorbid conduct disorder or depression)[20], and inpatients with affective disorders are at increased risk of self-harm

compared to inpatients with schizophrenia, but schizophrenia patients are more likely to suicide while on leave from hospital.[12]

Finally, low quality evidence indicates risk factors in urban Aboriginal youth (we identified only one well-conducted cross-sectional study), which reports increased suicidal ideation or behaviour with high emotional or social distress, less cultural connection, and behavioural factors including drug and alcohol use.[22]

Summary

The literature review largely confirms suicide risk factors that have long been documented. There is more recent evidence for suicide risk for medications associated with emergent suicidality, sexual minority groups, war veterans, and for Indigenous populations.

Question 1b: Methods for assessing risk (including formal screening tools and potential relationship to outcomes, e.g. suicide attempt/completion)

Moderate quality evidence was found concerning the following instruments for *initial screening* of adults and children older than 10 years presenting to emergency departments or acute mental health care settings.[14] See Table 2.

Manchester Self-Harm Rule (MASH):

This is a four-question rule asking if there is (1) a history of self-harm, (2) previous psychiatric treatment, (3) current psychiatric treatment, and (4) benzodiazepine taken as an overdose. A 'yes' to any of these questions puts patients in a high-risk category. Sensitivity and specificity of global clinical assessments were compared with MASH, resulting in 85% vs 94%, respectively, for sensitivity and 38% vs 26%, respectively, for specificity. They both also recorded similar positive predictive values (22% vs 21%) and negative predictive values (92% vs 96%).[52]

The P4 screener:

Similarly, the P4 screener assesses patients by asking four questions (4Ps): (1) *past* suicide attempts, (2) *plan* for acting out suicide, (3) *probability* of completing suicide, and (4) *preventive* factors (4Fs) – *family*, *future*, *faith*, and *fear* of failing in their attempt. Minimal risk patients are those who have neither a past history nor a suicide plan and also responded 'not at all likely' to the question about probability of an attempt. Lower risk patients are those who indicated they had a plan and/or past history but responded 'not at all likely' to the question about probability, and noted there were factors preventing them from taking action. Higher risk patients were those who reported the probability of a suicide attempt as either 'somewhat likely' or 'very likely' and/or reported there were no factors preventing them from taking action. No sensitivity or specificity statistics were found for this scale.[53]

ReACT Self-Harm Rule:

The ReACT Self-Harm Rule was derived using follow-up data from a prospective cohort study of presentations to emergency departments. A self-harm presentation was classified as higher risk if at least one of the following factors was present: recent self-harm (in the past year), living alone or homelessness, cutting as a method of harm, and treatment for a current psychiatric disorder. The rule performed with 95% sensitivity and 21% specificity.[54]

Behavioral Health Screening – emergency departments (BHS-ED):

This instrument has been reported as having 'reasonable' sensitivity, and specificity ranged from 78% to 85%. It focuses on depression, suicidal ideation, post-traumatic stress, risk behaviours and stress. It is a 63-item scale and includes 42-item follow-up questions taking approximately 15 minutes to complete.[55]

Risk Assessment Matrix (RAM):

The RAM is recommended for adults. It is a mental health triage tool designed to assist emergency department staff to make a rapid and accurate assessment of a patient with a suspected or actual mental health problem, and to identify patients at immediate risk of self-harm or suicide.[56] No sensitivity or specificity statistics were found.Moderate quality evidence was found for the use of the following instruments for *follow-up assessments* as part of an overall clinical interview conducted by medical staff trained in culturally appropriate suicide assessment.[14,24]

Beck's Suicide Intent Scale (SIS):

This scale was developed for use in adults to assess the severity of suicide attempts. It consists of 15 questions which take into account the characteristics of the attempt, such as precautions taken against discovery, degree of planning, expectation of fatality, and perceived seriousness of the attempt. The authors state that the scale has high reliability and validity (statistics not provided), but data regarding the relationship between intent and medical lethality of attempts are mixed. Further, aspects of suicide intent (e.g. precautions against discovery) have been shown to have predictive value in adults, but it is not clear whether the SIS conveys any unique information about prognosis or treatment considerations in adolescents.[57] No specificity and sensitivity statistics were found.

Depressive Symptom Inventory – Suicidality Subscale (DSI-SS):

This scale is for use in adults. It is a four-item self-report questionnaire designed to identify the frequency and intensity of suicidal ideation in the past two weeks, in which item scores range from 0–3, and inventory scores from 0–12, with higher scores reflecting greater severity of suicidal ideation. DSI–SS items assess frequency of suicidal ideation, development of a suicide plan, and an inability to control suicidal thoughts and suicidal impulses in most situations.[58] No specificity and sensitivity statistics were found.

Suicidal Ideation Questionnaire (SIQ) and Suicidal Ideation Questionnaire Junior (SIQ-JR):

These scales are for adolescents (SIQ) and children (SIQ–JR), and each of their items is rated on a 7-point scale, ranging from 0 ('I never had this thought') to 6 ('almost every day'). The scores of each item are summed to yield a total score reflecting severity of suicidal ideation. As these scales are oriented towards suicidal ideation, there is no item assessing suicide attempts, and therefore it cannot be used as an instrument to identify past or current attempters. Using cut-offs of 41 on the SIQ and 31 on the SIQ–JR, sensitivity was 79% and 92%, respectively, and specificity was 69% and 76%, respectively. It has been suggested that a cut-off score of 20 on the SIQ in a clinical setting might prove more useful than the higher cut-off in identifying youths in need of further evaluation for suicide risk.[57]

Violence and Suicide Assessment Form (VASA):

Constructed for use in a psychiatric emergency room for assessment of adults, this scale was found to predict suicide precautions on wards, harassment of other patients as assessed from nursing notes, and indicators of violence on wards.[59] No specificity and sensitivity statistics were found.

Nurses Global Assessment of Suicide Risk (NGASR):

This scale was developed to help novice practitioners with assessment of suicide risk in adults. It is based on 15 items, with some, such as 'evidence of a plan to commit suicide' given a weighting of 3, while others, such as 'history of psychosis', are weighted as 1, giving a maximum total score of 25. Scores of 5 or less are considered low level of risk, 6–8 are intermediate level of risk, 9–11 are high level of risk, and 12 or more are very high level of risk.[60] No specificity and sensitivity statistics were found.

Risk of Suicide Questionnaire (RSQ):

This scale is recommended for adults and children and can be used during emergency room visits. It is stated that it takes two minutes to detect children and adolescents at risk for suicide. Four questions were shown to identify 98% of children at risk: (1) Are you here because you tried to hurt yourself? (2) In the past week, have you been having thoughts about killing yourself? (3) Have you ever tried to hurt yourself in the past other than this time? (4) Has something very stressful happened to you in the past few weeks?[61, 62] No specificity and sensitivity statistics were found.

Additionally, moderate to low quality evidence was found for the use of the Beck Hopelessness Scale (BHS; 80% sensitivity and 42% specificity[24]) in hospital settings for adults, and moderate quality evidence suggests some benefit for suicide screening in primary care settings.[25]

Summary

While screening tools are recommended in several reviews and guidelines, they are given a moderate, or moderate to low, quality rating, and combined with their insufficient sensitivity and specificity (reported in only a limited number of studies), we suggest they are not reliable for use in clinical practice for predictive purposes. Furthermore, with the base rate of completed suicides so low, it is unlikely that, based on current knowledge, a new scale or refinements of existing instruments would yield further predictive capacity for completed suicide sufficient for clinical purposes.

Question 1c: Clinical management and care pathways (including access to services, timing of care, coordination of care, and follow-up, note: the evidence base can include qualitative 'experience of care' feedback from patients)

The following summary outlines what may be regarded as a recommended protocol after a patient's *initial presentation to services, and extending to the short-term period following discharge.* See Table 3.

Initial management:

There is only moderate to low quality evidence supporting consensus protocols for the identification and prioritisation of patients presenting to general medical, acute psychiatric, or general emergency departments with suicidal thoughts or behaviour. According to these protocols, individuals who screen positive for high risk of suicide or self-harm should be elevated to a high priority triage category and assessed by a doctor within an hour. Very high-risk patients (risk of immediate harm to self or others) should be assessed by a doctor immediately and kept under constant supervision.[32] If an acute medical emergency results from self-harm, this should be given priority for stabilisation prior to any assessment of mental state.[30] Various pharmacological sedation protocols may be used in the event of acute aggression or violence.[31] Training emergency department staff in suicide management is recommended[63], as moderate quality evidence from the US suggests that most emergency department providers are inadequately trained to confidently manage those presenting with suicidal risk.[34]

According to these protocols, comprehensive mental state assessment should be undertaken following a positive screen, including *psychiatric evaluation, psychosocial assessment*, and detailed *suicide risk assessment*. *Suicide risk assessment* aims to determine the severity of self-harm, or suicidal thoughts or behaviour.[19,30,31] These include identifying any specific plans for suicide, how lethal was the chosen method, how persistent were the attempts and what precautions against discovery were planned. In addition, clinicians are expected to elicit details of any previous suicide attempts. *Psychiatric evaluation* seeks to determine whether a relapsed, inadequately managed, or previously undiagnosed psychiatric disorder may be underlying the current clinical presentation. *Psychosocial assessment* refers to evaluation of any external factors that may contribute to the patient's current distressed state, such as stressors, life events, coping styles, etc.

Identification of suicide risk in patients attending primary care settings is an area that has received little attention. Moderate to low quality evidence suggests some effectiveness of brief health screening in primary care for identifying at-risk individuals, who may then be referred for on-site mental health evaluation with a dedicated psychiatric social worker.[39] Additional moderate to low quality evidence supports the utility of clinician/GP training programs to improve knowledge and screening practices for depression and suicide, with demonstrated benefits for increased mental health service use and reduced suicide rates.[46] Following positive identification in a primary care or other community setting, people at immediate or severe suicide risk would then be transferred to emergency departments or acute care settings, while individuals at lower risk may be referred to secondary mental health services for the development of a management plan in conjunction with their GP.[31]

Evaluation for discharge or admission to acute care:

Moderate to high quality evidence suggests the probability of discharge into the community from emergency departments in youth (<20 years) presenting with self-harm behaviour is related to low lethality of method, no psychiatric disorder or assessment of such, and low regional socio-economic status.[35] Moderate to low quality evidence identified predictors of discharge in all patients presenting to hospital emergency departments. The strongest predictors of discharge included not describing a specific suicide plan, no history of attempted suicide, and no current psychotic symptoms.[41] Other reasons for discharge may include resolution of the crisis, restricted means for suicide, being medically stable, presenting with non-lethal forms of self-harm, initiation/resumption of treatment for an underlying psychiatric disorder, family support, or having adequate referral to outpatient mental health services.[31] Conversely, potentially important factors predicting admission to hospital include male sex, having no stable housing, having a current psychiatrist, having health insurance, or having a longer initial evaluation (more than 180 minutes).[41]

Moderate quality evidence suggests that day hospitals (including provision of group-based therapies) may provide a viable alternative to either inpatient admission or discharge to the community for people with acute suicidal thoughts or behaviours. In persons with severe suicidal thoughts, day hospitals were associated with greater reductions in severity of suicidality than a general (overnight) inpatient ward, in addition to more positive subjective ratings from patients.[43]

During inpatient admission:

Moderate to high quality evidence suggests removal of non-collapsible curtain rails and low-lying ligature points for reducing suicides.[49,63] Moderate to low quality evidence suggests removal of other potential hazards, placement in a secure room (locked windows) near a nurses' station, and provision of a risk assessment at the beginning of each shift changeover, with vigilant ongoing supervision, although there is contradictory evidence as to the intensity of supervision required.[31,32,36] There is no evidence to support the use of safety/no-harm contracts between patient and clinician for preventing future self-harm, although they have often been recommended to strengthen the therapeutic alliance.[36]

Post-discharge and community-based care:

Moderate to high quality evidence suggests post-discharge follow-up within seven days of discharge from inpatient care, and the provision of 24-hour acute crisis teams in the community setting, are associated with reducing suicides.[49,63] The week following discharge is reported to present the highest risk of repeated self-harm attempts, and thus discharge planning with scheduled appointments and follow-up during this time is said to be crucial. However, moderate quality evidence suggests that adherence to a follow-up protocol may vary in association with other factors; lethality of self-harm method, presence of psychiatric or other diagnoses, and higher regional socio-economic status were all associated with higher rates of follow-up.[31,32] Moderate quality evidence suggests no benefit in providing discharged patients with 24-hour emergency contact details (e.g. phone number) in the form of 'green cards' or on-call crisis management assistance if this information is provided without additional mental health treatments[19]; however, such a strategy appears to have some utility when integrated within a broader structured management program.[44] Moderate quality evidence from one study found that a brief intervention (family cognitive behavioural therapy) administered in emergency departments might be beneficial for improving later engagement in outpatient therapy in a paediatric population, although no benefit was reported for reductions in rates of repeat suicide attempts or suicidality.[33]

No new evidence is available to inform the best practice protocol for immediate management of suicidality within community health settings. In many cases, this is because identification of severe suicide risk within primary care or other community settings generally results in transfer to emergency or acute psychiatric care.

The following summary outlines the recommended protocols after discharge for *ongoing treatment/management*. See Table 4.

Treatment options:

Moderate to high quality evidence suggests that linking patients with assertive outreach teams in the community has significant benefit for reducing suicide completion.[49] Moderate to high quality evidence also suggests some benefit of psychotherapy for adults in primary care settings (including cognitive behavioural therapy, dialectical behavioural therapy, problem-solving therapy and psychodynamic therapy) for reducing suicide attempts or self-harm.[25] Moderate quality evidence suggests gatekeeper training and educational interventions in Indigenous communities may have significant short-term benefits for improving detection of those at ongoing risk, but not for prevention of suicide.[37]

Suicide prevention strategies:

At the population level, moderate quality evidence suggests nationwide government-led suicide prevention programs have decreased suicide rates, with particularly strong effects in elderly and young people.[47] The evidence is unclear regarding the measurable effectiveness of restricting access to prevalent suicide methods (firearms, jump sites, substances used in overdose). Although associations have been reported between reduced availability or accessibility of certain methods of suicide and fewer suicides using those restricted methods, the effect of these restrictions on overall suicide rates is unclear.[38]

At the service level, moderate to high quality evidence suggests the following have significant benefit for reducing suicide rates in the community: 24-hour single point of access crisis resolution/home treatment teams, assertive outreach teams, and the implementation of policies for dual diagnosis (for comorbid substance and psychiatric disorders), patients who abscond, patients not adherent to medications, information sharing with criminal justice agencies, transfer from child and adolescent to adult units, training front-line clinical staff in suicide risk management at least every three years, and post-suicide multidisciplinary reviews to provide feedback to families and health settings.[49,63]

At the individual level, moderate to low quality evidence suggests that regular and early follow-up with patients following discharge may improve short-term treatment adherence.[44] Furthermore, some benefit has been reported for postal follow-up contacts (e.g. 'caring letters' from the treating doctor) in reducing self-harming behaviours in the medium term; however, a similar effect was not found for telephone follow-up contacts.[45]

5 Summary

The majority of recent research does not permit substantial advances beyond the current consensus practices for acute management of suicidality. There is a notable lack of high quality evidence, with a substantial proportion of the evidence being derived from clinical or expert opinion, and the evidence for best practice management strategies in primary care and community settings is scarce. The highest quality evidence for *immediate* management supports implementing removal of non-collapsible curtain rails and low-lying ligature points in hospitals, conducting post-discharge follow-ups within seven days, and provision of single point of access 24-hour crisis teams and a dual diagnosis policy.

Question 1.1: What are the operational definitions of 'effectiveness' when evaluating models of care?

The operational definitions of 'effectiveness' when evaluating models of care are measurable declines in rates of suicide attempts and rates of completed suicide among individuals exposed to healthcare services. Other potential variables such as depression or suicidal ideation would be regarded as secondary and indirect measures of effectiveness only.

Question 1.2: What evaluation measures have been used to monitor 'effectiveness'? (cf Question 1.1)

Evaluation measures include a reduction in rates of subsequent (i.e. repeated) presentations to health services (e.g. emergency departments) after self-harm or suicide attempts, and reductions in rates of coronial findings of suicide.

Provide recommendations for the NSW setting that address:

Question 2a: What constitutes 'best practice' for NSW? (note: from comparing/contrasting models of care (cf Question 1), the reviewer may highlight (if possible) examples of merit)

Much of what passes for specific policies in relation to clinical management and service pathways for suicidality and suicide prevention would qualify as clinical service provision policies for psychiatric disorders in general. This is highlighted in the study of While et al (2012)[49] and the follow-up report by the National Confidential Inquiry into Suicide and Homicide by People with Mental Illness (NCISH)[63], in which only three service policy implementations they evaluated were directly focused on suicide (ligature points, multidisciplinary review after suicide, and staff training in management of suicide risk). The remainder comprised assertive outreach, 24-hour crisis resolution/home treatment teams, seven-day follow-up post-discharge, management of treatment non-compliance, dual diagnosis management, response to inpatients who abscond, transfer of care from child and adolescent mental health services to adult services, and criminal justice information sharing, which all have clear relevance for comprehensive general mental health care provision, not solely suicide. Similarly, O'Connor et al (2013)[25] reported benefits of psychotherapy in primary care settings for both suicidality and depression.

When we consider such evidence as the foregoing against: (1) the lack of significant new knowledge about suicide risk factors that would enable more reliable clinical prediction of suicide, and (2) the absence of suicide risk rating scales of clinically acceptable predictive power, it is perhaps time for a modified approach to 'best practice' in suicide prevention for clinical services.

While it has to be acknowledged that clinical predictive capacity in relation to suicide is unsatisfactory, clinicians are nevertheless faced with having to make frequent clinical decisions concerning safety and treatment of patients with suicidal thoughts and/or behaviours (including decisions in relation to use of the Mental Health Act) in spite of less than perfect knowledge. Due to their poor predictive power, checklists cannot be relied on for prioritising resources to high-risk inpatients, as this could result in increased suicides in those deemed at low risk who are in hospital due to their absolute risk of suicide being around 200 times that of the wider community.[64] Checklists of suicide risk factors have three disadvantages in addition to poor predictive power. First is their danger of being considered in isolation, without regard to context. Second is their tendency to encourage a 'mechanical' approach that may give rise to complacency. Third is the risk of implementing treatment plans that are linked to level of risk assessed, but may be suboptimal in certain cases owing to individual variability.The guideline literature suggests that assessment should be comprehensive and encompass: (1) detailed evaluation of all aspects of the suicidal behaviour and ideation, (2) psychiatric diagnostic assessment, and (3) thorough determination of the psychosocial

circumstances involved in the clinical presentation.[19, 30, 31] Determining the nature and severity in all three of these domains would then form the basis of decision-making concerning patient safety and treatment, including a reasonable estimate of degree of risk of suicide. Where possible, family involvement in the decision-making concerning safety and treatment ought to be pursued with the patient's consent, and in some instances without it.[19,33,44,65]

Question 2b: What is the definition and measurement suite for 'effectiveness' that is likely to be most appropriate for NSW, for benchmarking and reporting outcomes in models of care (i.e. potentially inform performance indicators)?

The most appropriate primary outcome measures of service effectiveness in NSW follow in line with the key evaluation measures used to monitor effectiveness more broadly; namely, models of care in NSW may be deemed effective if they are associated with a reduction in the number of completed suicides as determined by the coroner, and reductions in repeat presentations to emergency departments for attempted suicide or severe self-harm, as reported in medical records. This information may be stratified by setting to evaluate differential effectiveness of service implementation across general hospital, psychiatric hospital, primary care and community settings. All other measures (e.g. depression, suicidal ideation) would be secondary outcome variables, and no more than indirect measures of effectiveness.

Question 2c: What are the gaps in the evidence base that may have implications for policy revision and development in NSW?

Despite substantial global research investment and the implementation of comprehensive National Suicide Prevention Strategies worldwide, this review has identified a number of gaps and unanswered questions arising from the currently available evidence, which have particular implications for future policy and service developments. The literature for assessment tools and risk indices for suicidality highlights a key knowledge gap relating to the reliable prediction of suicide risk. We are unable to conclusively recommend any particular strategy for routine risk assessment in the context of currently available evidence. Specifically, this review identified many risk indicators that appear related to the development of suicidal intent, but none are sufficiently specific to warrant definitive labelling of discrete populations, let alone individuals, as uniformly 'high risk'. Likewise, many assessment tools have been developed, but none provide satisfactory predictive power to warrant routine dissemination for the quantification of individual level 'risk severity' at first presentation or during ongoing risk assessment in acute care settings. However, in this context, the recent evidence arising from the University of Manchester and the NCISH may provide an avenue for further consideration within the NSW setting. The NCISH working group recently developed a framework for evaluating the quality of suicide risk assessment applied in practice. This framework was subsequently tested in a pilot analysis aiming to evaluate the quality of risk analysis in 42 cases of completed patient suicides in UK health services.[66] Their findings document an overall unsatisfactory quality of risk assessments undertaken prior to the subsequent suicide of each of the 42 patients, *specifically highlighting an undue focus on 'checklist' completion and a lack of tailored individual management plans as the key failings of the existing risk assessment protocols*. Instead, the report recommends that greater focus should be placed on individualised assessment, taking into consideration personal and social context, current risk factors and past history (as foreshadowed above), and on the creation of tailored management plans that are optimised for maximum implementation and integration to facilitate continuity across services. The current NSW management protocol may benefit from an audit, using a framework similar to that of the NCISH, to assess the quality of risk assessments undertaken for individuals who subsequently completed suicide, to inform the development of new or updated protocols with greater focus on individually tailored assessments, and with a view to reducing reliance on 'checklist' assessment to categorise risk severity.

It is clear from the evidence on risk indices that persons showing suicidal intent do not comprise a homogenous population, nor is suicidality a disorder in itself that may be explicitly treated; instead, it reflects a *behaviour* that is manifest as a consequence of extreme personal distress, occurring commonly in the context of psychiatric disorders. The unclear findings relating to the effectiveness of the majority of interventions investigated in recent literature are likely a consequence of this population heterogeneity.[46,67] There is a need for systematic collation of more recently available mortality data for indices of risk or protective factors that may exhibit greater specificity within defined (i.e. more homogenous) populations: for example, in children and adolescents, Aboriginal and Torres Strait Islander people, people from a non-English speaking background, or people living in rural areas of NSW. Furthermore, if determining the effectiveness of discrete management strategies is to remain a key goal of future evaluations, there is a

clear need to define homogenous sub-populations among those presenting with suicidality, for whom targeted prospective intervention may have greater success in achieving positive outcomes.

NSW has an extensive collection of good quality data reflecting both mortality and medical record outcomes that may be utilised, via record linkage analyses, to explore potential patterns in service use of those who go on to complete suicide in NSW. Similarly to the recent analyses from the NCISH working group exploring the impact of service changes on overall suicide rates in the UK[49 63], the range of currently available health and mortality records in NSW could be utilised to determine the effects of specific services on suicide rates in NSW. The current strategic plan in NSW documents the collection of additional suicide outcome data in the most recent update, which could be analysed in relation to the effectiveness of the distribution of service provision implemented since 2010. In particular, there is a need to quantify the effectiveness of multilevel interventions that target all levels of influence within the population: primary care, specialty care, community (gatekeepers, self-help programs, improved access to care), public awareness campaigns and blackouts on media reporting, in addition to population-level restrictions on prevalent suicide methods, such as firearms or poisons.[68] For example, information from emergency departments, inpatient admissions, and mental health ambulatory databases could be used to identify those who presented to services with suicidal or self-harm behaviour. Based on Australian Bureau of Statistics (ABS) 2011 data[2], an estimated 87,000 people would have presented to NSW health settings with intentional self-harm in the previous 10 years, and there should be around 6000 completed suicides. Risk categories assigned to completers vs non-completers could be used to provide an indication of how useful or accurate the risk assessment was (if documented). Subsequent care pathways and interventions that vary between local health districts could be assessed by suicide rates, taking into consideration confounding factors such as unemployment rates in each area.

Another key avenue for future research focus identified by the current review lies in the need for greater availability and uptake of training programs for clinicians to increase knowledge and screening for suicidality, depression and distress. Suicide prevention efforts may find greater success if targeted policies are directed towards the development of effective clinical training programs for identifying, managing and alleviating distress, and reducing clinical focus on obtaining categorical severity ratings for suicidality, than attempting to identify any single intervention that may be effective for an extremely heterogeneous population. In particular, the findings of While et al (2012)[49] and the NCISH working group[63] provide support for the use of multidisciplinary review panels, which enable clinicians to learn from the treatment services and management strategies provided for a person who subsequently completed suicide to inform future clinical practice. The utility of these reviews ought to be examined in an Australian context. The current practice of root cause analysis, which is focused on problem or fault identification within systems, rather than clinical review and clinical learning, serves the legitimate needs of management more than it serves the equally legitimate needs of clinicians.

6 Conclusion

This review largely confirms already known suicide risk factors. Current screening tools do not have sufficient predictive value and are in danger of being used without regard to context or individual variability. Therefore, assessment should be based on a comprehensive clinical evaluation, involving family members if possible and when appropriate. Clinical assessment should encompass a detailed evaluation of suicidal behaviour and ideation, a full psychiatric diagnostic assessment, and determination of the psychosocial circumstances of the individual. Determining the nature and severity in each of these domains would then form the basis of decision-making concerning patient safety and treatment, including an estimate of degree of risk of suicide. Training programs should be readily available to increase clinicians' knowledge of suicidality, depression and distress. The evidence for best practice immediate management strategies supports removal of non-collapsible curtain rails and low-lying ligature points in hospitals, seven-day post-discharge follow-ups, and the provision of single point of access 24-hour crisis teams in the community.

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Table 1: Factors that assist with recognition of patients at risk of suicide

Study ID	Design	Sample	Risk factors	Quality assessment	Quality rating
Stone 2009 **All countries** **Also see Carpenter 2011 for similar findings on paroxetine**	Peer-reviewed meta-analysis of double-blind, randomised, placebo-controlled trials reported in any language using individual patient data N~100,000 (8000 18–25 year olds)	Adults treated with antidepressants for any reason (all selective serotonin reuptake inhibitors, serotonin-noradrenaline reuptake inhibitors, tricyclic antidepressants, and other antidepressants). The total duration of observation was 15,505 person years	Young adults (18–25 years) on antidepressants reported increased suicidal behaviour regardless of class of drug, trial location, sex or ethnicity (OR 2.30, 95%CI 1.04–5.09). ORs declined at a rate of 4.6% per year of increasing age. Note that there were only six 'completers' and age was not reported separately for this group	• Low possibility of reporting bias • RCTs (randomisation should have distributed prior suicidality equally across groups) • Direct assessments • Large sample • Individual patient data • Consistent results • Medium effect size • Imprecise CIs	**Moderate to high quality** evidence suggests a medium sized increased risk of suicidal behaviour in young adults on antidepressants, regardless of class of drug, trial location, sex or ethnicity
Hammad 2006 **All countries** **Also see Bridge 2007 and Dubicka 2006 for similar findings**	Peer-reviewed meta-analysis of all double-blind, randomised, placebo-controlled trials using individual patient data N~4500	Children and adolescents treated with antidepressants for any reason (fluoxetine, sertraline, paroxetine, fluvoxamine, citalopram, venlafaxine, and mirtazapine) for 4–16 weeks	Children and adolescents on antidepressants regardless of drug type, treatment duration (events did not cluster at the start of therapy as expected), age, sex or past history of suicide attempt or ideation reported increased suicide ideation/behaviour (k=24, OR 1.95, 95%CI 1.28–2.98). ORs for suicidal behaviour declined at a rate of 4.6% per year of increasing age Events reported before randomisation were excluded	• Low possibility of reporting bias • RCTs (randomisation should have distributed unreported prior suicidality equally across groups) • Direct assessments • Large sample • Individual patient data • Consistent results • Small to medium effect size • Imprecise CIs	**Moderate to high quality** evidence suggests a small to medium sized increased risk of suicidal ideation or behaviour in children and adolescents on antidepressants regardless of drug type, treatment duration, age, sex or past history of suicide attempt or ideation

Study ID	Design	Sample	Risk factors	Quality assessment	Quality rating
Levenson 2008 **US**	Meta-analysis of all double-blind, randomised, placebo-controlled trials compiled for the US Food and Drug Administration N~45,000	All ages treated with antiepileptic drugs for any reason (sodium channel blocking drugs, GABAergic/ GABA-mimetic drugs, and carbonic anhydrase inhibitors) for a mean of 89 days	Patients who received an antiepileptic drug regardless of drug type, treatment duration (events did not cluster at the start of therapy as expected), age, sex or setting reported increased suicidal ideation/behaviour/completion (OR 1.80, 95%CI 1.24–2.66). Suicidal behaviour had a larger effect size (OR 2.92, 95%CI 1.44–6.47) than suicidal ideation (OR 1.45, 95%CI 0.93–2.30) Patients treated for epilepsy had the largest effect size, (OR 3.53, 95%CI: 1.28–12.10) compared to psychiatric conditions (OR 1.51, 95%CI 0.95–2.45), or other disorders (OR 1.87, 95%CI 0.81–4.76) Non-North American trials (OR 4.53, 95%CI 1.86–13.18) reported a larger effect size than the North American trials (OR 1.38, 95%CI 0.90–2.13)	• Low possibility of reporting bias • RCTs (randomisation should have distributed prior suicidality equally across groups) • Direct assessments • Large sample • Consistent results • Mostly small to medium effect sizes • Imprecise CIs	**Moderate-to-high quality** evidence suggests a small to medium sized increased risk of suicidality (particularly behaviour) in people taking antiepileptic drugs for epilepsy
Bangs 2008 **US**	Peer-reviewed meta-analysis of 12 double-blind, placebo-controlled RCTs conducted by Eli Lilly and Company in the US N~2000	Children and adolescents (6–17 years) with ADHD or nocturnal enuresis treated with atomoxetine (serotonin-noradrenaline reuptake inhibitor) for 6–18 weeks	Increased incidence of suicidal ideation (not behaviour or completed) in the atomoxetine group vs placebo (MHID 0.46, 95%CI 0.09–0.83, p=0.01). This was not statistically significant using risk ratio (MHRR 2.92, 95%CI 0.63–13.57, p=0.17). NNH=227 All of the patients identified as having suicidal events were males aged 7–12 years All suicidal events that occurred before randomisation and did not worsen after randomisation were excluded	• Low possibility of reporting bias • RCTs (randomisation should have distributed unreported prior suicidality equally across groups) • Direct assessments • Large sample • Consistent results • Medium effect size • Imprecise CIs	**Moderate to high quality** evidence suggests a medium sized increased risk of suicidal ideation in males aged 7–12 years taking atomoxetine

Study ID	Design	Sample	Risk factors	Quality assessment	Quality rating
Yoshimasu 2008 **All countries**	Peer-reviewed meta-analysis of English language psychological autopsy studies (case-control) N~5000	All completed suicides, all ages	People with substance-related disorders (k=16, OR 5.24, 95%CI 3.30–8.31). The relationship was strongest in women (k=3, OR 8.34, 95%CI 2.18–31.82) and in young people (<35 years, k=6, OR 8.55, 95%CI 4.76–15.37) People with mood disorders, particularly depression (k=17, OR 13.42, 95%CI 8.05–22.37). The relationship was strongest in women (k=3, OR 12.95, 95%CI 3.06–54.83) and in older people (>50 years, k=4, OR 24.62, 95%CI 6.43–94.20) People with a history of suicidal attempt or deliberate self-harm (k=11, OR 16.33, 95%CI 7.51–35.52) People who were divorced or single (k=17, OR 2.72, 95%CI 2.01–3.62) People who were unemployed (k=15, OR 2.11, 95%CI 1.50–2.98)	• Low possibility of reporting bias • Direct assessments • Large sample • Large effect sizes for substance, mood disorders and suicidal history • Medium effect sizes for marital and employment status • Inconsistent results • Imprecise CIs	**Moderate quality** evidence suggests a large increased risk in those with substance disorders (strongest in women and young people), mood disorders (strongest in women and old people), and in people with previous suicide attempts or self-harm **Moderate to low quality** evidence of a medium increased risk for people who are not married or employed

Study ID	Design	Sample	Risk factors	Quality assessment	Quality rating
Hawton 2005 **All countries** This meta-analysis also includes risk factors reported in Yoshimasu 2008	Peer-reviewed meta-analysis of English language case-control and cohort studies N~5000	Adult inpatients in mental health units with schizophrenia-spectrum disorders	Males (k=12, OR 1.56, 95%CI 1.29–1.9) Patients with recent loss (k=3, OR 4.03, 95%CI 1.37–11.08) Patients with a family history of depression (k=3, OR 2.95, 95%CI 1.13–7.67) Patients with feelings of worthlessness (k=2, OR 3.31, 95%CI 1.58–6.94) Patients with feelings of hopelessness (k=2, OR 21.40, 95%CI 1.71–268) Patients with impulsivity (k=2, OR 2.46, 95%CI 1.02–5.91) Patients with fear of mental disintegration (k=4, OR 12.10, 95%CI 1.81–81.30) Patients who are treatment non-compliant (k=4, OR 3.75, 95%CI 2.20–6.37) Patients experiencing fewer hallucinations,(k=6, OR 0.50, 95%CI 0.35–0.71) Patients experiencing fewer delusions (k=6, OR 0.48, 95%CI 0.24–0.94) Patients with higher education (k=2, OR 5.66, 95%CI 1.91–16.8; with lowest quality study removed) No associations were reported for suicide threats, command hallucinations, negative symptoms, social withdrawal, insight into psychiatric illness, family history of suicide, broken home, ethnicity (when lowest quality study is removed), having children, and a history of violence	• Low possibility of reporting bias • Direct assessments • Large sample • Medium to large effect sizes • Consistent apart from mental integration • Imprecise CIs, particularly hopelessness	**Moderate quality** evidence suggests a large sized increased risk in schizophrenia patients with higher education, and a medium increased risk for those with recent loss, family history of depression, worthless feelings, impulsiveness, non-compliance with treatment, and a small effect for males **Moderate to low quality** evidence suggests a large sized increase risk of hopelessness and fear of mental disintegration

Study ID	Design	Sample	Risk factors	Quality assessment	Quality rating
Marshal 2011 **All countries**	Peer-reviewed meta-analysis of English language case-control and cohort studies N~123,000	Youth (≤21 years)	Sexual minority youth reported higher rates of suicide ideation/behaviour compared to heterosexual youth (k=19, OR 2.92, 95%CI 2.11–4.00), particularly bisexual youth (k=7, OR 4.92, 95%CI 2.82–8.59) Sexual minority youth reported higher rates of suicidal ideation (k=9, OR 1.96), intent/plans (k=4, OR 2.20), attempts (k=14, OR 3.18), and attempts requiring medical attention (k=5, OR 4.17) Effects did not vary across gender, recruitment source, or sexual orientation definition	• Low possibility of reporting bias • Direct assessments • Large sample • Medium to large effect sizes • Unable to assess consistency • Imprecise CIs	**Moderate quality** evidence suggests a medium effect of increased suicidality in homosexual youth, and a large effect in bisexual youth
New Zealand Graded Guidelines 2003	Clinical guideline N not reported	All people of all ages	Schizophrenia is a risk factor, particularly if age <40, with frequent exacerbations of their illness, and with awareness of deterioration and poor prognosis Borderline personality disorder or antisocial personality disorder are risk factors Having exposure to recent stress or serious physical illness Having been exposed to childhood trauma/abuse Females make more frequent but less lethal attempts than males There is an increased risk in the first three months after discharge, especially on the day and first week, or after short-term admission (<7 days), or after re-admission within three months of a previous admission, or after self-discharge	• Medium risk of reporting bias • Unable to assess using GRADE guidelines, no data reported Using their own methodology (scale A–D), authors give this evidence a 'B' quality rating based on a large body of good quality observational studies	**Moderate quality** evidence suggests increased risk in schizophrenia, borderline personality disorder, antisocial personality disorder, in those with a serious physical illness, recent stress, or childhood abuse and those who have recently been discharged from hospital (particularly <7 days)
Pompili 2013 **All countries**	Peer-reviewed systematic review of English language cohort and cross-sectional studies N~50,000	War veterans with or without PTSD	Authors report that having a history of PTSD is associated with higher rates of suicidal behaviour, particularly in those reporting persistent guilt	• Low possibility of reporting bias • Direct assessments • Large sample • Unable to assess consistency, precision or effect sizes	**Moderate quality** evidence suggests increased suicidality in war veterans with PTSD, particularly those with persistent feelings of guilt

Study ID	Design	Sample	Risk factors	Quality assessment	Quality rating
Pompili 2004 **All countries**	Peer-reviewed meta-analysis of prospective cohort studies N=1538	Females (14–25 years) with or without anorexia nervosa	Anorexia nervosa was associated with increased suicide compared to matched population rates (matched for gender, year of publication and location) (k=9, 24% vs 3%)	• Direct assessments • Large sample • Prospective assessment • Medium possibility of reporting bias • Unable to assess consistency, precision or effect sizes	**Moderate quality** evidence suggests increased suicides in females with anorexia nervosa
Large 2011a,b **All countries**	Peer-reviewed meta-analysis of English and German language case-control studies, with few cohort studies N~70,000 inpatients N~250,000 outpatients	All inpatients in psychiatric settings, and patients recently discharged from psychiatric inpatient settings (up to one year)	*Inpatients* Having multiple risk factors (k=7, OR 10.94, 95%CI 5.94–20.16) Prior suicide attempts or deliberate self-harm (k=21, OR 3.95, 95%CI 3.22–4.84), or suicidal ideations (k=12, OR 2.63, 95%CI 1.52–4.56) Feelings of depression (k=13, OR 3.92, 95%CI 2.59–5.92), anxiety (k=7, OR 2.12, 95%CI 1.20–3.76), hopelessness (k=7, OR 3.70, 95%CI 2.28–5.99), or worthlessness/inadequacy/guilt (k=6, OR 3.73, 95%CI 2.33–5.98) Family history of suicide (k=6, OR 2.78, 95%CI 1.70–4.52) or mental illness (k=6, OR 1.55, 95%CI 1.13–2.12) Having a diagnosis of schizophrenia (k=13, OR 2.48, 95%CI 1.54–4.00) or affective disorder (k=13, OR 1.93, 95%CI 1.33–2.81) Current social or relationship problems (k=9, OR 1.82, 95%CI 1.46–2.27) Prior psychiatric admissions (k=15, OR 1.81, 95%CI 1.33–2.45) Involuntary hospital admission (k=12, OR 1.87, 95%CI 1.14–3.08) and longer duration of admission (k=7, OR 2.33, 95%CI 1.44–3.77) The authors suggest reporting and hindsight bias at the study level for current social problems, suicidal ideas, the presence of agitation or anxiety and involuntary admission. They also report poor sensitivity (64%) and reasonable specificity (85%) for multiple high-risk factors, but low positive predictive value (1.4% of all estimated inpatient suicides) No significant associations were found with male sex, older age, marital status, living alone, or employment status	• Low possibility of reporting bias at the review level • Direct assessments • Large samples • Consistent for outpatients apart from less follow-up care • Mostly medium effect sizes • Inconsistent for inpatients apart from family history of suicide or mental illness • Imprecise CIs • Possible reporting and hindsight bias at the study level for some factors • Low positive predictive value	**Moderate to low quality** evidence suggests a history of self-harm, depressive symptoms, hopelessness or worthlessness are the strongest indicators of suicide for inpatients and less so for outpatients within a year of discharge. Note that worthlessness is not reported post-discharge

Study ID	Design	Sample	Risk factors	Quality assessment	Quality rating
			After discharge Having multiple risk factors (k=4, OR 3.94, 95%CI 2.70–5.74) A history of self-harm (k=6, OR 3.15, 95%CI 2.28–4.33), or having suicidal ideations (k=6, OR 2.47, 95%CI 1.76–3.46) Feelings of depression (k=4, OR 2.70, 95%CI 1.63–4.48), or hopelessness (k=2, OR 2.31, 95%CI 1.39–3.87) Recent social difficulty (k=4, OR 2.23, 95%CI 1.40–3.54) An unplanned discharge (k=6, OR 2.44, 95%CI 1.71–3.47) A diagnosis of major depression (k = 6, OR 1.91, 95%CI 1.46 to 2.51) Male sex (k=5, OR 1.58, 95%CI 1.16–2.16) Less contact with services were less likely to commit suicide (k=7, OR 0.69, 95%CI 0.51–0.94) The authors report possible hindsight bias, poor sensitivity (40%) and reasonable specificity (87%) for multiple high-risk factors, but low positive predictive value (3% of all estimated patient suicides) No significant associations were found with age, marital status, living alone, employment status, ethnicity, education, a history of criminal conduct or violence, a family history of mental illness, coexisting physical illness, substance use, a diagnosis of bipolar disorder or schizophrenia, a long duration of illness or prior hospitalisation, antidepressant, antipsychotic, mood stabilising medication use, a reduction dose, poor adherence to medication, interrupted care, or hospital re-admissions		
James 2004 **All countries**	Peer-reviewed meta-analysis of prospective cohort studies in any language N=639	Youth (≤26 years)	ADHD youth reported higher rates of completed suicide (all young males) compared to US population controls (males 5–24 years) (k=6, RR 2.91, 95%CI 1.47–5.70) Authors state the association is via increasing severity of comorbid conditions, particularly conduct disorder and depression	• Direct assessments • Large sample • Prospective assessment • Medium effect sizes • Medium possibility of reporting bias • Unable to assess consistency • Imprecise CIs	**Moderate to low quality** evidence suggests a medium effect of increased suicide in ADHD males, with the association being driven by comorbid conduct disorder or depression

Study ID	Design	Sample	Risk factors	Quality assessment	Quality rating
Bowers 2010 **English, German and Dutch language**	Peer-reviewed meta-analysis of case-control studies N~15,000	Adult inpatients in psychiatric health units	Affective disorder was associated with increased self-harm history compared to schizophrenia (k=10, *r*−0.677, *p*0.03) Affective disorder patients are less likely to suicide while on leave (k=9, *r*−0.683, *p*=0.04) Authors state that locking ward doors does not reduce suicide rates	• Direct assessments • Large sample • Medium possibility of reporting bias • Medium effect sizes • Unable to assess consistency or precision	**Moderate to low quality** evidence indicates patients with affective disorders are at increased risk of self-harm than patients with schizophrenia. Schizophrenia patients are more likely to suicide while on leave from hospital
Luke 2013 **Australia**	Cross-sectional study N=172	Koori youth (mean age 19 years) 23.3% of the sample reported current suicidal ideation, 24.4% reported lifetime suicide attempt	Multivariate analysis revealed the following factors were independently related to ideation and prior attempts in Koori youth Emotional distress: depression, anger, boredom, poor self-esteem, and sexual abuse (ideation OR 7.60, 95%CI 3.41–16.95, *p*<0.001; attempt OR 2.54, 95%CI 1.45–4.46, *p*=0.001) Social distress: Koori values are not important, parents not living together, no adults to talk to, homeless, injecting drug use (ideation OR 1.82, 95%CI 0.97–3.40, *p*=0.06; attempt OR 2.52 95%CI 1.37–4.62, *p*=0.003), no friends to talk to, parents with substance problems, physical abuse, previously in youth detention (ideation OR 2.05, 95%CI 1.15–3.65, *p*=0.015; attempt OR 3.25, 95%CI 1.75–6.05, *p*<.001) More cultural connection: talk to elders about Koori issues, understand Koori history, use Victorian Aboriginal Health Service as main service provider, parents have high expectations (ideation only OR 0.55, 94%CI 0.29–1.03, *p*=0.06) Behavioural factors: no participation in sport, smoker, heavy drinker, marijuana use (attempt only OR.1.82, 95%CI 0.99–3.37, *p*=0 .055)	• Low possibility of reporting bias • Direct assessments • Large effect size for emotional distress on ideation • Medium effect sizes for other factors • Imprecise CIs • Small sample • One study (consistency NA)	**Low quality** evidence indicates Koori youth may be at increased risk of suicidal ideation or behaviour with high emotional and social distress, less cultural connection and behaviour factors including drug and alcohol use

ADD/ADHD=attention-deficit/hyperactivity disorder; CI=confidence interval; k=number of studies; GRADE=Grading of Recommendations Assessment, Development and Evaluation (arrows represent the grading process); MHID=Mantel-Haenszel incidence difference stratified by study (estimate of the percentage among atomoxetine-treated patients minus the percentage among placebo-treated patients in percentage units); MHRR=Mantel-Haenszel risk ratio stratified by study (estimate of the percentage among atomoxetine-treated patients over the percentage among placebo-treated patients); NA=not applicable; NNH=number needed to harm; OR=odds ratio; p=significance level; *p*=significance level; PRISMA=Preferred Reporting Items for Systematic reviews and Meta-Analyses; PTSD=post-traumatic stress disorder; *r*=correlation coefficient; RCT=randomised controlled trial; RR=relative risk; STROBE=The Strengthening the Reporting of Observational Studies in Epidemiology

Table 2: Assessment tools for patients at risk of suicide

Study ID	Design	Sample	Assessment tools	Quality	Overall quality
Brim 2012 **US**	Practice guideline containing graded evidence based on study design (in order of quality; systematic review with meta-analysis, RCT/s, non-randomised trial/s, case-control/cohort study/s, review of descriptive studies, single qualitative study, expert opinion) N~70,000	All ages presenting to emergency departments (EDs) in the US	Suicide screening tools should be used as a part of the assessment process for appropriate ED patients based on presentation (rated as high quality, below are all moderate quality) Screening for risk of suicide in paediatric patients older than age 10 based on presentation is appropriate, feasible and practical in the ED Training ED personnel improves confidence in screening for suicide risk The following instruments are valid and feasible for *initial* assessment of suicide risk in the ED: The Behavioral Health Screening –ED (BHS-ED); Manchester Self-Harm Rule (MASH); the P4 screener; and ReACT Self-Harm Rule The following instruments are feasible, valid and reliable measures for *further* assessment of risk for suicide in the ED: Beck's Suicide Intent Scale (SIS); Depressive Symptom Inventory – Suicidality Subscale (DSI–SS); Risk Assessment Matrix (RAM); Suicidal Ideation Questionnaire (SIQ); Suicidal Ideation Questionnaire Junior (SIQ–JR); Violence and Suicide Assessment Form (VASA); Nurses Global Assessment of Suicide Risk (NGASR); Risk of Suicide Questionnaire (RSQ)	• Medium risk of reporting bias • Unable to assess using GRADE guidelines, no data reported All evidence was graded as moderate by the authors, apart from the recommendation of screening tools, which is given a high quality rating. We have downgraded this rating due to insufficient sensitivity and specificity statistics for these tools	**Moderate quality** evidence recommends initial screening and follow-up assessment for suicide risk as part of an overall assessment in EDs in adults and children older than 10 years. Assessment should be conducted by trained personnel
O'Connor 2013 **All English language**	Peer-reviewed systematic review of English language studies assessing the accuracy of screening instruments N~4000	Adults in primary care settings	Evidence suggests that screening tools can identify some adults at increased risk for suicide in primary care, but accuracy is lower in studies of older adults and lower again in younger adults	• Low possibility of reporting bias • Direct assessment • Large sample • Unable to assess consistency, precision or effect sizes	**Moderate quality** evidence suggests some benefit for suicide screening in primary care settings

Study ID	Design	Sample	Assessment tools	Quality	Overall quality
MacMillan 2007 **All English language**	Peer-reviewed meta-analysis of English language prospective cohort studies N=3775	Adults (one study included adolescents) in hospital settings	For suicide and self-harm in adults, the Beck Hopelessness Scale (with cut-off ≥9) has reasonable sensitivity, but low specificity (suicide sensitivity 0.80, 95%CI 0.68–0.90, specificity 0.42, 95%CI 0.41–0.44; self-harm sensitivity 0.78, 95%CI 0.74–0.82, specificity 0.42, 95%CI 0.38–0.45) regardless of setting, follow-up period or baseline risk	• Low possibility of reporting bias • Direct assessments • Large sample • Unable to assess precision or effect sizes • Inconsistent	**Moderate to low quality** evidence suggests reasonable sensitivity but poor specificity for predicting suicidality using the Beck Hopelessness Scale in adults
New Zealand Graded Guidelines 2003	Clinical guideline N not reported	All ages in emergency and mental health settings	Assessment should be conducted within the context of a suitably trained and culturally appropriate mental health clinician. A suicide assessment should be conducted in a separate interview room and the following assessment tools are recommended: Rapid Assessment of Patients in Distress, The Beck Hopelessness Scale in adults, a Mental State Examination, as well as a comprehensive psychiatric/psychosocial assessment augmented by a corroborative interview (note: lack of family/friends or social supports is a risk factor)	• Medium risk of reporting bias • Unable to assess using GRADE guidelines, no data reported Using their own methodology (scale A to D), authors give this evidence a 'C–D' quality rating, apart from the Beck Hopelessness Scale, which is given a 'B' rating	**Low quality** evidence suggests some benefit for assessment using the Rapid Assessment of Patients in Distress, The Beck Hopelessness Scale in adults, a Mental State Examination, and a comprehensive psychiatric/psychosocial assessment augmented by a corroborative interview

CI=confidence interval; GRADE=Grading of Recommendations Assessment, Development and Evaluation (arrows represent the grading process); NA=not applicable

Table 3: Interventions and protocols for immediate management of patients with suicidality

Study ID	Design	Setting	Protocol/ intervention	Findings	Quality assessment	Quality rating
Psychiatric hospitals						
While 2012, NCISH 2013 **UK**	Cross-sectional analysis of pre- and post-service implementation effects on suicide rates N not reported	Mental health services across the UK	Relationship between implementation of services and suicide rates over time	Removal of non-collapsible curtain rails (17.4% reduction in suicide rates, $p<0.01$) and low-lying ligature points in psychiatric wards 22.1% reduction, $p<0.01$), implement seven-day post-discharge follow-ups (16.2%, $p<0.01$)	• Low risk of reporting bias • Population sample • Direct assessment • Prospective assessment (pre-post) • Unable to assess precision or effect sizes • One study (consistency NA)	**Moderate to high quality** evidence suggests removal of non-collapsible curtain rails and low-lying ligature points, and the implementation of seven-day post-discharge follow-ups
Jones 2008 **UK**	RCT N=206	Acute psychiatric inpatient care	Admission to a psychiatric day hospital (including daily group-based therapies, N=141) compared to a general psychiatric inpatient ward (with a limited program of daily activities, N=65)	A significant relationship between suicidality and treatment setting ($p=0.015$), such that in patients with high levels of suicidality at admission, those attending the day hospital showed greater symptom reduction at discharge than patients on the ward, regardless of whether they lived alone or with others. A similar effect was found in patients with lower levels of initial suicidality, but only if they lived with others However, this effect was not maintained at 3 or 12 months post-discharge Subjective feedback on each intervention identified day hospitals associated with feelings of 'being listened to', 'less alone', 'less judgement', and 'more support'. In contrast, the general ward was associated with 'being observed', and 'feeling safe/secure'	• Low risk of reporting bias • RCT • Direct assessment and comparison • Unable to assess precision or effect sizes • Small sample • One study (consistency NA)	**Moderate quality** evidence suggests day hospitals may be associated with greater short-term reductions in suicidality, and more positive subjective ratings from patients, compared to general psychiatric inpatient wards
General hospitals						

Study ID	Design	Setting	Protocol/ intervention	Findings	Quality assessment	Quality rating
Bridge 2012 **US**	Follow-back data linkage cohort study N=3241	General medical ED Youth<20	Discharge following emergency treatment for self-harm behaviour	73% of patients admitted to emergency for self-harm were subsequently discharged to the community Discharged patients were significantly more likely to have presented with cutting behaviour (OR 1.12, 95%CI 1.05–1.19), as opposed to more lethal methods such as poison, and less likely to have been previously diagnosed with any psychiatric disorder (OR 0.93, 95%CI 0.88–0.98) compared to those who were admitted to hospital Around 60% of patients were discharged without mental health assessment, or any arrangements for follow-up outpatient care. The likelihood of mental health assessment was related to the lethality of self-harm behaviour. Socio-economic status was also important, with higher poverty related to discharge into the community	• Low risk of reporting bias • Large sample • Direct assessment • Prospective assessments • Precise • Small effect sizes • One study (consistency NA)	**Moderate to high quality** evidence suggests the probability of discharge into the community from EDs in youth presenting for self-harm behaviour was related to low lethality of method, no psychiatric disorder or assessment of such, and low regional socio-economic status

Study ID	Design	Setting	Protocol/ intervention	Findings	Quality assessment	Quality rating
Betz 2013 **US**	Cross-sectional study N=631	General medical ED providers	Attitudes and practices of ED providers, including nurses, attending physicians, and resident physicians	The prevailing attitude across survey respondents (including nurses and physicians) was that all or most suicides are preventable Most providers reported confidence in their ability to screen for suicidality (81–91%), but fewer reported confidence in assessing suicide risk, creating a safety plan (23–40%), or providing brief counselling (46–56%) Notably, more nurses (40%) than attending (27%) or resident (23%) physicians felt confident to create a personalised safety plan Five times as many nurses (37%) as attending physicians (8%) reported screening all or most patients in the ED for suicidal ideation. For patients with identified suicidality, more providers report assessing the severity of suicide risk (63–74%) than creating a safety plan (25–51%) or briefly counselling (30–49%)	• Low risk of reporting bias • Direct assessment • Large sample size • Unable to assess precision or effect sizes • One study (consistency NA)	**Moderate quality** evidence suggests ED providers in the US may be inadequately trained to confidently manage patients presenting with suicidal risk
Asarnow 2011 **US**	RCT N=181	ED intervention to increase later treatment engagement Children and adolescents (10–18 years)	Family cognitive behavioural therapy conducted in the ED plus intervention for follow-up treatment	Patients in intervention group were significantly more likely to be referred to outpatient treatment (OR 6.2, 95%CI 1.8–21.3, p=0.004), with greater attendance and higher rates of psychotherapy (OR 4.0, 95%CI 1.9–8.5, p=0.001) and medication (OR 3.3, 95%CI 1.5–7.0, p=0.003). These effects were largest in patients who were hospitalised from the ED. There were no differences between groups in repeat suicide attempts or suicidality. Some improvement was noted in behavioural outcomes including depression	• Low risk of reporting bias • RCT • Direct assessment and comparison • Large effect sizes • Imprecise • Small sample • One study (consistency NA)	**Moderate quality** evidence suggests some benefit of family-based ED intervention for improving later engagement in outpatient therapy, but no benefit was found of the specific intervention for reducing suicidality

Study ID	Design	Setting	Protocol/ intervention	Findings	Quality assessment	Quality rating
Goldberg 2007 **US**	Retrospective analysis of case records N=257	Psychiatric ED	Predictors of hospitalisation vs discharge after presenting to psychiatric emergency with suicidal ideation	88% of presentations were initially assessed by non-physician clinical staff (e.g. psychiatric nurse). 70% of cases were subsequently hospitalised, compared to 30% (N=78) who were discharged Important predictors of hospitalisation included having a specific suicide plan (OR 10.50, 95%CI 5.27–20.86), having current psychosis (OR 17.37, 95%CI 4.84–62.49), and a history of attempted suicide (OR 2.32, 95%CI 1.20–4.50) Other potentially relevant factors increasing need for hospitalisation include maleness, having no stable housing, having a current psychiatrist, having health insurance or Medicaid cover, having a longer evaluation (more than 180 minutes) No data reported on effectiveness of hospitalisation vs discharge for suicide prevention	• Low risk of reporting bias • Large effect sizes • Direct assessment • Imprecise • Small sample • One study (consistency NA)	**Moderate to low quality** evidence suggests patients presenting with a specific suicide plan, history of attempted suicide, and current psychotic symptoms are more likely to be hospitalised
New Zealand Graded Guidelines 2003	Clinical guideline N not reported	General medical wards and ED	Protocols for immediate management of suicidal thoughts or behaviours	These protocols are reported in many other clinical management guidelines; however, the guideline report provided additional assessment of evidence sources and reliability	• Medium risk of reporting bias • Unable to assess using GRADE guidelines, no data reported	**Moderate to low quality** evidence provides recommendations of best practice protocols for immediate risk management Few recommendations have been evaluated by good quality trials, but instead are largely derived from expert opinion
			Initial triage/ preliminary risk screening on presentation A positive risk screen is then followed by comprehensive mental health assessment (psychiatric evaluation, psychosocial assessment, suicide risk assessment)	Initial triage determines the degree of immediate danger to self. Any presentation with self-harm must be categorised to a sufficiently urgent triage level (and not wait more than one hour for doctor) Psychiatric assessment evaluates current mental state and the presence of any underlying/untreated disorders Risk assessment determines the severity of self-harm/suicide behaviour and the level of risk, including how lethal the attempt; how	Using their own methodology (scale A–D), authors gave this evidence a 'C–D' rating based on low quality studies and expert opinion	

Study ID	Design	Setting	Protocol/ intervention	Findings	Quality assessment	Quality rating
				persistent; past attempts; family history; psychosocial factors including stressors, life events, coping styles, cognitive factors; as well as the ability to start treatment		
			Protocol for hospitalisation or discharge following emergency assessment	Patients should be considered for hospitalisation in the following conditions: • Acutely suicidal • For medical management of injury • For intensive psychiatric management • In the event of failure of less intensive crisis management Reasons for not admitting must be clearly documented and arrangements made for follow-up within 24 hours Reasons for discharge may include: • Acute crisis averted • Restricted access to dangerous items • Medically stable, not intoxicated • Underlying psychiatric disorder begun or re-initiated treatment • Family/support person consulted and arrangements agreed on • Referral made for mental health services	Authors gave this evidence a 'D' rating based mostly on expert opinion	
			Inpatient unit staff must be vigilant with supervision, including during medication administration, during toileting	The level of support should reflect ongoing assessments of risk Risk assessments should be conducted and documented during each nursing shift Two senior clinicians must approve changes to the level of observation	Authors gave this evidence a 'C' rating based on lower quality studies	
			On admission, remove environmental hazards, secure room near nurses' station	In particular, removal of dangerous items and securing the environment (e.g. locked windows, removing ligature points)	Authors gave this evidence a 'D' rating based mostly on expert opinion	

Study ID	Design	Setting	Protocol/ intervention	Findings	Quality assessment	Quality rating
			Case notes should be augmented with documentation of structured risk assessment, ongoing mental state, and actions taken	Structured assessment may help to increase transparency of case notes and avoid overlooking key information	Authors gave this evidence a 'C' rating based on lower quality studies	
			Follow-up post-discharge should be planned in consultation with the person and their support people	Follow-up must occur within a week of discharge. The first few days post-discharge are the highest risk of suicide	Authors gave this evidence an 'A' rating based on RCT or meta-analytic data	
			Use of safety contracts between patient and clinician to prevent further harm	Contradictory evidence suggests no clear support for effectiveness in suicide prevention	Authors gave this evidence a 'D' rating based mostly on expert opinion	
			'Green card' provision (24-hour crisis team access) for outpatient crisis management	Contradictory evidence suggests green cards are insufficient alone, but may have benefit in tandem with other outpatient services	Authors gave this evidence an 'A' rating based on RCT or meta-analytic data	
			Chronically suicidal people must have tailored management plans	Management plans must be developed, incorporating an individual's chronic and acute symptoms, to allow assessment of current risk in the context of past episodes. EDs must be able to readily access these plans and contact the person's case manager/therapist on presentation. All attempts must be taken seriously and not downplayed Inpatient admission may be required in the presence of acute life stressor, or comorbid presence of an Axis I disorder	Authors gave this evidence a 'C–D' rating based mostly on expert opinion	
NICE 2004 **UK**	Evidence-based guideline N not reported	General medical/ED	Protocols for immediate management of suicidal thoughts or behaviours	These protocols are reported in many other clinical management guidelines; however, the guideline provided additional assessment of evidence sources and reliability	• Medium risk of reporting bias • Unable to assess using GRADE guidelines, no data reported	**Moderate to low quality** evidence provides recommendations of best practice protocols for immediate risk management Few recommendations have
			Initial triage/preliminary risk	Initial triage determines the degree of immediate danger to self, mental capacity, and	Authors gave this evidence a 'D' rating based mostly	

Study ID	Design	Setting	Protocol/ intervention	Findings	Quality assessment	Quality rating
			screening on presentation A positive risk screen is then followed by comprehensive mental health assessment (psychiatric evaluation, psychosocial assessment, suicide risk assessment)	willingness to remain for further assessment Psychiatric assessment evaluates current mental state and the presence of any underlying/untreated disorders Risk assessment determines the severity of self-harm/suicide behaviour and the level of risk, including how lethal the attempt; how persistent; past attempts; family history; psychosocial factors including stressors, life events, coping styles, cognitive factors; as well as the ability to start treatment	on expert opinion	been evaluated by good quality trials, but instead are largely derived from expert opinion
			Clinicians must be adequately trained to manage patients with self-harm	Appropriate training will assist staff to understand and care for patients with self-harm Negative clinician attitudes can increase patients' levels of distress and can lead to avoiding seeking help	Authors gave this evidence a 'C' rating based mostly on lower quality studies	
			Patients presenting with self-harm who wish to leave before assessment has been undertaken	Assessment of mental capacity must be undertaken before the person leaves the service, and the assessment results clearly recorded and passed onto the person's GP or mental health services for rapid follow-up If diminished capacity or mental illness is identified during assessment, urgent mental health assessment should be sought, and measures should be taken to prevent the person leaving the service	Authors gave this evidence a 'C' rating based mostly on lower quality studies	
			Patients presenting with self-harm must be offered treatment for physical injury, regardless of their willingness to accept psychiatric treatment	Ambulance and ED services with patients who have self-harmed by poisoning (within 1–2 hours of ingestion) may assess the use of activated charcoal to prevent absorption of poison Anaesthesia/analgesia must be offered to patients with superficial wounds, e.g. suturing	Authors gave this evidence a 'B' rating based on good quality observational studies	
			Appropriate follow-up	Patients at risk of repeated self-injury may	Authors gave this evidence	

Study ID	Design	Setting	Protocol/ intervention	Findings	Quality assessment	Quality rating
			arrangements must be made prior to discharge	benefit from discussion of coping strategies and harm minimisation techniques (except in the case of poisoning)	a 'D' rating based mostly on expert opinion	
			Adequate documentation must be ensured when a patient is discharged from the ED without further treatment	The decision to discharge should be based on combined assessment of needs and risk, which should be written in their case notes and passed onto their GP. The decision to discharge should not be based solely on the presence of low risk of repeated self-harm or suicide attempts, because many people have other social or personal problems that may increase later risk	Authors gave this evidence a 'C' rating based mostly on lower quality studies	
RANZCP 2004 **Australia and New Zealand**	Clinical guideline N not reported	General medical/ED	Initial triage/risk screening, followed by comprehensive assessment (psychiatric evaluation, risk assessment)	Psychiatric assessment seeks to evaluate current mental state. Risk assessment seeks to determine the severity of self-harm/suicide behaviour and the level of risk	• Medium risk of reporting bias • Unable to assess using GRADE guidelines, no data reported	**Moderate to low quality** evidence for best practice protocols for immediate risk management Few recommendations have been evaluated by good quality trials, but instead are largely derived from expert opinion
			Specialist psychiatric nurses for routine assessment	Trained nurses may provide risk assessments comparable to registrars and psychiatrists		
			Remove environmental hazards, secure room (locked windows) near nurses' station	Support for removal of dangerous items and securing the environment		
			Adequate documentation of risk assessments, ongoing mental state, and actions taken	Support for the importance of documentation of precautions taken		
			Assessment for admission/ discharge	Formal admission may be associated with better outcomes for prevention; however, inconsistent protocol exists for inpatient admission or discharge following risk screening		
Adams 2013 **All countries**	Systematic review of RCT and observational studies	General medical inpatients	All patients admitted (both ED and general wards) should be routinely screened on admission for suicidal thoughts or behaviour	Screening tools are used in ED to determine the level of intervention required, but in general wards may be used for ongoing documentation	• High risk of reporting bias • Unable to assess using GRADE guidelines, no data reported	**Moderate to low quality** evidence for best practice protocols for immediate risk management Few recommendations have

Study ID	Design	Setting	Protocol/ intervention	Findings	Quality assessment	Quality rating
	N not reported		Remove environmental hazards, secure room (locked windows) near nurses' station	Support for removal of dangerous items and securing the environment		been evaluated by good quality trials, but instead are largely derived from expert opinion
			Patient Observation Aide (POA) (one-on-one observation)	Contradictory evidence for observer distance: no clear protocol for the degree of observation required (e.g. constant, 15-minute, hourly, etc)		
			Safety contracts between patient and clinician	Contradictory – no clear support for effectiveness in suicide prevention		
			Adequate documentation of risk assessments, ongoing mental state, and actions taken	Support for importance of documentation of precautions taken and notification procedures		
			Documenting ongoing level of risk	A nurse may upgrade the level of precaution, but only a physician or psychiatrist may downgrade or remove precautions		
Chang 2011 **All countries**	Systematic review of RCT and observational studies N not reported	General medical ED	Physical stabilisation (treating any physical damage or self-harm)	Treating any immediate injury should be the first medical priority on presentation to ED	• High risk of reporting bias • Unable to assess using GRADE guidelines, no data reported	**Low quality** evidence for best practice protocols for immediate risk management Few recommendations have been evaluated by good quality trials, but instead are largely derived from expert opinion
			Involuntary restraint (medical or physical) for high-risk patients; optional forced disrobing into hospital gown	Contradictory evidence – application dependent on local laws		
			Remove environmental hazards, secure room (locked windows) near nurses' station	Support for removal of dangerous items and securing the environment		
			Continuous (one-on-one) observation	Contradictory recommendations for observer distance or degree of observation required		
			Safety/no-harm contracts between patient and clinician	Contradictory – no clear support for effectiveness in suicide prevention		
Primary care						
Gardner 2010	Prospective observational study	Youth (age <20) in primary care	Services provided to youths who screen positive for suicidal ideation on a	Of 1547 screened, 209 reported positive screening for suicidality; 205 were subsequently triaged (94% on the same day as screening),	• Large sample • Direct assessment • Large effect size for	**Moderate to low quality** evidence suggests brief computerised screening for

Study ID	Design	Setting	Protocol/ intervention	Findings	Quality assessment	Quality rating
US	N=1547		computerised health screen	and 152 then referred for emergency mental health evaluation by co-located psychiatric social workers. Of these, around 65% received mental health services within six months; the other 35% received follow-up referrals but no immediate care Reports of suicidal ideation were significantly associated with younger age ($p<0.001$), fighting resulting in an injury ($p=0.002$), and depressive symptoms ($p<0.0001$) A positive suicidality screen in primary care significantly predicted the odds of subsequent presentation at mental health services for suicidal behaviour within six months (OR=4.50, 95%CI 1.67–11.82, $p=0.001$) No data reported for effectiveness of primary care interventions for suicide prevention	screening effectiveness • Prospective assessment • Medium risk of reporting bias • Imprecise • One study (consistency NA)	suicidality by primary care providers, with co-located specialists for immediate triage, may be an effective opportunity to engage high-risk individuals in mental health evaluation
NICE 2004 **UK**	Evidence-based guideline N not reported	Primary care	Protocols for immediate management of suicidal thoughts or behaviours	These protocols are reported in many other clinical management guidelines; however, the guideline report provided additional assessment of evidence sources and reliability	• Medium risk of reporting bias • Unable to assess using GRADE guidelines, no data reported	**Moderate to low quality** evidence for best practice protocols for immediate risk management Few recommendations have been evaluated by good quality trials, but instead are largely derived from expert opinion
			Preliminary risk screening on presentation	All patients presenting to primary care with self-harm should be assessed for risk, including assessment of depression, hopelessness, and suicidal intent	Authors gave this evidence a 'C' rating based mostly on lower quality studies	
			If any doubt about the seriousness of risk a patient should be immediately referred for secondary care or to the ED	Transfer to emergency services should be immediate in cases of high risk or severity, or in the case of poisoning, and transfer should be supervised by an appropriate healthcare worker when appropriate	Authors gave this evidence a 'D' rating based mostly on expert opinion	

Study ID	Design	Setting	Protocol/ intervention	Findings	Quality assessment	Quality rating
			If urgent transfer is not necessary	Risk and needs assessment should be undertaken to determine the need for urgent referral to secondary mental health services Assessment should include evaluation of psychological factors contributing to self-harm intent, current mental state and social needs assessment	Authors gave this evidence a 'C' rating based mostly on lower quality studies	

CI=confidence interval; ED=emergency department; GP=general practitioner; GRADE=Grading of Recommendations Assessment, Development and Evaluation (arrows represent the grading process); N=number of participants; NA=not applicable; NCISH=National Confidential Inquiry into Suicide and Homicide by People with Mental Illness; NICE=National Institute for Clinical Excellence; OR=odds ratio;*p*=significance level; RANZCP=Royal Australian and New Zealand College Of Psychiatrists; RCT=randomised controlled trial

Table 4: Interventions and protocols for ongoing management/prevention for patients at risk of suicide

Study ID	Design	Sample	Intervention	Results	Quality assessment	Quality rating
General hospitals						
Clifford 2013 **Australia, United States, Canada and New Zealand**	Systematic review of RCT and observational studies N not reported	General medical and community settings *Population*: Indigenous peoples	Community prevention strategies: restricting alcohol access, empowerment programs, risk screening, crisis response	Inconsistent reduction in suicidal behaviour; some increase in protective behaviour within community	• Low risk of reporting bias • Large sample • Direct assessment • Evidence appears inconsistent, with a lack of well-conducted studies • Unable to assess precision	**Moderate quality** evidence suggests gatekeeper training and educational interventions may have significant short-term benefits for improving detection of those at risk. Their effectiveness for suicide prevention is unclear
			Gatekeeper training	Significant short-term increase in knowledge and confidence to detect risk. No data for effect on suicide rates		
			Education-based training modules in the community	Small short-term increase in knowledge. No data for effect on suicide rates		
Primary care						
O'Connor 2013 **All countries**	Systematic review of RCT and observational studies N~2500	Primary care	Psychotherapy treatment strategies in primary care Including CBT, DBT, problem-solving therapy, psychodynamic therapy, other (non-specified) therapies with direct contact	Psychotherapy had a 32% reduction in suicide attempts or self-harm in adults compared to usual-care comparison, 11 studies, RR 0.68 95%CI 0.56–0.83, $I^2$16% However, there was no difference in levels of suicidal ideation, eight studies, SMD -0.10, 95%CI -0.27–0.06, I^2 26%	• Low risk of reporting bias • Large sample • Direct assessment • Precise • Consistent • Follow-up not specified	**Moderate to high quality** evidence suggests some benefit of psychotherapy for reducing suicide attempts; however, this conclusion is limited by insufficient detail regarding the nature of the interventions, the populations tested, and the duration of follow-up
			'Enhanced usual care' strategies (wide variation in treatments used – less intensive than psychotherapy)	No difference between enhanced and usual care for reducing suicide attempts, 12 studies, RR 0.91, 95%CI 0.80–1.02, I^2 0%	• Large sample • Direct assessment • Precise • Consistent	
			Medication strategies	Only one good quality (placebo-controlled) trial, (N=167), compared lithium in depressive disorders and found no statistically significant difference in suicide survival rate, though three suicides occurred in the placebo group only	• Direct assessment • Unable to assess precision	

Study ID	Design	Sample	Intervention	Results	Quality assessment	Quality rating
Gaynes 2004 **All countries**	Systematic review of RCT for self-harm prevention therapies N not reported	Primary care and specialty psychiatric settings	Treatment strategies for preventing repeated self-harm behaviour following self-harm attempts	Problem-solving therapy vs standard follow-up care over 6–12 months: five studies, OR 0.70, 95%CI 0.45–1.11 Intensive care plus outreach vs standard care over 6–12 months: six studies, OR 0.83, 95%CI 0.61–1.14 Crisis team care vs standard after-care over 12 months: one RCT, OR 0.43, 95%CI 0.15–1.27. A second study found contradictory results over six months; OR 1.20, 95%CI 0.82–1.75 DBT vs standard after-care over 12 months: one RCT, OR 0.24, 95%CI 0.06–0.93 Inpatient behaviour therapy vs inpatient insight-oriented therapy: one RCT, OR 0.60, 95%CI 0.09–4.45 Continuity of therapist vs different post-discharge therapist: one RCT, OR 3.70, 95%CI 1.13–12.09 General hospital admission vs discharge (by four months): one RCT, OR 0.75, 95%CI 0.16–3.60 Flupenthixol vs placebo (six-month follow-up): one RCT, OR 0.09, 95%CI 0.02–0.50 Antidepressants vs placebo (3–12-month follow-up): three RCTs, OR 0.83, 95%CI 0.47–1.48 Long-term therapy vs short-term therapy: one RCT, OR 10.0, 95%CI 0.35–2.86 Interpersonal psychotherapy vs standard after-care over six months: one RCT, 19.3% difference between groups, 95%CI 8.6%–30% Psychoanalytically oriented partial hospitalisation vs standard after-care: one RCT, no data, significant reduction in DSH during 36-month follow-up, $p<0.004$ No significant difference found in additional studies of standard care vs postal contact, or outpatient day hospitals, or in fluoxetine vs placebo, or fluphenazine vs placebo	• Low risk of reporting bias • Direct assessment • Unable to assess consistency • Imprecise • Most outcomes have only one RCT with small samples • Variability of intervention between studies within each treatment category (e.g. 'problem-solving')	**Moderate to low quality** evidence suggests no significant benefits were gained from any intervention with more than one RCT Several RCTs identified significant effects (e.g. benefits of DBT) but these have not been replicated

Study ID	Design	Sample	Intervention	Results	Quality assessment	Quality rating
Community settings						
While 2012 **NCISH 2013** **UK**	Cross-sectional analysis of pre- and post-service implementation effects on suicide rates N not reported	Mental health services	Relationship between implementation of services and suicide rates over time	Implementation of following services were associated with significant reductions in suicide rates: 24-hour crisis resolution/home treatment teams (20.6% p=0.01), and assertive outreach teams within community services (21.9%, p<0.01); a dual diagnosis policy (24.9%, p<0.01); a response to inpatients who abscond policy (26.6%, p<0.01); a policy on patients who are not taking medication as prescribed (20.7%, p<0.01); a policy on sharing information about risk with criminal justice agencies (24%, p<0.01); a policy on multidisciplinary review and information sharing with families (23.5%, p<0.01); a policy on the formal transfer of care from child and adolescent mental health services to adult services (23.1%, p<0.01); training for clinical staff in management of suicide risk at least every three years (18.9% p<0.01)	• Low risk of reporting bias • Population sample • Direct assessment • Prospective assessment (pre-post) • Unable to assess precision or effect sizes • One study (consistency NA)	**Moderate to high quality** evidence suggests implementing 24-hour crisis and assertive outreach teams and policies on dual diagnosis, patients who abscond, patients not taking medications, information sharing with criminal justice agencies, post-suicide multidisciplinary reviews, transfer from child and adolescent to adult units, and training staff in suicide risk management
Matsubayashi 2011 **21 OECD countries**	Retrospective longitudinal cross-sectional analysis N not reported	Mental health services	Relationship between development of a national suicide prevention program and suicide rates over time	Aggregated data for 21 countries identified large reduction in suicide rates following initiation of a national suicide prevention program, with rates dropping by approximately 1.384 suicides per 100,000 persons This effect was highest in males older than 65 years, with rates dropping by 3.457 suicides per 100 000. Females older than 65 also showed significant reductions (−1.709 per 100,000) Significant but smaller effects were found in males younger than 24 (−1.330 per 100,000) and females younger than 24 (−0.276 per 100,000)	• Low possibility of reporting bias • Direct assessment • Unable to assess precision or effect sizes	**Moderate quality** evidence suggests that nationwide government-led suicide prevention programs have decreased suicide rates, with particularly strong effects in elderly and young people

Study ID	Design	Sample	Intervention	Results	Quality assessment	Quality rating
Robinson 2011 **All countries**	Systematic review of RCT and observational studies N not reported	All health settings	Psychological treatment strategies for suicide prevention	CBT vs treatment as usual: one trial reported reduced suicidal ideation (MD −18.28) but no difference in self-harm incidents (MD −3.4) between groups at nine-month follow-up Individual therapy vs control intervention: one trial found no difference in suicidal ideation (MD −7.5) or suicide attempts (RR=0.42, 95%CI 0.09 −1.92) at 12 months Group therapy vs treatment as usual: 2 studies found no difference in self-harm incidents (RR 0.54, 95%CI 0.07–3.95) or suicidal ideation (SMD=−0.08) at six months DBT vs control intervention: one trial found significant reduction in suicide attempts (MD=−4.83) and ideation (MD=−7.75) by 12 months Family therapy vs treatment as usual: two trials found no differences in self-harm (RR=1.01) or suicidal ideation (SMD −0.39) by six months Youth nominated support team vs treatment as usual: one trial found no differences in suicide attempts between groups (RR 1.55, 95%CI 0.83–2.93) 'Green card' vs treatment as usual: one trial found no differences between groups in suicide attempts by 12 months (RR 0.53, 95% CI 0.14–1.93)	• Low possibility of reporting bias • Direct • Medium to small effect sizes • Few well-conducted trials, substantial expert opinion • Follow-up not reported • Imprecise where assessable • Appears inconsistent	**Moderate to low quality** evidence suggests modest benefit of psychological therapies over treatment as usual for reducing suicidality and suicide rates. However, the evidence is unclear for the relative superiority of any particular intervention
New Zealand Graded Guidelines 2003	Clinical guideline N not reported	Post-discharge from general medical wards and ED	Key objectives of intervention strategies for the ongoing treatment/ management of suicidality	Objectives include maintaining safety, treating any underlying mental illness, intervening to alleviate any psychosocial stressors These protocols are reported in many other clinical management guidelines; however, the guidelines report provided additional assessment of evidence sources and reliability	• Medium risk of reporting bias • Unable to assess using GRADE guidelines, no data reported	**Moderate to low quality** evidence provides recommendations of best practice protocols for immediate risk management Few recommendations have been evaluated by good quality trials

Study ID	Design	Sample	Intervention	Results	Quality assessment	Quality rating
			Continuity of care – keeping same therapist from inpatient to outpatient care	Continuity may increase medication adherence and improve attendance at appointments	Authors gave this evidence an 'A' rating based on RCT or meta-analytic data	
			Use of psychosocial therapies including CBT, IP, and DBT	CBT and IP may have benefits for reducing self-harm behaviour and depressive symptoms among patients who attended an ED following a suicide attempt DBT showed some benefit for reducing self-harm in people with borderline personality disorder	Authors gave this evidence a 'B' rating based on meta-analysis with risk of bias	
			Ensuring safety in prescription of medications	Consider weekly prescribing or dispensing to prevent opportunities to hoard medication or overdose Clinicians should carefully monitor suicide risk following prescription of agents including antidepressants and benzodiazepines, which may initially amplify suicidality	Authors gave this evidence a 'C' rating based on lower quality studies	

Study ID	Design	Sample	Intervention	Results	Quality assessment	Quality rating
Mann 2005 **All countries**	Systematic review of RCT and observational studies N not reported	All patients in psychiatric, inpatient, primary care, or community settings	Suicide prevention strategies: primary care strategies; gatekeepers; screening; therapeutic strategies; means restriction; media blackouts	Increasing primary care physicians' knowledge of, and screening practices for, depression and suicidality have resulted in increased use of care management/treatments, antidepressant prescription and reduced suicide rates. Limited evidence reports benefits for gatekeeper training for reducing suicidal behaviour Screening instruments have validity in identifying individuals at risk of suicidal behaviour, with no evidence to suggest screening may induce suicidal thinking in unaffected individuals Meta-analyses of RCTs do not report substantial benefits on suicidality of antidepressants in psychiatric disorders, but conclusions are limited. Observational evidence supports increased prescription with decreased suicide rates Psychological therapies with some promise for suicidal behaviour include CBT, problem-solving therapy, intensive care plus outreach, and IP. Improved follow-up after a suicide attempt is crucial in avoiding future attempts Where the method of suicide is common, restriction of means has a substantial benefit for reducing suicide rates, though the risk of method substitution is unclear Media blackouts on suicide reporting have coincided with reduced suicide rates	• Low possibility of reporting bias • Direct • Unable to assess using GRADE, no data reported • Follow-up not reported	**Moderate to low quality** evidence suggests some benefit of increasing physicians' knowledge of, and screening practices for, depression and suicidality (including medication and psychological therapies) may help to reduce suicide rates. Means restriction and media blackout represent two additional methods for population-level suicide prevention Few recommendations have been evaluated by good quality trials
Isaac 2009 **All countries**	Systematic review of RCT and observational studies N~1000	Community members: peer helpers, clinicians, teachers, military personnel, Aboriginal people	Community gatekeeper training for suicide risk minimisation through early identification	One RCT and six cohort studies of school staff, adolescents, community members (including Aboriginal community), and youth workers identified that gatekeeper training was associated with increased skills, attitudes and knowledge relating to identification of suicide risk and prevention Six cohort studies of physicians, community members and adolescents identified inconsistent reductions in suicide rates following gatekeeper training	• Low possibility of reporting bias • Direct assessments • Unable to assess using GRADE, no data reported • Follow-up not reported	**Moderate to low quality** evidence is unclear as to any benefits of gatekeeper training for reducing overall suicide rates. Some benefit may be observed for increasing knowledge and improving attitudes towards identification

Study ID	Design	Sample	Intervention	Results	Quality assessment	Quality rating
						and prevention
Luxton 2013 **All countries**	Systematic review of RCT and observational studies N~10 000	Post-ED discharge follow-up strategies for suicide prevention	Regular caring letters/postcards as follow-up after discharge from ED following self-harm or suicide attempt	Four studies provide some evidence for a small benefit of postal contact for reduced episodes of self-harming behaviours in the medium term (1–2 years). Only trend-level differences were sustained at longer follow-ups (5–15 years)	• Large sample • Medium possibility of reporting bias • Unable to assess using GRADE guidelines, no data reported • Appears inconsistent	**Moderate to low quality** evidence suggests regular follow-up contact with patients following discharge may have a small benefit for reducing suicidality in the short to medium term
			Regular telephone calls as follow-up after discharge from ED following self-harm or suicide attempt	No overall benefit of ongoing telephone contact reported in five studies (follow-up duration 3–18 months)		

Study ID	Design	Sample	Intervention	Results	Quality assessment	Quality rating
Lizardi 2010 **All countries**	Systematic review of RCT and observational studies N not reported	Post-discharge from general ED	Interventions to improve treatment engagement and/or reduce suicide risk post-discharge	Three studies targeted treatment engagement and continuity of care in adults and provide limited support for interventions including specialist nurse home visits, and the use of an integrated referral network of providers with flexible treatment options (over 12 months post-discharge). No support was found for telephone follow-ups up to eight months In adolescents, four studies report limited benefits of psychoeducation and family therapy sessions for increasing adherence to outpatient treatment programs. Some benefit was found for attendance at first appointment, but results were not sustained. One small study found that access to on-call access to trainee psychiatrists during a crisis ('green cards') had benefits for reducing self-harm events and service readmission Brief interventions specifically designed to reduce repeated suicide attempts have also been tested in outpatient care, with limited effectiveness. Written interventions had inconsistent effectiveness: no benefit was found for 'green cards' or telephone follow-ups for reducing subsequent hospital re-admission or outpatient adherence beyond initial contact. Postal contact (caring letters, postcards) had some initial benefit for reducing suicidality but this was not maintained in the longer term. Immediate outpatient follow-up (vs a 10-day wait) was associated with reduced hospitalisation over six months but no difference in suicidality	• Medium possibility of reporting bias • Unable to assess using GRADE guidelines, no data reported • Appears inconsistent	**Low quality** evidence suggests regular and early follow-up with patients following discharge may improve adherence in the short term but no clear benefits for reducing frequency of suicide attempts

Study ID	Design	Sample	Intervention	Results	Quality assessment	Quality rating
Florentine 2010 **All countries**	Non-systematic review of observational studies N not reported	Population level Preventing access to suicide methods via physical restriction and reduction of cognitive availability	Assessment of the effectiveness of restricted access as a means of suicide prevention	Detoxification of local gas supplies was one early strategy between 1955 and 1975 for reducing suicide rates and was successful in several countries. From 1993, cars were required to have a catalytic converter, which reduces levels of carbon monoxide output. Increased firearm restrictions have similarly been associated with reduced suicide rates, particularly in the UK and Australia. Restricted access to locations that become prevalent suicide spots has also shown benefits, e.g. installing safety barriers at jump sites. Removal of ligature points from prisons and hospitals has some evidence for reduced suicides Further limitation of access to highly lethal pesticides may also be beneficial for reducing suicide rates; this has shown some success in several countries. In addition, use of non-lethal pack sizes and blister packaging for analgesics such as paracetamol has reduced overdose attempts; a similar approach may be used for other medications commonly used in overdose Cognitive prevention also plays an important role; for example, the media reporting detail of suicide methods has a demonstrated impact on copycat suicides in persons already at risk. Media blackouts on suicide reporting have been shown to reduce overall suicide rates. Psychological treatments may assist to alter suicide-related imagery or beliefs in persons with past exposure to suicide. Pro-suicide websites provide detailed technical information on methods, which dramatically increase their cognitive availability to impulsive attempters. Challenging false beliefs about the speed/painfulness of certain suicide methods may help to reduce their appeal	• Unable to assess using GRADE guidelines, no data reported • High risk of reporting bias • Few well conducted studies	**Low quality** evidence is unclear as to the statistical benefits of reduced physical or cognitive access to certain suicide methods. Physical restriction of means has documented successes for reducing suicide rates in the past

CBT=Cognitive Behavioural Therapy; CI=confidence interval; DBT=Dialectical Behavioural Therapy; ED=emergency department; GRADE=Grading of Recommendations Assessment, Development and Evaluation (arrows represent the grading process); I =heterogeneity measure; IP=Interpersonal Psychotherapy; MD=mean difference; N=number of participants; NA=not applicable; NCISH=National Confidential Inquiry into Suicide and Homicide by People with Mental Illness; OECD=Organisation for Economic Co-operation and Development; OR=odds ratio; *p*=significance level; RCT=randomised controlled trial; RCT=randomised controlled trial; RR=risk ratio; SMD=standardised