



For which strategies of suicide prevention is there evidence of effectiveness?

July 2004

## ABSTRACT

This Health Evidence Network (HEN) synthesis report notes that suicide rates among adolescents and young adults have increased considerably over the last decades. In addition, many widely-used suicide prevention programmes have never been scientifically assessed, thus making it uncertain which are effective.

Due to the limited evidence and the heterogeneity of the interventions, it is not possible to determine if one single intervention was more effective than another. A broad array of suicide preventive interventions addressing different risk factors at various levels will be required.

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## **Summary**

### **The issue**

Suicide is a serious public health problem in the European Region, where rates vary from about 40 per million people (in Greece) to about 400 per million (in Hungary). Suicide rates among adolescents and young adults have also increased considerably over the last decades. Many widely-used suicide prevention programmes have never been scientifically assessed, thus making it uncertain which are effective. The objective of this report is to synthesize research findings from systematic reviews to address this question.

### **Findings**

About 30 types of suicide preventive interventions were evaluated in the published research, which covered the whole spectrum of primary and secondary prevention efforts. More than half of these interventions fall into the domain of treatment rather than prevention and maintenance.

Limited evidence indicates that no single intervention appeared to be effective in reducing the suicide rate. Evidence from systematic reviews (rated as "good" in relation to their methodological quality) indicated that some interventions targeting at-risk individuals appeared promising.

School-based suicide prevention programmes focusing on behavioural change and coping strategies in the general school population indicated lowered suicidal tendencies, improved ego identification and coping skills. Programmes focusing on skill training and social support for at-risk students were effective in reducing risk factors and enhancing protective factors.

Two meta-analyses showed a reduction in self-harm (suicidal behaviour) rates in patients with a history of deliberate self-harm, for the following interventions:

- problem-solving therapy
- provision of an emergency contact card
- flupenthixol therapy
- dialectic behavioural therapy
- cognitive behavioural therapy.

### **Policy considerations**

Due to the limited evidence and the heterogeneity of the interventions, it is not possible to determine if one single intervention was more effective than another. A broad array of suicide preventive interventions addressing different risk factors at various levels will be required.

In the general school population, suicide prevention programmes based on behavioural change and coping strategies were found to be effective. In adolescents at high risk, school-based suicide prevention programmes based on skill training and social support appeared to be effective in reducing risk factors and enhancing protective factors.

For adult patients who have attempted suicide or deliberate self-harm, there is some evidence, in a very controlled setting, of the benefits of cognitive behavioural therapy. Trends towards benefits were also seen with the use of problem solving, emergency cards, dialectical therapy and the medication flupenthixol.

An evaluation framework with standardized definitions of suicide and parasuicide should be established to help evaluate the effectiveness of planned strategies.

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## **Glossary**

*Indicated prevention:* targeted to high-risk individuals identified as having minimal but detectable signs of mental disorder, or biological markers indicating predisposition for same, without meeting DSM-III-R diagnostic levels (1).

*Maintenance interventions:* supportive, educational, and/or pharmacological in nature; provided on a long-term basis to individuals who have met DSM-III-R diagnostic levels and whose illness continues (1).

*Parasuicide:* attempted suicide; behaviours from suicidal gestures and manipulation to serious attempts (2); according to the WHO definition, an act with a 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 or generally realized therapeutic dosage, and which is aimed at realizing changes which the subject desired via the actual or expected physical consequences (3).

*Postvention:* the general care and support or special treatment needed by survivors of a suicide; sometimes considered to include the collection of "psychological autopsy" information for the purpose of reconstructing the social and psychological circumstances associated with the suicide (4).

*Prevention:* includes any self-injury prevention or health promotion strategy generally or specifically aimed at reducing the incidence and prevalence of suicidal behaviours (4).

*Protective factors:* those that appear to reduce the risk for suicide; most likely to be more stable over time, but with fluctuations and shifts (5).

*Selective prevention:* targeted to individuals or a subgroup of the population whose risk of developing mental disorders is significantly higher than average (1).

*Treatment interventions:* therapeutic in nature (such as psychotherapy, support groups, medication, and hospitalization) and provided to individuals who meet or nearly meet the Diagnostic and Statistical Manual of Mental Disorders (Third Edition-Revised) (DSM-III-R) diagnostic levels (1).

*Universal prevention:* targeted to the general public or a whole population group that has not been identified on the basis of individual risk (1).

## **Introduction**

Suicide is a serious global public health problem. From 1950 to 1995 the global rates of suicide have increased by 60% (6). In 2000, suicide claimed an estimated 815 000 lives worldwide, with an overall age-adjusted rate of 14.5 per 100 000 population globally and 19.1 per 100 000 in the European Region. While suicide was reported to be the thirteenth leading cause of death globally, it was the seventh leading cause of death in the European Region (6). Moreover, suicide rates among adolescents and young adults have increased considerably over the last few decades in a number of industrialized countries (7). The magnitude of the problem is even more significant when the number of attempted but uncompleted suicides – 20 times more common – is included (8).

In Europe, suicide rates vary from 3.8 per 100 000 people in Greece to 40 per 100 000 in Hungary (9). The highest rates in the European Region are also the highest in the world. Certain populations are at particular risk, such as males in eastern Europe, and adolescents and women in western Europe (10).

The majority of researchers and professionals (11) 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
- physical illness
- substance abuse
- family violence
- access to means of suicide.

Research has shown that more than 90% of people who commit suicide had depression or another diagnosable mental or substance abuse disorder (11). Some risk factors vary with age, gender, and ethnic group. Risk factors may change over time, while some factors frequently occur in combination (4). Identified risk factors also vary in their degree of effect and no one single factor has been found to be a sufficient cause of suicide (4).

In response to this serious public health problem, substantial efforts have been made in many countries to prevent suicide. A 1996 survey found that Finland, Norway, Sweden, Australia, and New Zealand had developed comprehensive national strategies aimed at reducing suicide rates. Special nation-wide

prevention strategies are particularly well developed in the Netherlands and United Kingdom (12). Other countries, including the Estonia, France and the United States, have established some national programmes (12). In 1994, the Canadian National Task Force Update identified a number of suicide-preventive interventions that looked promising (4). Prevention strategies included improving societal conditions, public education (improving coping and life skills, media relations, and public education programmes), and reducing the availability and lethality of means for suicide. Intervention strategies recommended include education and training for health care professionals and other gate-keepers, providing intervention services such as community coordination and collaboration, suicide prevention centres, and hospital-based services. Postvention strategies should include suicide bereavement, survivor support programmes, and psychological autopsy.

As various strategies have been developed to address this public health problem it is unclear which suicide prevention strategies are effective. The objective of this report is to synthesize research findings from systematic reviews to address two questions: What types of suicide preventive interventions have been evaluated in the published research, and which suicide preventive interventions have good quality supporting evidence?

### **Sources for this review**

This review is based on a comprehensive literature search undertaken to identify quantitative or qualitative systematic reviews that assessed the effectiveness of suicide preventive interventions by evaluating change in suicidal behaviours (including repetition of self-harm) or suicidal risk factors. Details of the literature search strategy and inclusion criteria for the selection of systematic reviews are presented in Appendix 1.

Interventions evaluated in the systematic reviews are presented according to the Institute of Medicine framework for the prevention of mental disorders, which considers the elements associated with prevention, treatment and maintenance (1) (see Box 1).

#### **Box 1: Framework for the prevention of mental disorders**

##### *Prevention*

- Universal
- Selective
- Indicated

##### *Treatment*

- Case identification
- Therapies (medical and non-medical)

##### *Maintenance*

- Compliance with long term treatment to reduce relapse and recurrence
- After care (including rehabilitation)

Source: adapted from the Committee on Injury Prevention and Control (1).

The systematic reviews were critically appraised for their methodological quality using a tool that was developed for evaluating reviews on health promotion and school education (see Appendix 2). These reviews were presented in detail in a Health Technology Assessment (HTA) report (13).

## Findings

Ten systematic reviews (14-23) including more than 110 studies met the inclusion criteria. There was a great deal of overlap of the primary studies assessed in the ten systematic reviews. Three reviews were meta-analyses (21-23), while the other seven were qualitative systematic reviews. The New Zealand Health Technology Assessment (NZHTA) Agency published a series of reports (Evidence tables) on suicide preventive interventions (see Appendix 3). These NZHTA reports did not include a qualitative synthesis which was one of our inclusion criteria (see Appendix 1) and thus these reports were not included in our review.

The various types of suicide-preventive interventions evaluated in these systematic reviews are presented in Box 2 using the previously presented framework (see Box 1). About 30 suicide-preventive interventions were evaluated and more than half fall into the domain of treatment rather than prevention and maintenance.

<b>Box 2: Suicide preventive interventions identified in systematic reviews</b>	
Prevention	<p><i>Universal</i></p> <ul style="list-style-type: none"> <li>• media reporting responsibility/restrictions (14,15)</li> <li>• means access restrictions (14,15)</li> </ul> <p><i>Selective</i></p> <ul style="list-style-type: none"> <li>• safety measures on high buildings (14)</li> <li>• suicide prevention centres (14,15)</li> <li>• <b>school-based suicide prevention programmes (14,15,16,17, 18)</b></li> </ul> <p><i>Indicated</i></p> <ul style="list-style-type: none"> <li>• educating general practitioners (14,15)</li> <li>• computer assisted help (Internet) (15)</li> <li>• <b>postvention (15, 18)</b></li> </ul>
Treatment	<p><i>Case identification</i></p> <ul style="list-style-type: none"> <li>• screening (14)</li> <li>• increased identification support (14)</li> <li>• youth health clinics (15)</li> </ul> <p><i>Therapies (Medical and non-medical treatments)</i></p> <ul style="list-style-type: none"> <li>• <b>antidepressants (15,19,22)</b></li> <li>• <b>flupenthixol (19,22)</b></li> <li>• <b>general hospital admission (19,22)</b></li> <li>• electroconvulsive therapy (14)</li> <li>• <b>intensive care plus outreach (19,22)</b></li> <li>• inpatient treatment (20)</li> <li>• group support (15)</li> <li>• <b>cognitive behavioural therapy (15,21)</b></li> <li>• <b>problem-solving (15,19,22)</b></li> <li>• <b>dialectical behaviour therapy (19,22)</b></li> <li>• <b>inpatients behaviour therapy (19,22)</b></li> <li>• <b>home-based family therapy (15,19,22)</b></li> <li>• <b>psychosocial crisis intervention (21)</b></li> </ul>



	<ul style="list-style-type: none"> <li>• psychoanalysis 15</li> <li>• outpatient-based crisis intervention 15</li> </ul>
Maintenance	<p><i>Compliance</i></p> <ul style="list-style-type: none"> <li>• <b>compliance management 21</b></li> <li>• <b>provision of emergency card 19,22</b></li> <li>• <b>in-patient shelter 21</b></li> <li>• <b>home-based family therapy 22</b></li> </ul> <p><i>Aftercare</i></p> <ul style="list-style-type: none"> <li>• <b>long-term therapy 14,19,22,23</b></li> </ul>

When the criteria (24) were applied for the appraisal of the methodological quality of the systematic reviews, only three out of the ten reviews (18,21,22) were considered to be of good quality based on their total scores. There were considerable limitations associated with the methodological quality of the ten systematic reviews. Some reviews did not provide sufficient information about study participants, intervention protocol, or intervention implementation. The interventions evaluated in the good quality reviews are emboldened in Box 2 and a summary of results related to those interventions is presented in the following section. Details of the other systematic reviews can be found in the full HTA report (13).

The following results have been organized to show those with some evidence of benefit first, remembering that caution is needed in interpretation given the poor methodological quality of some studies included in the reviews.

## Prevention

### *School-based suicide prevention programmes*

The qualitative review by Guo and Harstall (18) included ten studies (three of them randomized controlled trials) focused mainly on high school students age 12 to 19. These school-based suicide prevention programmes for adolescents varied considerably in objective, focus, target population, and delivery modes. The duration of the programmes ranged from one 1.5 hour session to 180 sessions of 55 minutes each. The prevention programmes were usually delivered by school staff (teacher, school nurses, or counsellors) or social workers with previous training. The programmes studied in the trials were grouped into four categories, and the first two categories indicated some benefit.

1. Three suicide-prevention programmes for adolescents at high risk that focused on skill training and social support appeared to be effective in reducing risk factors (depression, hopelessness, stress, anxiety and anger) and enhancing protective factors (personal control, problem-solving skills, self-esteem and network support).
2. Two suicide-prevention programmes that focused on behavioural change and coping strategies in the general school population demonstrated lowered suicidal tendencies, improved ego identity, and improved coping ability.
3. Four studies evaluated curriculum-based suicide education programmes in the general school population. One study with a relatively large sample size demonstrated improvement in knowledge about help resources but found little desired change in attitude toward suicide. No long-term effect was demonstrated on suicidal behaviours.
4. One study evaluated a postvention<sup>1</sup> programme but this did not demonstrate any benefits.

For school-based suicide prevention programmes, one of the major methodological limitations was that some studies did not establish the validity and reliability of the outcome measurement tools. In addition,

<sup>1</sup> Postvention = The care, support, special treatment needed by survivors of suicide.

different tools were used to measure the same outcomes. Therefore, results from these studies are difficult to compare and the soundness of conclusions based on such studies may be questioned (18).

### **Treatment and maintenance**

One meta-analysis by Hawton and colleagues (22) examined the effectiveness of various interventions provided in hospital or outpatient clinics, mainly involving psychosocial and pharmacological treatments for patients with a history of deliberate self-harm or attempted suicide. Outcome measures were rates of repetition of deliberate self-harm. The meta-analysis included 23 randomized controlled trials and grouped the studies into 11 categories according to the similarity of treatment strategies. The effects of psychosocial interventions were often compared to standard care (control group) in the clinical trials but details of standard care, such as treatment content, were not always provided. The first four categories describe those interventions that showed some benefit:

1. Five studies of problem-solving versus standard aftercare reported reduced repetition of deliberate self-harm (not statistically significant).
2. Two studies of emergency care versus standard aftercare showed a trend towards less repetition of deliberate self-harm (not statistically significant).
3. One small study in females with borderline personality disorder and recurrent self-harm demonstrated a significantly lower rate of repetition of deliberate self-harm with dialectic behavioural therapy compared with standard aftercare.
4. One small study demonstrated significant reduction in repetition of self-harm for the neuroleptic therapy flupenthixol compared to a placebo.
5. One study showed a significantly higher rate of repetition of self-harm in patients with the same therapist compared with patients who had a different therapist. It was noted that those in the same therapist group had more risk factors on entry into the study so the imbalance in the two groups made the results questionable.
6. In six studies of intensive intervention plus outreach versus standard aftercare there were no consistent effects.
7. The one study for general hospital admission compared to discharge did not demonstrate a benefit.
8. Three studies compared antidepressants such as mianserin, nomifensine or paroxetine with placebos but the combined analysis did not indicate any benefit.
9. One study did not find any beneficial effects for long-term therapy (unspecified type) compared to short-term therapy.
10. One study did not find home-based family therapy beneficial compared to standard aftercare.
11. One study of inpatients compared behavioural therapy with insight-orientated therapy but it was too small to draw meaningful conclusions.

A meta-analysis by van der Sande et al. (21) studied patients after a suicide attempt. Fifteen randomized controlled trials were included and grouped into four categories according to therapeutic background and treatment protocol. In all trials the outcome of interest was rate of repeated suicide attempts. Only the first category of studies showed some benefit:

1. Each of the four studies on cognitive behavioural therapy demonstrated small benefits that were significant in the pooled analysis. However, this analysis was not performed on an intention-to-treat basis and so may overestimate the true effect of implementation in standard clinical practice.
2. Six studies were undertaken on psychiatric management of poor compliance. None of the individual studies or the pooled analysis found a significant effect.
3. Two studies on guaranteed inpatient shelter demonstrated no effects individually or in the pooled analysis.

4. Two studies on psychosocial crisis intervention demonstrated no effects individually or in the pooled analysis.

As Lineham (20) pointed out, the majority of research participants for psychosocial and pharmacological treatments were those who attended general hospitals and most attempted self-poisoning rather than any other form of self-harm such as cutting. However, up to one-third of self-harm episodes might not lead to medical contact. Thus, caution should be taken when generalizing results from these studies to other suicidal populations.

## **Discussion**

### *Study limitations*

Although many suicide preventive interventions have been developed and implemented, some for a long time, only a few of them have been formally evaluated for their effectiveness. In 1999 the Centres for Disease Control in the United States developed a framework for programme evaluation in public health (25). This framework is both a synthesis of existing evaluation practices and a standard for further improvement. It is important to incorporate an evaluation component when planning effective strategies.

High quality systematic reviews were found that assessed randomized and non-randomized controlled studies on school-based suicide prevention programmes for adolescents, and the use of psychosocial and pharmacological treatments in high-risk patients who had already attempted suicide or deliberate self-harm. As demographic variations such as gender, age and ethnic origin have been shown to impact the effectiveness of suicide prevention strategies, generalization of these results is difficult. Furthermore, poor descriptions of some interventions make it difficult to identify similarities and differences among the strategies and to determine which components may be effective alone or in combination.

Most of the studies included in the systematic review used small sample sizes that made it difficult to detect any effects. This is especially the case for the clinical trials on the psychosocial and pharmacological treatments of suicidal patients. Furthermore, suicide is a relatively rare event and hence large sample sizes are necessary in order to measure any difference.

### *Defining suicide and parasuicide*

The definitional ambiguity that existed among the suicidal outcomes measured may create two major limitations (20). First, inconsistent definitions make it very difficult to compare findings and outcomes across studies. Second, the absence of any reliable or valid assessment of actual intent to die can lead to falsely classifying suicidal and non-suicidal behaviours. Some investigators view all intentional self-injurious behaviours not resulting in death as "suicide attempts."

"Parasuicide" 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. Some authors use the term to define behaviours that vary from suicidal gestures to serious attempts to kill oneself (15). Both the behavioural act and the injurious outcome are considered intentional. Other authors view parasuicide as a subset of attempts defined as an unsuccessful suicide attempt usually of low lethality (26). 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" (3).

To evaluate the effectiveness of suicide-preventive interventions in the future, it will be necessary to achieve consensus on the definitions of suicide, parasuicide and on the specification and delivery of the interventions.

#### *Cost effectiveness*

The focus of this review was not on evidence of costs associated with suicide preventive interventions. It will be important to consider costs and resource availability (for the delivery of psychosocial interventions, for example) when evaluating any new programme.

## **Conclusions**

Good quality systematic reviews of the evidence relating to the effectiveness of suicide preventive interventions are few. A good-quality systematic review however, does not mean that the studies included in the review were methodologically robust. The evidence from the three good-quality systematic reviews can be summarized as follows:

In the general school population, suicide prevention programmes based on behavioural change and coping strategies were found to be effective. In adolescents at high risk, school-based suicide prevention programmes based on skill training and social support appeared to be effective in reducing risk factors and enhancing protective factors.

For adult patients who have attempted suicide or deliberate self-harm, there is some evidence, in a very controlled setting, of the benefits of cognitive behavioural therapy. Trends towards benefits were also seen with the use of problem solving, emergency cards, dialectical therapy and the medication flupenthixol.

It is not possible to determine if one intervention was more effective than another or the best combination of interventions to create an optimal strategy. Furthermore, generalization of these findings to other populations may not be appropriate.

Evidence for other interventions was available and either demonstrated no effect or was insufficient to determine clinical benefit.

Although the effectiveness of a variety of suicide preventive interventions has been examined in the primary research, a large number of interventions that are currently in use in many health service sectors have not yet been evaluated. Future work is needed to evaluate these interventions.

As suicide is an outcome of complex interactions of various risk factors and protective factors, it has been suggested that a broad array of suicide preventive interventions addressing different risk factors at different levels will be required to possibly achieve an overall reduction in the population suicide rate in the long term. Consequently it may be necessary to develop a conceptual framework when planning and establishing national or regional suicide prevention strategies.

Future programme planning and research challenges in the area of suicide prevention include standardizing definitions for suicide-related terminology, standardizing assessment protocols for identifying at-risk populations, and using outcome measures whose validity and reliability have been tested and established. Incorporating an evaluation component is important for planning effective strategies, improving existing programmes and demonstrating the results of resource investment. The policy considerations include the following:

- Suicide is a serious public health problem. Reported suicide rates may be underestimated, but suicide rates in Europe are among the highest in the world.
- A broad array of suicide preventive interventions addressing different risk factors at various levels will be required in effective prevention programmes.
- Good quality reviews only exist for school-based programmes and psychosocial and pharmacological treatments. Elements of each of these approaches were found to have some effect but it is not possible to determine if a particular intervention was more effective than another.
- Evidence from the well-conducted systematic reviews apply to very specific groups and therefore the findings from these reviews are most applicable to similar populations.
- When implementing a new intervention, an evaluation framework needs to be established at the outset, with standardized definitions of suicide and parasuicide.

## **Appendix 1: Synthesis methods**

### *Search strategy*

The following databases were searched for systematic reviews published in English journals from 1990 to October 2003: Cochrane Library, CINAHL, EMBASE, ERIC, PsycInfo, PubMed/Medline, Canadian Medical Association Infobase Clinical Practice Guidelines, NHS Centre for Review and Dissemination (CRD) HTA, EED, DARE, National Guidelines Clearinghouse, and TRIP, BioethicsLine, EBM Reviews - ACP Journal Club, HealthSTAR, Sociological Abstracts, Web of Science.

Websites scanned included 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.

The following keywords were used alone or in combination:

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

### *Inclusion criteria*

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

- a clear objective or research question
- a systematic search strategy and define their search strategy
- clear inclusion and exclusion criteria for studies reviewed
- evaluation of the effectiveness of suicide prevention strategies (no restriction on types of intervention, target population, and settings)
- information about participants and intervention contents
- measurement of 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)
- critical appraisal of the methodological quality of studies reviewed
- qualitative or quantitative synthesis of the data from studies reviewed.

### *Exclusion criteria*

Reviews focusing only on the treatment of underlying mental diseases without reporting suicide-related outcomes were excluded.

## **Appendix 2: Criteria for methodological quality**

A quality measurement tool that was previously developed to assess the quality of systematic reviews on health promotion and school education (24) consists of eight criteria:

### *1. Search*

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

This quality assessment tool has its own limitations, such as:

- lack of testing for consistency and validity
- lack of clear instructions regarding its use
- lack of an item regarding inclusion/exclusion criteria for selecting research studies
- underdeveloped criterion for methodological quality assessment

The maximum total score is 16. In order to compare the systematic reviews based on the quality score, an arbitrary cut-off of 70% of the maximum total score was chosen to determine the quality of the reviews.

### Appendix 3: Excluded studies

Hall K, Day P. *Suicide prevention topic 1: What kind of follow-up is needed to reduce the risk of repeated suicide attempts/suicide? A critical appraisal of the literature.* New Zealand Health Technology Assessment (NZHTA), editor. Christchurch, NZ: New Zealand Health Technology Assessment (NZHTA); 2002.

Day P, Dawson S. *Suicide prevention topic 2: What is the efficacy of crisis interventions? A critical appraisal of the literature.* New Zealand Health Technology Assessment (NZHTA), editor. Christchurch, NZ: New Zealand Health Technology Assessment (NZHTA); 2002.

Hall K. *Suicide prevention topic 3: What is the relative efficacy of different suicide assessment tools regardless of the restrictions on who can administer these? A critical appraisal of the literature.* New Zealand Health Technology Assessment (NZHTA), editor. Christchurch, NZ: New Zealand Health Technology Assessment (NZHTA); 2002.

Dawson S. *Suicide prevention topic 4: Are different triage models associated with different outcomes in people presenting following suicide ideation/threat/attempt? A critical appraisal of the literature.* New Zealand Health Technology Assessment (NZHTA), editor. Christchurch, NZ: New Zealand Health Technology Assessment (NZHTA); 2002.

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