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Suicide Prevention Strategies: Evidence from Systematic Reviews

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SUMMARY

- This report provides an overview of the evidence from systematic reviews on the effectiveness of suicide prevention strategies.
- Ten reviews were selected. Two reviews covered a wide range of suicide prevention strategies, three reviews focused on school-based suicide prevention programs for adolescents, four reviews assessed psychosocial and pharmacological treatments for suicidal patients, and one review examined long-term lithium treatment for patients with major affective disorders. Out of ten reviews, three reviews received a 'good' methodological quality rating.
- Suicide, parasuicide, attempted suicide, and suicide prevention were not clearly defined in the reviews. In the future, clarifying these definitions will enable one to make comparisons among the various studies.
- As the intervention strategies assessed as a means for suicide prevention in the reviews were very different from one another, direct comparisons among the interventions were not possible. In addition, a standardised approach to identify those individuals considered to be "at-risk" for suicide is needed.
- There was uncertainty and insufficient evidence as to the safety and effectiveness of school-based preventive programs for adolescents. The programs directed to the at-risk students appeared promising in terms of reduction in suicidal risk behaviours and enhancement of protective factors.
- There was insufficient evidence to make any firm recommendations about the most effective form of clinical intervention, psychosocial treatment, or pharmacological treatment for patients who deliberately self-harmed themselves. Evidence from reviews with a good methodological quality rating suggests that some types of psychosocial and pharmacological treatments including problem-solving therapy, provision of a card for emergency contact, flupenthixol treatment and dialectical behavioural therapy appeared promising in reducing rates of repeated self-harm among suicide attempters.
- Suicide is complex and multifaceted and therefore requires a combination of prevention/treatment strategies to achieve reduction in suicide rates. In recognition of the low base rate of suicide, it may not be feasible and appropriate to assess the effectiveness of a single suicide prevention strategy against a population rate reduction standard.

In the future, the following aspects should be considered when planning and developing provincial suicide prevention strategies:

- standardization of definitions for suicide-related terms;
- standardization of assessment protocols for identifying at risk populations; and
- utilization of outcome measures that have been shown to be valid and reliable for the prevention strategy of interest and the populations being targeted.

ABBREVIATIONS

CBT	cognitive behavioural therapy
CG	control group
CI	confidence interval
DSH	deliberate self-harm
GP	general practitioners
EG	experimental group
MA	meta-analysis
MAOIs	monoamine oxidase inhibitors
RCT	randomised controlled trial
RR	relative risk
SA	standard aftercare
SOR	summary odds ratio
SR	systematic review
SS	statistically significant
SSRIs	selective serotonin re-uptake inhibitors
TCAs	tricyclic antidepressants
vs	versus

DEFINITIONS

Prevention – includes any self-injury prevention or health promotion strategy generally or specifically aimed at reducing the incidence and prevalence of suicidal behaviours ¹.

Intervention – includes early recognition and assessment of risk, immediate response, resource referrals, and follow-up management and treatment of individuals at risk of suicide ¹.

Postvention – refers to the general care and support or special treatment needed by survivors of a suicide. In addition, postvention is sometimes considered to include the collection of “psychological autopsy” information for the purpose of reconstructing the social and psychological circumstances associated with the suicide ¹.

Primary prevention – control of the factors associated with the emergence of health problems. Primary prevention addresses the general population ² and seeks to decrease the number of new cases of a disorder or illness (incidence) ³.

Secondary prevention – screening and early intervention. Secondary prevention targets individuals at the onset of the pathological condition in the context of screening ² and seeks to lower the rate of established cases of the disorder or illness in the population (prevalence) ³.

Tertiary prevention – treatment and rehabilitation. Tertiary prevention targets individuals in a context of treatment when clinical features are present ² and seeks to decrease the amount of disability associated with an existing disorder or illness ³.

Universal prevention – is targeted to the general public or a whole population group that has not been identified on the basis of individual risk ³.

Selective prevention – is targeted to individuals or a subgroup of the population whose risk of developing mental disorders is significantly higher than average ³.

Indicated prevention – is targeted to high-risk individuals who are identified as having minimal but detectable signs or symptoms foreshadowing mental disorder, or biological markers indicating predisposition for mental disorder, but who do not meet DSM-III-R diagnostic levels at the current time ³.

Predisposing factors – are those factors that are typically historical in nature, setting the stage for a vulnerability to suicidal behaviour ⁴.

Precipitating factors – are those factors that are sudden in their onset and act as a trigger for predisposed persons ⁴.

Contributing factors – are those factors that serve to exacerbate the existing risk for suicidal behaviour caused by either predisposing or precipitating factors and can be either sudden in their onset or more historical in nature ⁴.

Protective factors – are those factors that appear to reduce the risk for suicide. They are most likely to be more stable over time, but fluctuations and shifts would be expected ⁴.

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INTRODUCTION

The Alberta Mental Health Board (AMHB) requested the Health Technology Assessment Unit of the Alberta Heritage Foundation for Medical Research to provide an overview of the published research on the effectiveness of suicide prevention strategies. The objective of this report is to identify the themes and provide a background, as part of several other analyses, to assist the AMHB in establishing program priorities and determining future strategic directions.

Suicide, a self-directed violence, is a global public health problem. According to a recently published *World Report on Violence and Health* prepared by the World Health Organization, worldwide, suicide claimed the lives of an estimated 815,000 people in 2000, for an overall age-adjusted rate of 14.5 per 100,000 ⁵.

Suicide in Canada is a significant public health problem that is largely preventable. Canadians are seven times more likely to die from suicide than to be the victim of a homicide ⁶. Aboriginal Canadians, especially young native males, are at high suicide risk. Some aboriginal communities have rates three to five times higher than the general population ⁷.

Suicide is currently the fifth leading cause of death among Canadians and is the second leading cause of death among Canadian children and youth aged 10 to 24 years ⁸. To provide a snapshot in time, approximately 3,700 Canadians took their own lives, an average of about 10 suicides per day in 1998 ⁸. In 1999, Alberta's age-standardized suicide rate was 14.9 per 100,000 people, which was higher than the national rate of 13 per 100,000 ⁶.

The majority of researchers and professionals involved in suicide prevention agree that suicide is associated with a complex array of factors such as mental illness, social isolation, a previous suicide attempt, family violence, physical illness, substance abuse, and access to means of suicide ⁹. Research has shown that more than 90 percent of people who kill themselves have depression or another diagnosable mental or substance abuse disorder ⁹. Some risk factors vary with age, gender, and ethnic group and may even change over time, while some factors frequently occur in combination ¹. Risk factors have different levels of effect on the person and no single one factor has been found to be a necessary or sufficient cause of suicide ¹.

In 1994, the Canadian National Task Force Update identified a number of suicide prevention strategies that might be promising ¹. Prevention strategies included improving societal conditions, public education (improving coping and life skills, improved media relations, public education programs), and reducing the availability and lethality of means for suicide. Intervention strategies recommended include education and training for health care professionals and other gatekeepers, providing

intervention services such as community coordination and collaboration, suicide prevention centres, and hospital-based services. Postvention should include dealing with suicide bereavement, survivor support programs, and psychological autopsy ¹.

Given the large amount of primary research on suicide prevention, this report focuses on the appraisal of the research findings from systematic reviews. This report attempts to address the following questions: 1) what types of suicide prevention strategies have been evaluated in the research? 2) which suicide prevention strategies are effective or promising?

FRAMEWORK OF SUICIDE PREVENTION

Suicide is an outcome of complex interactions among neurobiological, genetic, psychological, social, cultural, and environmental risk and protective factors ¹⁰. Combined with the fact that suicide is a low base rate phenomenon, determining the effects of suicide prevention strategies is a difficult task. It has been recognised that a reduction in suicide rate should not be the only measure for the effectiveness of a program. Thus this report also looks at other suicide-related outcomes such as reduction in attempted suicide and suicide ideation, enhance of protective factors, or changes in suicide-related knowledge.

Conceptual frameworks have taken on an increasingly important role in defining suicide prevention. Such frameworks provide a useful basis for the planning and evaluation of large-scale suicide prevention initiatives ¹⁰. Adopting a common conceptual framework allows the prevention strategies to address different but interrelated suicide risk factors. The appreciation of the complexity and multi-dimensional nature of suicide is reflected in the increased focus on the implementation of a broad array of suicide prevention strategies. This approach is consistent with the Centres for Disease Control's recommendations and the United Nation's Guidelines for the Formulation and Implementation of National Strategies ^{11, 12}.

There are a number of frameworks used for conceptualizing suicide prevention. One such framework classifies prevention strategies into prevention, intervention, and postvention. Public health interventions are traditionally characterized as three levels of prevention: primary, secondary, and tertiary ^{2, 3}. In addressing some limitations of this original public health model, Gordon proposed a prevention framework involving universal, selective, and indicated preventive interventions that are based on a risk-benefit point of view ¹³. Since neither the traditional public health model nor Gordon's classification were designed for use in the prevention of mental disorders, the Institute of Medicine ³ developed another framework for prevention of mental disorders (Figure 1). This framework consists of three categories: prevention, treatment, and maintenance. This framework was seen to be the most appropriate for categorizing the selected systematic reviews in this report (Dr. Ramsay, personal communication).

Figure 1: The mental health intervention spectrum ³

Prevention	<ul style="list-style-type: none">• Universal• Selective• Indicated
Treatment	<ul style="list-style-type: none">• Case identification• Standard treatment for known disorders
Maintenance	<ul style="list-style-type: none">• Compliance with long term treatment to reduce relapse and recurrence• After-care (including rehabilitation)

FINDINGS

Through a comprehensive literature search, ten critical reviews ¹⁴⁻²³ were selected (see methodology in Appendix A). Three reviews were meta-analyses ²¹⁻²³, while the other seven reviews were qualitative systematic reviews.

There were numerous systematic reviews that assessed suicide prevention in the context of treating an underlying mental illness. These reviews included studies that assessed pharmacological interventions for the treatment of mental disorders, especially depression. While it is important to assess pharmacological interventions for treating an underlying mental illness, the inclusion criteria for this report allowed the inclusion of systematic review with outcome measures that were suicide related. These reviews were not included in this report.

Types of suicide prevention strategies evaluated in the research

The ten reviews identified include a great array of suicide prevention strategies. Five reviews ¹⁴⁻¹⁸ covered prevention and treatment and five reviews ¹⁹⁻²³ focused on treatment and maintenance. The prevention strategies identified in the ten reviews are summarized in Figure 2 and Table 1.

Figure 2: Suicide prevention strategies identified in systematic reviews

Prevention	Universal	<ul style="list-style-type: none"> • Media reporting responsibility/restrictions • Means access restrictions 	
	Selective	<ul style="list-style-type: none"> • Safety measures on high buildings • Suicide prevention centres • School awareness education • Suicide prevention curricula • Suicide prevention program 	
	Indicated	<ul style="list-style-type: none"> • GP education • Computer assisted help (Internet) 	
Treatment	Case identification	<ul style="list-style-type: none"> • Screening • Suicide prevention program • Increased identification support • Youth health clinics 	
	Standard treatment	<ul style="list-style-type: none"> • Medical treatments 	<ul style="list-style-type: none"> ❖ Psychotropic (antipsychotics & antidepressants) ❖ General hospital admission ❖ Electroconvulsive therapy ❖ Intensive care ❖ Inpatient treatment
		<ul style="list-style-type: none"> • Non-medical treatments 	<ul style="list-style-type: none"> ❖ Group support ❖ Counseling ❖ CBT ❖ Problem-solving ❖ Dialectical behaviour therapy ❖ Inpatients behaviour therapy ❖ Intensive intervention ❖ Family therapy ❖ Psychosocial crisis intervention
Maintenance	Compliance	<ul style="list-style-type: none"> • Compliance management • Post-discharge contacts • Emergency card • In-patient shelter • Home-based family therapy 	
	Rehabilitation	<ul style="list-style-type: none"> • Long-term therapy 	

Table 1: Summarisation of strategies assessed in systematic reviews

Study	Study Objective	Intervention	Setting /Target	Outcome Measured
Prevention and Treatment				
Gunnell & Frankel 1994 ¹⁴ SR	To examine available evidence of the effectiveness of suicide prevention interventions, and relate the evidence of each intervention to the potential exposure of the at risk population in order to reconstruct the possible impact of current programs.	Interventions aimed to reduce suicide rate	Primary care, secondary care, and public health settings General and at-risk population	Suicide rate
Hider 1998 ¹⁵ SR	To assess the literature describing the epidemiology and the main risk factors for suicidal behaviour among young people, along with a review of the evidence for the recognition, management, and prevention of adolescent suicidal behaviour by primary care practitioners.	Population-based intervention and targeted intervention	Primary care setting General and at-risk groups of adolescent	Suicide related knowledge and attitude, suicide risk factors, and suicidal behaviours (suicide ideation and suicide attempts)
Ploeg et al. 1996 ¹⁶ SR	To summarise the evidence on the effectiveness of adolescent suicide prevention curriculum programs.	Adolescent suicide prevention curricula programs	School General and at-risk groups of adolescents	Suicide risk, knowledge, attitudes, coping, hopelessness and empathy
Ploeg et al. 1999 ¹⁷ SR An update of Ploeg et al. 1996 ¹⁶	To assess the impact of school-based curriculum suicide prevention programs for adolescents on outcomes including knowledge, attitudes and behaviour related to suicide and to assess gender-related differences in response to the programs.	School-based curriculum suicide prevention programs	School General and at-risk groups of adolescents	Knowledge and attitude, mental health status and development, satisfaction with program, suicide risk behaviours, and social health indicators
Guo & Harstall 2002 ¹⁸ SR	To update the evidence on the effectiveness of suicide prevention programs for children and youth, and analyze the elements related to the different programs.	School-based suicide prevention programs	School General and at risk groups of children and youth	Suicide-related knowledge and attitude, suicide risk and protective factors, suicidal behaviour

Table 1: Summarization of strategies assessed in systematic reviews (cont'd)

Study	Study Objective	Intervention	Setting /Target	Outcome Measured
Treatment and Maintenance				
Hawton et al. 2002 ²² MA An update of Hawton et al. 1998 ²⁴	To identify and synthesize all RCTs that examined the effectiveness of psychosocial and physical treatments for patients who have deliberately harmed themselves.	Psychosocial and pharmacological treatment	Hospital, outpatient clinic Patients with history of deliberate self harm	Rate of repeated self-harm
NHS CRD 1998 ¹⁹ SR An update of Hawton et al. 1998 ²⁴	To evaluate effectiveness of interventions and to review research evidence on characteristics of an effective clinical service for assessment and aftercare of people who present following an episode of deliberate self-harm.	Psychosocial and pharmacological treatment	Hospital, outpatient clinic, home, community mental health centre Patients with history of deliberate self harm	Repetition of self harm
Sande et al. 1997 ²¹ MA	To systematically review RCTs on the effects of psychosocial/psychotherapeutic treatment and interventions for suicide attempters.	Psychosocial/psychotherapeutic treatment	Hospital, outpatient, home Suicide attempters	Repeated suicide attempts
Linehan 1997 ²⁰ SR	To review RCTs on the effects of both psychosocial and behavioural interventions designed to directly reduce rates of suicide and parasuicidal behaviour (including suicide attempts) among suicidal individuals.	Psychosocial treatment and pharmacotherapy	Hospital, psychiatric inpatients unit, clinic, home Inpatients and outpatients with suicide attempts (or parasuicide)	Suicide rate, rates of parasuicide or suicide attempts, or serious threats
Tondo et al. 2001 ²³ MA	To compare suicide rates with versus without long-term lithium treatment in major affective disorders.	Long-term lithium treatment	Setting was not stated. Patients with major affective disorders	Suicide rates

Critical appraisal of methodological quality

The methodological quality of the ten systematic reviews was evaluated using a set of previously published criteria²⁵ (see Appendix A). The method for assessing methodological quality is described in Appendix A. The quality rating for each review is summarised in Table 2.

According to the criteria, among the ten reviews, three reviews^{18, 21, 22} were considered to be of good quality based on their total scores. The review by Guo and Harstall¹⁸ received the highest quality rating (13 out of 16).

In general, the majority of the reviews used relatively comprehensive literature searches in terms of electronic databases used to locate relevant research. However, all of the ten reviews except the review by Guo and Harstall¹⁸ limited their search to studies that were published in English. The authors of the other reviews made no attempt to include unpublished studies. The authors of one review¹⁵ were not able to retrieve all of the articles that were identified by the literature search because of the short timeframe allocated for the completion of the review. Such limitations in the search strategies have the potential to introduce a publication bias.

Most of the ten reviews did not provide sufficient information on data extraction processes in terms of details to be extracted and number of reviewers who extracted data. In some reviews, only one reviewer performed data extraction.

Five reviews^{16-18, 22, 23} used a set of criteria to formally assess the methodological quality of the primary studies. One review¹⁹ only briefly mentioned the method for quality rating but did not present the results of the quality assessment. One of the authors was contacted and stated that the quality assessment was previously reported in a Cochrane review²⁴ (personal communication). Some reviews only presented study design or hierarchy of evidence, while others only provided some scattered discussion on the methodological quality. In most reviews methodological limitations of the primary studies were taken into consideration when interpreting the research results and drawing conclusions.

Some reviews did not provide sufficient information in terms of study participants, intervention protocol, and intervention implementation. For example, the age of participants was not reported in some of the reviews. The components of suicide prevention programs are very important for evaluating the program effects. Lack of detailed description of the program elements makes it difficult to compare the results across all studies.

Five reviews¹⁹⁻²³ that focused on treatment and maintenance reported quantitative results (e.g., proportion of patients who repeated self-harm) rather than merely qualitative statements or reporting of 'p' values.

Overall, there were considerable limitations associated with the methodological quality of the ten systematic reviews. Discussion of the results needs to take this 'quality' aspect into consideration. On the other hand, it was found that the quality measurement tool used in this report also had its own limitations (see discussion in Appendix A).

Table 2: Assessment of methodological qualities of systematic reviews*

Study	Search	Data extraction process	Methodological quality assessment	Use of methodological assessment	Details of participants	Details of intervention content	Details of intervention implementation	Reporting of results	Total score
Prevention and Treatment									
Gunnell & Frankel 1994 ¹⁴	1	0	2	1	0	1	0	1	6
Hider 1998 ¹⁵	1	0	2	2	0	2	1	1	9
Ploeg et al. 1996 ¹⁶	1	0	2	2	0	1	2	1	9
Ploeg et al. 1999 ¹⁷	1	0	2	2	0	1	2	1	9
Guo & Harstall 2002 ¹⁸	2	1	2	2	2	2	2	0	13**
Treatment and Maintenance									
Hawton et al. 2002 ²²	1	1	2	2	2	1	1	2	12**
NHS CRD 1998 ¹⁹	1	1	1	1	2	1	1	2	10
Sande et al. 1997 ²¹	1	1	1	2	0	1	2	2	11**
Linehan 1997 ²⁰	1	0	1	2	2	1	1	2	10
Tondo et al. 2001 ²³	2	0	2	2	0	0	1	2	9

*Lister-Sharp et al. 1999²⁵: each criterion has a maximum value of 2 resulting in a maximum total score of 16.

** Reviews that received a total score of 11 (70% of the total score of 16) or above were considered to be of 'good' quality.

Effectiveness of suicide prevention strategies

The details of the interventions and outcomes assessed in the ten systematic reviews are summarised in Table 3 in Appendix B.

Systematic reviews assessing prevention and treatment strategies

Two reviews covered a wide range of suicide prevention strategies^{14, 15}. The review by **Gunnell and Frankel**¹⁴ included 24 studies that evaluated the effectiveness of suicide prevention programs in primary, secondary, and public health settings. Only two studies included in this review were RCTs. The majority of studies were considered to be of a low level of evidence based on study design. Reduction in suicide rate was the only outcome measured. More than ten programs were evaluated in these studies but the details of the interventions were not clearly reported. Most studies used geographic or historic comparisons to measure a change in suicide rate.

The review by Gunnell and Frankel¹⁴ did not receive a 'good' quality rating. Thus, the results and conclusions need to be viewed with caution. The major finding of this review was that no single intervention assessed by a RCT was shown to reduce suicide. There was no specific medical intervention (i.e. pharmaceuticals, such as anti-depressants) that was shown to affect suicide rates. Great potential for suicide prevention seemed to arise from limiting the availability of methods for suicide, although the evidence was weak.

The authors of this review noted that the available evidence offers little support for the hope that the targets of reduction in suicide rates can be achieved on the basis of current knowledge and current policy. It was clear from this analysis that the expected reduction in suicide rates can be achieved only through a combination of strategies. Furthermore, the authors state that there is a need to improve both the recognition of those who may be potentially suicidal and the perceived usefulness and ease of access to the available agencies in times of crisis.

The authors suggest that in the future, it is critical that controlled clinical trials be used where possible. However, it is important to recognise that the sample sizes required to demonstrate the effectiveness of population-based interventions, targeted at such a rare event, will need a very large sample size. As such, the likelihood of well designed RCTs of appropriate numbers ever being conducted in this area remains a challenge.

The review by **Hider**¹⁵ described the epidemiology and main risk factors for suicidal behaviour among young people as well as the available evidence for the recognition, management, prevention and treatment of suicidal behaviour by primary practitioners. For the purpose of this report, only a summary of the prevention and treatment strategies for suicidal young people are presented.

The prevention of suicidal behaviour by primary care practitioners was conducted on two levels: 1) population-based interventions, and 2) targeted interventions. Targeted

interventions were aimed to prevent suicidal behaviour in those young people established to be at high-risk of suicide.

Hider identified a number of limitations in the quality of the published literature that was examined. Many studies, due to design, were unable to exclude chance, bias, or confounding as alternative explanations for their findings. In addition, a significant amount of the research that examined the recognition or assessment of suicide risk in young people, was based solely on expert opinion.

This review did not receive a 'good' quality rating. The findings from this review must be viewed with caution due to several limitations. This review was not exposed to wide peer review but only received advice from a consultant. Not all of the studies that were identified from the literature search were appraised because of the very short time frame for the completion of the assessment. In addition, this review was mainly based upon the published academic literature and did not extensively review unpublished work, or "grey" literature.

In terms of population-based intervention, this review found that uncertainty remains about the effectiveness and safety of school-based prevention programs although they have become common in the United States. Programs that target at-risk youth appear to be most promising in reducing suicidal behaviour among young people. Other approaches such as lobbying by primary care practitioners for the restriction of the means may be able to reduce youth suicidal behaviour. Office-based preventive interventions and education programs to assist general practitioners in recognising and treating mental illness appear to be effective interventions. On the other hand, uncertainty exists about the ability of primary care practitioners, who work in youth health clinics, in reducing suicidal behaviour among young people.

As to targeted intervention, cognitive behavioural therapy and support groups were likely to reduce youth suicidal behaviour, but little evidence supports the use of family therapy, crisis intervention and psychoanalysis. Evidence from RCTs suggested that pharmacotherapy seems to be effective in terms of treating underlying mental disorders, but less effective at preventing youth suicidal behaviour. The effectiveness of postvention was not proven by any clinical trial.

The author stated that a combination of treatment modalities was likely to be the most effective means of reducing suicidal behaviour among adolescents. In addition, an appreciation of cultural factors was considered important in the prevention of suicidal behaviour among young people either within population-based or targeted interventions.

Overall, the reviews by Gunnell and Frankel ¹⁴ and Hider ¹⁵ agreed that there was no strong evidence to support any single intervention as effective in reducing suicide rate. Uncertainty remains about the effectiveness and safety of school-based suicide prevention programs. Education programs for general practitioners may have the

potential in reducing suicide rate. A number of methodological limitations of primary research, which may contribute to the lack of strong evidence, were identified in the two reviews.

Three reviews¹⁶⁻¹⁸ examined the evidence on the effectiveness of school-based suicide prevention programs for adolescents. The review by Ploeg et al. 1999¹⁷ was an update of their earlier review that was published in 1996¹⁶.

Ploeg et al.¹⁷ applied slightly different inclusion criteria for their updated review. While the earlier review used broader inclusion criteria, the updated review¹⁷ only included school-based curriculum suicide prevention programs. These two reviews did not receive a 'good' quality rating.

School-based suicide prevention programs for the general population usually aimed to increase awareness of the problem of youth suicide and warning signs and behaviours related to suicide, to promote identification of and response to potential suicide by peers, to provide information about mental health resources and to provide coping skill training. Some programs were targeted towards at-risk students and focused on suicide risk factors and suicidal behaviours.

Outcomes were classified into five categories including suicide-related knowledge and attitude, mental health status and development, satisfaction with the program, health risk behaviours, and social health indicators.

Serious methodological limitations were identified in terms of study design, control for confounders, testing of validity and reliability of measurement tool, and withdrawal and dropout rates.

In the updated review, only two included studies examined the outcome on actual suicidal behaviours. One study rated as 'moderate' found decreased suicide risk behaviours²⁶, whereas a study with a 'weak' quality rating failed to find significant reduction in self-reported suicide attempts²⁷. The authors noticed that the methodologically weak studies were more likely than strong/moderate studies to suggest negative or harmful effects of the curriculum programs.

Significant gender differences were found with males more negatively affected than females on the outcomes of coping, hopelessness, and attitudes towards suicide. In general, females expressed greater satisfaction with the programs than males. A dose-response relationship for the outcomes of the prevention programs was not supported by the results. Increased intensity and/or duration of the intervention did not appear to be associated with more positive outcomes.

According to the authors, findings from more rigorous studies indicated that programs may improve suicide-related knowledge and attitudes, as well as mental health indicators (perceived stress, reduced anger, and increased self-esteem). Findings from less rigorous studies also suggested negative program effects, especially for males who may be at higher risk for suicide.

The review by **Guo and Harstall** ¹⁸ had a similar focus but also specifically looked at the components of the suicide prevention programs. This review included ten studies, the majority of which were the same as the studies included in Ploeg's reviews. As well, this review used the same assessment tool to determine the methodological quality of the primary studies. The quality rating for each study was somewhat different from that of Ploeg's reviews.

The programs evaluated in the reviews varied in terms of program objective, focus, target population, and delivery mode. Participants were adolescents and most frequently high school students in Grades 9 and 10. The duration of the programs ranged from a single, one and one-half hour session to 180 sessions of 55 minutes each. The prevention programs were usually delivered by school staff (teacher, school nurses, or counsellors) or social workers with previous training.

The review by Guo and Harstall ¹⁸ received a 'good' quality rating. This review found promising results from two studies that used similar approaches for risk stratification and delivered intervention programs containing similar components. These two studies provided consistent and encouraging evidence on the effects of suicide prevention programs for at-risk youth in terms of reducing suicide risk factors, enhancing protective factors, and reducing suicidal behaviours.

As to the safety of school-based suicide prevention programs, only one out of the four studies that looked at potential harm of the programs found a negative program effect among Blacks and males. However, this effect was not verified in a follow up study.

Overall, the three reviews agreed that there is currently insufficient evidence to either support or not support school-based curriculum programs. Suicide prevention programs may have some negative effects on certain groups of students. According to Guo and Harstall, evidence from the studies with a relatively good methodological quality suggested that suicide prevention programs targeted to the at-risk population appeared promising and encouraging in reducing suicidal behaviour among adolescents.

Systematic reviews assessing treatment and maintenance strategies

Four reviews ¹⁹⁻²² with similar and specific research objectives, to examine the effectiveness of psychosocial and pharmacological treatments for patients after deliberate self-harm or suicide attempts, measured for reduction in suicide attempts or parasuicide. The reviews by **Hawton et al.** ²² and **NHS** ¹⁹ were updates of an earlier meta-analysis by Hawton et al. ²⁴ that was published in 1998.

The meta-analysis by Hawton et al. ²² and the systematic review by NHS ¹⁹ grouped studies into 11 categories according to the similarity of treatment strategies. The review by Hawton et al. ²², which received a 'good' quality rating, found promising results from small trials involving suicide attempters for problem solving therapy, provision of an emergency access card, dialectical behavioural therapy, and flupenthixol therapy.

Although based on the same clinical trials, NHS¹⁹ stated that problem solving therapy, provision of an emergency access card, and dialectical behavioural therapy, but not flupenthixol therapy appeared promising. The reason for NHS not including flupenthixol therapy as a promising intervention is that it was based on a single study with small numbers (personal communication). This review did not receive a 'good' quality rating.

Another meta-analysis by **Sande et al.**²¹ included 15 RCTs and grouped studies into four categories according to therapeutic background and treatment protocol. This review received a 'good' quality rating. The authors found that the interventions in the first three categories, including psychiatric management of poor compliance, guaranteed in-patient shelter, and psychosocial crisis intervention, failed to show any significant effects on reduction in repeated suicide attempts. However, all four studies on the fourth category, CBT, demonstrated small differences in the repetition rates between the experimental and control groups, favoured the experimental group, although the differences did not reach the level of statistical significance. The combined results from these four studies appeared to show a significant reduction in repeated suicide attempts.

The review by **Linehan**²⁰ included 20 clinical trials (18 RCTs) and qualitatively evaluated the effects of outpatient treatment, inpatient treatment, and pharmacological treatment in reducing suicide attempts or parasuicide. This review did not receive a 'good' quality rating. The analyses showed that four out of thirteen psychosocial intervention studies (31%) and one out of three pharmacotherapy studies (33%) reported efficacious results when compared to treatment-as-usual or placebo controls. From another perspective, when outpatient psychosocial interventions were examined, the strongest predictor of whether the experimental treatment would be more effective than the control was whether high-risk suicidal individuals were included. Three well-designed studies showed that psychosocial interventions appear effective in reducing the risk of subsequent parasuicidal behaviour. These are considered to be the strongest evidence showing the effectiveness of outpatient behavioural interventions for highly suicidal patients.

The literature on deliberate self-harm is limited in two ways. First, the data came largely from studies including general hospital attendees, although up to a third of self harm episodes may not lead to medical contact. Second, most research has been conducted on deliberate self-poisoning rather than other forms of self-harm, such as cutting. There is some overlap between these behaviours, but caution should be taken about generalizing the findings¹⁹.

There was a great overlap in the primary studies included in these four reviews. The majority of RCTs included in the four reviews were identical. Thus, in total, only 31 studies published since 1973 were identified and assessed in the four reviews. Overall,

the inclusion criteria, treatment setting, and length and extensiveness of the interventions examined in the studies reviewed were highly variable.

The main limitation with nearly all trials included in these reviews was that they included far too few subjects to have the statistical power to detect clinically meaningful differences in rates of self-harm between experimental and control groups. Another limitation was that the comparison intervention for most of the studies of psychosocial intervention was standard care. Some studies did not provide details of this care, particularly with respect to both the treatment and the setting. Moreover, the outcome variable selected was not consistently defined and measured in a standard way across all studies.

One major concern about the reliability of the results from these four reviews was that these reviews only included trials published in English journals. The lack of a comprehensive search including 'grey literature' would likely introduce publication bias, which may result in an over estimate of intervention effects.

Overall, these four reviews¹⁹⁻²² were consistent in their conclusions that there was insufficient evidence about the most effective forms of treatment. However, the meta-analysis by Hawton et al.²² which received a good quality rating identified four promising interventions from small clinical trials including problem-solving therapy, provision of emergency card, dialectical behavioural therapy, and neuroleptic medication (flupenthixol). Another meta-analysis²¹ found that CBT appeared promising.

The meta-analysis by **Tondo et al.**²³ examined the effectiveness of long-term lithium treatment for patients with major affective illness (mostly bipolar disorder) in reduction of suicide rate. Twenty two studies were included in this review and only three out of 22 trials had a blind randomized design. The methodological quality of the included studies was rated using a set of criteria. Information regarding participants and the intervention was very limited.

This review did not receive a 'good' quality rating. According to the authors, the evidence reviewed provides strong and consistent support for the conclusion that suicide rates were much lower during long-term lithium treatment than without such long-term treatment. However, the average suicide rate for this special group of patients during lithium maintenance treatment greatly exceeded average rate reported for general populations by at least 10-fold.

DISCUSSION

Overall findings

The findings from this review need to be viewed with caution due to its methodological limitations. Only systematic reviews that were published in English were included.

There were some limitations (see Appendix A) associated with the assessment tool chosen to evaluate the methodological quality of the ten systematic reviews.

Although rather broad inclusion criteria were used in this report without any restriction on types of intervention, target population, and outcome measurements, only ten systematic reviews fully met the inclusion criteria. While two reviews^{14, 15} covered a great array of suicide prevention strategies from prevention through treatment, the other eight reviews had very narrow and specific focuses. Three reviews¹⁶⁻¹⁸ focused on school-based suicide prevention programs for adolescent, four reviews specifically addressed the effectiveness of psychosocial and pharmacological treatments for patients who had engaged in deliberate self-harm (or suicide attempts), and one review²³ examined the effectiveness of long-term lithium treatment for patients who had a major affective disorder. There was a great deal of overlap in the primary studies assessed in the included reviews. Given the fact that many suicide prevention programs have been developed and implemented for a long time, evidence suggests that only few of them have been formally evaluated for their efficacy/effectiveness.

The meta-analysis with a 'good' quality rating²² suggested that problem-solving therapy, provision of a card to allow suicidal patients to make emergency contact with services, flupenthixol treatment for recurrent self-harm, and dialectical behavioural therapy for female patients with borderline personality disorder and recurrent self-harm appeared to be promising. Another meta-analysis²⁴, which received a 'good' quality rating, suggested that CBT may be effective in reducing repeated suicide attempts. Large trials of these promising therapies are required. It was also noted that the majority of research participants were those who attended general hospitals. However, up to one third of the episodes might not lead to medical contact. Most research was conducted on those who attempted self-poisoning rather than any other form of self-harm such as cutting. Thus, caution should be taken when generalising results from these studies to other suicidal population. The authors agreed that there was currently insufficient evidence to suggest the most effective intervention for suicide attempters.

The review by Guo and Harstall¹⁸, which was rated as 'good' for its methodological quality, suggested that the current evidence is inadequate to support school-based suicide prevention programs because of the uncertainty regarding their effectiveness and safety. Evidence from two well-designed and conducted studies suggested that the suicide prevention programs that targeted at-risk populations seemed more promising in terms of reducing suicidal behaviours among adolescents.

As the authors of these reviews pointed out, the results from the primary studies should be viewed with caution because of the variable and often poor methodological quality. These methodological limitations include:

- small sample sizes,
- selection bias of participants,

- lack of information on treatments provided in control groups,
- lack of validity and reliability information on outcome measurement tools,
- limitation in the analyses or pooling of the results, and
- lack of clear definitions for suicidal behaviours and suicide prevention.

The studies included in the systematic reviews usually contained **small sample sizes**, which makes it difficult to detect significant effects of suicide prevention programs. This is especially the case for the clinical trials on the psychological, behavioural, and pharmacological treatments of suicidal patients.

Inclusion and exclusion criteria for participants in some trials were considered inappropriate in terms of determining the effect of an intervention. For example, suicidal individuals were often excluded from clinical trials because of ethical considerations²⁰. This is an important consideration since evidence is lacking on how to treat these highly suicidal patients most effectively.

The effects of psychosocial interventions were often compared to standard care (control condition) in clinical trials. However, **details of standard care** such as treatment content were not provided in some studies²⁴, which makes it difficult to interpret study results.

For school-based suicide prevention programs, one of the major methodological limitations is that the validity and reliability of the outcome measurement tools were not established in some studies. In addition, different tools were used to measure the same outcomes in several studies. Results from these studies are difficult to compare and the soundness of conclusions based on such studies may be questioned.

Methodological limitations were also evident in terms of **analyses used** in the studies. It was noted that some clinical trials of CBT were not analysed on an intention-to-treat basis, which may lead to an overestimation of the effect of the experimental intervention²¹.

Issues related to definitions

The definitional ambiguity and vagueness that existed among the outcomes measured may create two major limitations²⁰. Firstly, inconsistent definitions make it very difficult to compare findings and outcomes across studies. This is compounded by the fact that a majority of investigators did not operationally define their terms. Secondly, the absence of any reliable or valid assessment of actual intent to die can lead to falsely classifying suicidal and nonsuicidal behaviours. Use of clearly defined suicide-related terms is important in generalizing research findings to the Alberta context.

Suicide and self-harm

One problem relating to research on fatal and nonfatal self-injury is the confusion resulting from the numerous terms used to refer to this behaviour and the failure to

precisely define such terms²⁰. To fully understand the scope and meaning of suicide prevention, a clear working definition of suicide and self-harm is required.

Attempted suicide

Some investigators view all intentional self-injurious behaviour not resulting in death as “suicide attempts”. Sometimes the use of the term “suicide attempt” is not associated with intent to die²⁰. When referring specifically to intentional self-injurious behaviour without accompanying intent to die, ambiguous terminology is more often the rule than the exception. Therefore, in the absence of a well-recognised and accepted term, investigators will often label the behaviour under study by its form or method (i.e. self-mutilation, overdosing, self-poisoning). While these terms do not explicitly indicate that the behavioural act and resulting bodily injury or harm is intentional, the context implies an assumption that the behaviour and outcome consequences are not accidental²⁰.

It is important to note that in clinical environments, the term “self-harm” is frequently used to refer to any behaviour pattern that results in psychological or physical harm to the individual. Some examples include driving fast and staying in abusive relationships. Unfortunately, this further obscures and complicates the meaning of self-harm²⁰.

Parasuicide

Parasuicide is a term that was coined as a result of the difficulties arriving at a consensus on how to measure or infer “intent to die” during self-injurious acts. It covers behaviours that can vary from suicidal gestures to serious attempts to kill oneself¹⁵. Parasuicide is defined by Linehan²⁰ as intentional, nonfatal, self-injury to cause bodily harm or death, which includes both suicide attempts and acts without suicide intent. Both the behavioural act and the injurious outcome are considered intentional. Other authors view parasuicide as a subset of attempts defined as being an unsuccessful suicide attempt that was (usually) of low lethality²⁸.

In the ongoing multinational WHO/Euro parasuicide epidemiological monitoring studies, parasuicide is defined as “an act with nonfatal outcome, in which an individual deliberately initiates a non-habitual behaviour that, without intervention from others, will cause self harm, or deliberately ingests a substance in excess of the prescribed therapeutic dosage, and which is aimed at realizing changes which the subject desired via the actual or expected physical consequences”²⁹.

Parasuicide is a heterogeneous category that includes self-injurious behaviour with intent to die (a suicide attempt) as well as behaviour without attempt to die (for example, putting out a cigarette on one’s arm with no thought of dying). Many clinicians in the United States understand parasuicide as limited to intentional self-injury that is not a suicide attempt²⁰. This is likely because there is no agreed-upon term for “nonsuicidal but otherwise intentional self-injury” to parallel the terms

“suicide attempt” or “ambivalent suicide attempt”. Unfortunately, the misuse of the term parasuicide further confounds the interpretation of research on suicidal behaviour.

CONCLUSION

Ten systematic reviews identified in this report indicated that a number of suicide prevention strategies have been evaluated for their effectiveness and safety in the primary research. These strategies included education programs for the general practitioners, school-based suicide prevention programs for adolescents, restriction of access to means of suicide and media restriction on reporting of suicide, use of internet and computer based tools, screening for suicide risk, psychological or psychosocial and pharmacological treatment for those patients who had mental disorders (e.g., depression) or had previous suicide attempts, and postvention. It has been noted that a large number of suicide prevention programs, which are currently in place, have not been evaluated. Future work needs to address the lack of evaluation of the programs effectiveness.

In general, the majority of the primary studies included in the reviews suffered from serious methodological limitations, which prevented the systematic reviews from providing scientifically sound evidence on the effectiveness and safety of various suicide prevention strategies.

The available evidence suggests that there is no single suicide prevention program that appears to be effective in reducing suicide rates. According to the findings from the reviews that received a ‘good’ rating for their methodological quality, some types of psychological and pharmacological treatments including problem-solving therapy, provision of a card for emergency contact, flupenthixol treatment and dialectical behavioural therapy appeared promising from small trials in reducing rates of repeated self-harm among suicide attempters. There is currently insufficient evidence to support or not to support school-based suicide prevention programs for adolescents. Programs directed to at-risk students seemed more promising in reducing suicidal behaviours among adolescents. Large controlled clinical trials are required to test promising treatments shown in smaller trials. Trials should also look at those patients who deliberately harm themselves using the means other than self poisoning (e.g., cutting) or who do not receive medical attention.

There is no agreement about target population. Psychosocial or psychological treatment, behaviour treatment, and pharmacological treatments seemed to be more effective when at high risk patients were included in the trials. School-based suicide prevention curricula for adolescents also appeared more effective in the at-risk group. There is no standardised way to identify individuals at high suicidal risk. The gender difference in response to suicide prevention programs needs to be examined, especially for suicide prevention in adolescents.

Although there is currently no strong evidence to support or not to support any suicide prevention strategy in terms of reducing suicide rates, some common findings and suggestions from primary research may provide useful insights for planning suicide prevention strategies at the local level and for future research:

- It is necessary to develop standardized definitions for suicide-related terms such as suicide, self-harm, attempted suicide, and parasuicide to ensure consistent provincial data collection.
- It is important to implement standardized assessment protocols for identifying at risk populations.
- When planning provincial suicide prevention strategies, efforts may need to be focused on the strategies targeted to at-risk populations and the use of multiple strategies that have promising evidence to support their effectiveness.
- Treating highly suicidal patients and their underlying mental disorders is one of the promising areas of suicide prevention.
- Reduction of suicide rates may not be a feasible outcome measure of effectiveness of suicide prevention strategies in the short term. Other intermediate outcomes such as reduction in suicidal behaviour or risk factors should be measured to determine whether or not a prevention strategy is effective.
- It is critical to use outcome measures that have been shown to be valid and reliable for certain prevention strategies and the populations being targeted.

Because suicide is a multifaceted issue that involves psychological, social, economic, genetic, cultural, and environmental factors, one single intervention is not likely to have the potential to reduce suicide rates. A broad array of suicide prevention, treatment and maintenance strategies that address different suicide risk factors and protective factors will be required to possibly achieve the overall reduction of suicide rates in the long term.

APPENDICES

APPENDIX A: METHODOLOGY

Search strategy

Databases searched for systematic reviews on suicide prevention were as follows: CINAHL (1990 - 2002), EMBASE (1990 - August 2002), ERIC (1990 - September 2002), PsycInfo (1990- August 2002), PubMed Medline (October 2002), Cochrane Library (2002 Issue # 3), Canadian Medical Association Infobase Clinical Practice Guidelines, NHS Centre for Review and Dissemination (CRD) HTA, EED, DARE, National Guidelines Clearinghouse, and TRIP.

Websites scanned were: Agency for Health Research and Quality (AHRQ), British Columbia Office of Health Technology Assessment (BCOHTA), Canadian Task Force on Periodic Health Examination (Canadian Guide to Clinical Preventive Health Care), Canadian Coordinating Office for Health Technology Assessment (CCOHTA), Health Services Utilization and Research Commission (HSURC), Institute for Clinical Evaluative Sciences (ICES), and all English INAHTA members websites. However, only the New Zealand Health Technology Assessment and the Canadian Task Force on Periodic Health Examination websites yielded relevant results.

Databases searched with no relevant result were: BioethicsLine (1990 to December 2000), EBM Reviews - ACP Journal Club (1991- July/ August 2002), HealthSTAR (1996- January 2000), Sociological Abstracts (1990 - June 2002), Web of Science (1990 - October 2002).

The following keywords were used alone or in combination:

Suicide/ parasuicide/ self harm/ prevention/ postvention/ meta-analysis/ critical/ critically/ appraisal/ systematic/ systematically/ review/ reviews.

All searches were limited to the English language and from 1990 onwards.

Inclusion criteria

To be included, the review had to meet the following criteria regarding relevance, study design, and information provided:

- include evaluations of the effectiveness of suicide prevention strategies (no restriction on types of intervention, target population, and settings);
- provide information about participants and intervention contents;
- measure suicide-related outcomes, e.g., a reduction in suicide risk factors or in suicidal behaviours (complete suicide, suicidal ideation, suicide attempts, or repetition of self-harm);
- have a clear objective or research question;
- have a systematic search strategy and define their search strategy;
- have clear inclusion and exclusion criteria for studies reviewed;

- critically appraise the methodological quality of studies reviewed, and
- qualitatively or quantitatively synthesize the data from studies reviewed.

Exclusion criteria

- reviews that only focused on the treatment of underlying mental diseases and did not report suicide-related outcomes.

Data extraction

Information about study objectives, focus of interventions, target population, setting, and outcomes was extracted. One reviewer (Bing Guo) completed the data extraction process.

Criteria for methodological quality

A quality measurement tool that was previously developed²⁵ was used to assess the methodological quality of the ten systematic reviews included in this report. The reason for choosing this tool was that it was developed to assess the quality of systematic reviews on health promotion and school education, which fall into the realm of public health and is somewhat similar to suicide prevention. The measurement tool included eight criteria: (1) search; (2) data extraction process; (3) methodological quality assessment; (4) use of methodological quality assessment; (5) details of participants; (6) details of intervention content; (7) details of intervention implementation; and (8) reporting of results. Each criterion is scored as 0, 1, or 2. A higher score means a higher quality rating. Each of the eight criteria has the same weight contributing to the total scores. Two reviewers (Bing Guo and Ann Scott) independently assessed the quality of ten reviews. Disagreement was resolved by discussion.

According to one of the authors (Sarah Stewart-Brown), this measurement tool was not previously validated and only the total score out of 16 for each study were presented in their report (personal communication). In order to compare the systematic reviews based on the quality score, an arbitrary cut-off of 70% of the total score was chosen to determine the quality of the reviews. The review that received a score of 11 or above was considered to be of 'good' quality.

This quality assessment tool has its own limitations. For example:

- This tool was not previously tested for its consistency and validity.
- Lack of clear instructions regarding its use. Some criteria were vague using subjective terms like 'some description' versus 'explicit description', or 'extra discussion' versus 'detailed discussion'. Without clear definitions, it was difficult to decide what these terms mean and introduced a certain amount of ambiguity.

- This tool did not have an item regarding inclusion and exclusion criteria for selecting research studies. Clearly defined inclusion and exclusion criteria can help to focus the scope of the research and this is a very important selection process when conducting systematic reviews. Without this aspect, the tool may not be able to sufficiently measure the review's quality.
- The criterion for methodological quality assessment needs to be further enhanced. A term of 'formal assessment using criteria' could mean the criteria for ranking the level of evidence (i.e., only study design considered) or a set of criteria addressing several important aspects of a review (such as search, inclusion and exclusion, data extraction, quality assessment, details of intervention).

Because of these limitations, some difficulties were encountered especially in the interpretation of criteria. The rating results were considerably different between the two independent reviewers. To resolve the disagreement, the two reviewers had to develop clear instructions for each criterion to achieve more consistency and better agreement.

Quality of reviews²⁵

The quality of each included review was rated as 0, 1, or 2 on each of the following criteria:

1. Search

- 0 Vague or 1 databases only
- 1 Several databases alone or plus other methods
- 2 Broad search, unpublished/ono-journal/foreign

2. Data extraction process

- 0 No details
- 1 Either details of data extraction forms or numbers of reviewers given
- 2 Both details of data extraction forms and numbers of reviewers given

3. Methodological quality assessment

- 0 No more than design given
- 1 Some extra discussion or information
- 2 Detailed discussion or formal assessment using criteria

4. Use of methodological quality assessment

- 0 Not used
- 1 Presented but had little influence
- 2 Influenced presentation of results and /or conclusions

5. Details of participants

- 0 Numbers only
- 1 Numbers and ages only
- 2 Numbers, ages, and some demographic details

6. *Details of intervention content*

- 0 Minimal details
- 1 Some description of the majority of interventions
- 2 Explicit descriptions of all interventions

7. *Details of intervention implementation*

- 0 No/minimal details
- 1 Some details of length of sessions/duration or person implementing
- 2 Details of length of sessions/duration or person implementing

8. *Reporting of results*

- 0 General statements but no numbers
- 1 Some details and numbers
- 2 Numbers / effect sizes etc for each study and all outcomes accounted for

APPENDIX B: FINDINGS OF SYSTEMATIC REVIEWS

Table 3: Findings of systematic reviews

Study	Intervention (number of studies)	Outcome	Conclusion
Prevention and Treatment			
Gunnell & Frankel 1994 ¹⁴ 24 studies (only two RCTs) were included.	<p>Primary care settings Educational program for GP on the diagnosis and treatment of depression (2)</p> <p>Secondary care settings Screening of prisoners for suicide risk; suicide prevention program in prisons (3)</p> <p>Drug treatment and electroconvulsive therapy (4)</p> <p>Group treatment of depressed and suicidal people (1)</p> <p>Public health measures Increased support to identify high risk group of callers to suicide prevention centre (1) (RCT with 18-month follow-up)</p> <p>Post-discharge contacts with former psychiatric inpatients who default from follow-up (1) (RCT with 4-year follow-up)</p> <p>Samaritan and suicide prevention centers (4)</p> <p>Media restrictions on reporting of suicide (1)</p> <p>Legislative restrictions of the availability of drugs (barbiturates) (1) (no control)</p> <p>School based prevention programme (5)</p> <p>Safety measures on high buildings (1)</p>	<p>Suicide rate reduced in the year after the intervention and rose again two years after the intervention.</p> <p>One American study showed that fewer suicides occurred the year after intervention (but no control), while another British study did not find reduction in suicide.</p> <p>Two studies found reduction of risk of suicide after long term treatment with lithium, while the other two studies failed to find any convincing evidence on the effectiveness of lithium, antidepressants, or electroconvulsive therapy in reducing long-term suicide risk.</p> <p>Suicide rate was lower in the experimental group.</p> <p>This RCT failed to show any reduction in suicide.</p> <p>This RCT found no significant difference in suicide rate between experimental and control groups.</p> <p>The intervention may be beneficial to small subsets (young white women) of the population at risk.</p> <p>The intervention led to a reduction in the number who used the same method to commit suicide, but not all-cause suicide rates.</p> <p>The intervention was associated with a short-term reduction in method specific and all-cause suicide rates.</p> <p>Evidence suggest that these interventions make little impact on suicide rates.</p> <p>The intervention may lead to reductions in method specific or site specific rates but not to overall suicide rates.</p>	<p>No single intervention was shown in a well-conducted RCT to reduce suicide rates.</p> <p>No specific medical intervention was shown to affect suicide rates. Large sample sizes are required to prospectively evaluate interventions in particular settings.</p> <p>The greatest potential seems to arise from limiting the availability of methods for suicide. Methods commonly used for suicide need to be regularly reviewed and interventions evaluated.</p> <p>This review offers little support for the aspiration that the posited targets can be achieved on the basis of current knowledge and policy.</p>

Table 3: Findings of systematic reviews (cont'd)

Study	Intervention	Outcome	Conclusion
Prevention and Treatment (cont'd)			
<p>Hider 1998 ¹⁵</p> <p>About 300 articles with a wide range of study design were included</p>	<p>Population-based suicide prevention (health education, health promotion, and health protection) School-based prevention programs</p> <p>Restriction of access to means of suicide and responsible reporting of suicide by the media</p> <p>Office based preventive health care Provision of youth health clinics usually set up in schools and staffed by GPs or practice nurses</p> <p>Education of GPs to improve their recognition of young people at risk</p> <p>Internet and computer based tools</p> <p>Targeted intervention for young people at high risk of suicidal behaviour</p> <p>Psychological or psychosocial treatments Cognitive behavioural therapy (CBT)</p>	<p>Generally research has not found consistent improvement in attitude related to suicide and suicidal behaviour. One longitudinal study (without a control group) found lower reported rates of suicide attempts in a large school system in the US after the introduction of a school-based program, while a correlational study found that states in the US with more school-based programs did not have lower suicide rates.</p> <p>No studies have actually evaluated the effect of introduction of restrictions on the access to means of self-harm on actual suicide rate. Findings from several cross sectional or ecological studies presented conflicting results.</p> <p>Based on quasi-experimental and descriptive studies along with the expert opinion, responsible reporting of suicide in media could be effective at reducing suicidal behaviour.</p> <p>Evidence from descriptive studies indicates the potential of school-based clinic to identify young adults at risk of suicide and that school health clinics were able to increase the access of young people with mental illness to primary care.</p> <p>A quasi-experimental study reported that suicide rate was reduced after the introduction of training programs for GPs for the recognition and management of depression but reverted back to the baseline level three years later.</p> <p>Two case histories suggested that interactive suicide notes on the Internet might have been influential in the suicidal death of two young people. One study found significantly higher score of self-esteem after receiving computer cognitive restructuring.</p> <p>Several small controlled trials reported favourable results for the use of CBT among adult suicide attempters, but no studies specifically examined the effectiveness of CBT at reducing suicidal behaviour among adolescents. One small RCT found a favourable result of dialective behaviour therapy (a variation of CBT) for patients with borderline personality disorder.</p>	<p>There is uncertainty and insufficient evidence on safety and effectiveness of school-based preventive programs.</p> <p>Restriction of access to means of suicide and responsible reporting of suicide events by the media may be able to reduce suicidal behaviour in youths.</p> <p>Office-based preventive interventions and education programs to assist GPs to recognize and treat mental illness appear to be effective interventions.</p> <p>Uncertainty exists about ability of primary care practitioners, working in youth clinics, to reduce suicidal behaviour.</p> <p>CBT and group support can probably prevent suicidal behaviour. Less evidence is available on effectiveness of family therapy, crisis intervention, and psychoanalysis.</p> <p>Pharmacotherapy appears very effective at treating underlying mental illness, but less able to prevent suicidal behaviour.</p> <p>The effectiveness of postvention has not been proven by any clinical trial.</p>

Table 3: Findings of systematic reviews (cont'd)

Study	Intervention	Outcome	Conclusion
Prevention and Treatment (cont'd)			
Hider 1998 ¹⁵ (cont'd)	<p>Family therapy</p> <p>Group support</p> <p>Psychoanalysis</p> <p>Outpatient-based crisis intervention</p> <p>Pharmacotherapy Direct effect of Pharmacotherapy on suicidal behaviour</p> <p>Effect of Pharmacotherapy on psychiatric conditions closely associated with suicide Tricyclic antidepressants (TCAs)</p> <p>Mono-Amine Oxidase Inhibitors (MAOIs)</p> <p>Selective Serotonin Re-uptake inhibitors (SSRIs)</p> <p>Postvention</p>	<p>Only one RCT found that family therapy provided by a social worker in a patient's home was ineffective at reducing suicidal ideation among young people.</p> <p>One RCT compared support group for depressed young people with social skill training and found no difference between two groups after 9 months.</p> <p>No controlled trials have been undertaken of provision of psychoanalytical treatment. Several reviews suggested that psychoanalysis is an inappropriate treatment for most adolescents.</p> <p>A before and after study found that the provision of a crisis intervention service reduced the rate of subsequent hospitalization. Problem solving training per se did not show to be effective at preventing suicidal behaviour among adolescents.</p> <p>Clinical trials evaluating the efficacy of SSRIs among either adult or adolescent populations have found mixed results. A meta-analysis concluded neither suicidal behaviour nor ideation were increased by the administration of the SSRI, and although there was a significant reduction in ideation there was no statistically significant effect on suicidal acts and attempts.</p> <p>A meta-analysis of 12 RCTs concluded that there was no significant difference between TCAs and placebo in the treatment of adolescent depression.</p> <p>No RCTs have specifically assessed the effectiveness of MAOIs for the treatment of depression among young people.</p> <p>A recent RCT showed that fluoxetine (an SSRI) was superior to placebo in the treatment of depression.</p> <p>One controlled study found no significant difference in the rate of suicidal ideation and attempts between 63 pupils who have received counselling and 63 matched controls.</p>	

Table 3: Findings of systematic reviews (cont'd)

Study	Intervention (number of studies)	Outcome	Conclusion
Prevention and Treatment (cont'd)			
<p>Ploeg et al. 1996¹⁶</p> <p>11 studies with a control group were included.</p>	<p>The interventions used in 10 studies involved teaching/demonstration using a suicide prevention curriculum while counselling was used in one postvention study.</p>	<p>Three studies examined changes in suicide risk; 2 studies showed significantly greater reduction in suicide risk (depression, anxiety, and emotionality) in EG than CG.</p> <p>The reviewed studies demonstrated a relatively consistent, positive impact of programs on knowledge related to suicides. Six out of 8 studies found increased knowledge, one found both significant and non-significant changes in knowledge, and one found non-significant results.</p> <p>Nine studies examining program effects on attitudes related to suicide found both beneficial and harmful effects.</p> <p>Four studies examined program effects on self-rated measures of coping. Two studies found a significant, positive change in coping skills. One study found no difference between EG and CG, while the other found girls showed a reduction in maladaptive coping but boys showed an increase.</p> <p>Three studies included a measure of hopelessness. Two studies found no significant difference in scores between EG and CG. The other study showed a decrease in hopelessness for girls but an actual increase for boys.</p> <p>No difference in suicide risk between counselled and control students in the postvention study.</p>	<p>Based on the findings of this review, there is insufficient evidence to support curriculum-based suicide prevention programs for adolescents. The evidence suggests that there may be both beneficial and harmful effects of the programs on some students, and that the potential negative effects, especially among males, could have serious consequences.</p> <p>The literature suggests that more broadly based comprehensive school health programs should be evaluated for their effectiveness in addressing the determinants of adolescent risk behaviour.</p>
<p>Ploeg et al. 1999¹⁷</p> <p>9 prospective studies with a control group were included.</p> <p>An update of Ploeg et al. 1996¹⁶</p>	<p>School-based curriculum suicide prevention programs included suicide education and general coping skills training.</p>	<p>Rigorous evaluation of curricula in 5 studies indicated that programs may improve suicide –related knowledge and attitude, as well as mental health indicators, such as perceived stress, reduced anger, and increased self-esteem.</p> <p>Findings from 4 less rigorous studies indicated negative program effects, especially for males who may be at higher risk for suicide.</p>	<p>Overall, the evidence is mixed, indicating both significant and non-significant findings for similar outcomes, and both beneficial and harmful effects for some participants. There is insufficient evidence to support a school-based curriculum suicide prevention program for adolescents.</p>

Table 3: Findings of systematic reviews (cont'd)

Study	Intervention (number of studies)	Outcome	Conclusion
Prevention and Treatment (cont'd)			
Guo & Harstall 2002 ¹⁸ 10 studies with a control/ comparison group were included.	School-based suicide prevention programs for adolescents at high risk (3) Curriculum-based suicide education programs for general school population (4) Suicide prevention programs for the general school population focused on behavioural change and coping strategies (2) Postvention programs (1)	All 3 studies with moderate or strong quality rating indicated changes in depression, hopelessness, stress, anxiety and anger, as well as improvements in self-esteem and network support, personal control, and problem-solving skill. The changes were more evident within group rather than between EG and CG. One study with a moderate quality rating indicated significant improvement in suicide-related knowledge and attitude. One study with strong quality rating found lowered suicide tendencies in 4 out of 6 schools with a greater affect on females at two schools; improved ego identity in 3 schools, and improved coping ability in two schools. Another study with a moderate quality rating found a reduction in suicide risk, improved distress-coping skill awareness, and more positive changes in the EG. One single study with weak quality rating did not find program effects.	Suicide prevention programs that targeted at-risk population appeared promising in reducing suicidal behaviours. Most often the significant finding of change due to the prevention programs were within the group (pre/post changes) rather than significant differences between the EG and CG. Thus, the overall findings of this review suggest that there is insufficient evidence to either support or not to support curriculum-based suicide prevention in schools.
Treatment and Maintenance			
Hawton et al. 2002 ²² 23 RCTs were included. An update of Hawton et al. 1998 ²⁴	Problem-solving therapy vs SA (5) Intensive intervention plus outreach vs SA (6) Emergency card vs SA (2) Dialectical behaviour therapy vs SA (1) Inpatient behaviour therapy vs inpatient insight-orientated therapy (1) Same therapist vs different therapist (1) General hospital admission vs discharge (1) Flupenthixol vs placebo (1) Antidepressants vs placebo (3) Long-term therapy vs short term therapy (1)	All 5 studies reported reduced repetition of DSH. SOR 0.7 (95% CI 0.45 to 1.11) not SS. No consistent direction among 6 studies. SOR 0.84 (0.63 to 1.15). Both studies showed a trend towards less repetition of DSH, SOR 0.45 (0.19 to 1.07) not SS. Significantly lower rate of repetition of DSH in EG (0.24; 0.06 to 0.93). Small sample size of the single study precludes meaningful conclusions from the odds ratio analysis (0.60; 0.08 to 4.45). Repetition rate of DSH in EG significantly higher than CG (3.70; 1.13 to 12.09), but several imbalances between two groups resulted in greater prevalence of risk factors for repetition in EG. One single study did not indicate a beneficial effect of general hospital admission following DSH (0.75; 0.16 to 3.60). Significant reduction in repetition of DSH in EG (0.09; 0.02 to 0.50). Pooled odds ratio indicates no apparent benefit regarding repetition of DSH with mianserin, nomifensine or paroxetine (0.83; 0.47 to 1.48). The single study did not indicate that long-term therapy was more effective in preventing repetition of DSH (1.0; 0.35 to 2.86).	The summary odds ratio indicated a trend towards reduced repetition of DSH for problem-solving therapy compared with SA and for provision of an emergency contact card in addition to SA compared with SA alone. Single small trials indicated significantly reduced rates of further self-harm for flupenthixol and for dialectical behavioural therapy. There still remains considerable uncertainty about which forms of psychosocial and physical treatments for self-harm patients are most effective, inclusion of insufficient number of patients in trials being the main limiting factor. There is a need for larger trials of treatments associated with trends

Table 3: Findings of systematic reviews (cont'd)

Study	Intervention	Outcome	Conclusion
Treatment and Maintenance (cont'd)			
Hawton et al. 2002 ²² (cont'd)	Home-based family therapy vs SA (1)	The single study did not demonstrate a beneficial effect of family therapy carried out in patient's home (1.02; 0.41 to 2.51).	towards reduced rates of repetition of DSH. The results of small single trials, which have been associated with statistically significant reductions in repetition, must be interpreted with caution and it is desirable that such trials are also replicated.
NHS CRD 1998 ¹⁹ 22 RCTs were included. An update of Hawton et al. 1998 ²⁴	Problem solving therapy vs SA (4) Intensive care vs SA (6) Emergency card vs SA (2) Dialectical behaviour therapy vs SA (1) Inpatient behaviour therapy vs inpatient insight orientated therapy (1) Same therapist vs different therapist (1) General hospital admission vs discharge (1) Flupenthixol vs placebo (1) Antidepressants vs placebo (3) Long term therapy vs short term therapy (1) Family therapy vs SA (1)	A comparison of proportion (%) of participants who repeated self harm during follow-up between EG and CG was provided for each individual study. No intervention produced a statistically significant reduction in repetition of self harm, although for some interventions there was a trend in that direction. Three interventions seem promising: <ul style="list-style-type: none"> • Providing patients with a crisis card which carries advice about seeking help in the event of future suicidal feelings. • Problem-solving therapy • Dialectical behaviour therapy 	The trials varied in both the nature of the intervention and their aims. This heterogeneity in aims, coupled with widely varying study populations and interventions, meant that little pooling of data was possible. No intervention produced a statistically significant reduction in repetition. However, three interventions including providing patients with crisis card, problem-solving therapy, and dialectical behaviour therapy seem promising.
Sande et al. 1997 ²¹ 15 RCTs were included.	Psychiatric management of poor compliance (6) Guaranteed in-patients shelter (2) Psychosocial crisis intervention (2)	None of the studies found a significant reduction in repeated suicide attempts. RR overall showed no evidence of reduced rates of repeated suicide attempts after intervention. No study showed a significant reduction in the rate of repeated suicide attempts. RR overall showed no significantly reduction in the risk of repeated suicide attempts. No study showed significant difference in repeated suicidal behaviour in favour of the intervention. RR overall did not reach the level of SS.	A pooled analysis of studies that focus on psychiatric management of poor compliance, psychosocial crisis intervention, and guaranteed in-patient shelter in cases of emergency showed no significant effect on the repetition of suicide attempts. However, the pooled results of 4 studies on CBT showed a significant preventive effect on repeated suicide attempts. This result may be too

Table 3: Findings of systematic reviews (cont'd)

Study	Intervention	Outcome	Conclusion
Treatment and Maintenance (cont'd)			
van der Sande et al. (cont'd) ²¹	Cognitive-behavioural treatment (4) One study could not be classified into one of the above four categories.	In all four studies, the difference in the repetition rates between EG and CG, although small, favoured the EG. RR overall appeared to show a significant reduction in repeated suicide attempts as a result of CBT.	optimistic because of methodological variability.
Linehan 1997 ²⁰ 20 studies (18 RCTs and 2 studies with a close approximation to randomisation) were included.	Outpatient treatment for suicidal patients (13) Inpatient treatment of patients following a parasuicide episode (2) Pharmacotherapy trials following a parasuicide episode (3) Psychosocial treatments following determination of high risk for suicide (2)	Two studies of additional or more intensive clinical outreach such as home visits showed a significant reduction in parasuicide. One study of provision of a simple card with an emergency phone number found a significant reduction in parasuicide acts and suicide threats combined. Three studies focused on outpatient psychotherapy or counselling offered by mental health professionals compared to referral to outpatient psychotherapy or to one's primary care physician found lower rates of parasuicide. No study found an added benefit in subsequent suicide and parasuicide rates by adding an experimental treatment to the usual inpatient treatment regimen. Antidepressants were not effective in two studies. One study on flupenthixol treatment showed a significant decrease in suicide attempts. No study showed significant reduction in suicide.	Five psychosocial treatment regimens and one pharmacotherapy showed a significant reductions in subsequent parasuicide acts. The quality of studies and the focus of the treatments were extremely variable. Three reasonably well-designed studies showed that psychosocial interventions appear effective in reducing the risk of subsequent parasuicidal behaviours. When high-risk parasuicidal individuals are not excluded from the population being treated, focused behavioural interventions appear promising.
Tondo et al. 2001 ²³ 22 studies were included.	Long-term lithium treatment vs no lithium treatment	Crude suicide rates during lithium treatment were 5.5 times (81.8%) lower than without lithium treatment among all 22 studies. Computed risk ratio in studies with rates on/off lithium treatment was 8.85 (96% CI, 4.12-19.1; p<0.0001).	The evidence reviewed provides strong, consistent support for the conclusion that suicide rates were much lower during than without the long-term lithium treatment. This result held consistently across all studies in the meta analysis, including the few randomized trials. The findings indicate that studies addressing the therapeutics of suicide are feasible. The average lowering of suicidal risk in association with lithium treatment found in this review was incomplete in that suicide rates found during lithium treatment greatly exceed average suicide rates reported in international general populations.

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