

Systematic Review

A Youth Suicide Prevention Plan for Canada: A Systematic Review of Reviews

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Nous célébrons 60 ans



Objective: We conducted an expedited knowledge synthesis (EKS) to facilitate evidence-informed decision making concerning youth suicide prevention, specifically school-based strategies and nonschool-based interventions designed to prevent repeat attempts.

Methods: Systematic review of review methods were applied. Inclusion criteria were as follows: systematic review or meta-analysis; prevention in youth 0 to 24 years; peer-reviewed English literature. Review quality was determined with AMSTAR (a measurement tool to assess systematic reviews). Nominal group methods quantified consensus on recommendations derived from the findings.

Results: No included review addressing school-based prevention ($n = 7$) reported decreased suicide death rates based on randomized controlled trials (RCTs) or controlled cohort studies (CCSs), but reduced suicide attempts, suicidal ideation, and proxy measures of suicide risk were reported (based on RCTs and CCSs). Included reviews addressing prevention of repeat suicide attempts ($n = 14$) found the following: emergency department transition programs may reduce suicide deaths, hospitalizations, and treatment nonadherence (based on RCTs and CCSs); training primary care providers in depression treatment may reduce repeated attempts (based on one RCT); antidepressants may increase short-term suicide risk in some patients (based on RCTs and meta-analyses); this increase is offset by overall population-based reductions in suicide associated with antidepressant treatment of youth depression (based on observational studies); and prevention with psychosocial interventions requires further evaluation. No review addressed sex or gender differences systematically, Aboriginal youth as a special population, harm, or cost-effectiveness. Consensus on 6 recommendations ranged from 73% to 100%.

Conclusions: Our EKS facilitates decision maker access to what is known about effective youth suicide prevention interventions. A national research-to-practice network that links researchers and decision makers is recommended to implement and evaluate promising interventions; to eliminate the use of ineffective or harmful interventions; and to clarify prevention intervention effects on death by suicide, suicide attempts, and suicidal ideation. Such a network could position Canada as a leader in youth suicide prevention.



Un plan de prévention du suicide chez les jeunes pour le Canada : une revue systématique des revues

Objectif : Nous avons mené une synthèse accélérée des connaissances (SAC) pour faciliter le processus décisionnel éclairé par des données probantes concernant la prévention du suicide chez les jeunes, plus particulièrement les stratégies en milieu scolaire et les interventions en milieu non scolaire destinées à prévenir les tentatives répétées.

Méthodes : Une revue systématique des méthodes des revues a été effectuée. Les critères d'inclusion étaient les suivants : une revue systématique ou méta-analyse; la prévention chez les jeunes de 0 à 24 ans; la littérature en anglais révisée par les pairs. La qualité des revues était déterminée par AMSTAR (un outil de mesure pour évaluer les revues systématiques). Les méthodes du groupe nominal quantifiaient le consensus des recommandations tirées des résultats.

Résultats : Aucune revue incluse qui traitait de la prévention en milieu scolaire ($n = 7$) ne rapportait de taux réduits de décès par suicide d'après des essais randomisés contrôlés (ERC) ou des études de cohortes contrôlées (ECC), mais des tentatives de suicide réduites, l'idéation suicidaire, et des mesures substitutives du risque de suicide ont été rapportées (selon les ERC et ECC). Les revues incluses sur la prévention des tentatives de suicide répétées ($n = 14$) ont constaté que : les programmes de transition des services d'urgence peuvent réduire les décès par suicide, les hospitalisations, et la non-observance du traitement (selon les ERC et ECC); la formation en traitement de la dépression des prestataires de soins de première ligne peut réduire les tentatives répétées (selon un ERC); les antidépresseurs peuvent augmenter le risque de suicide à court terme chez certains patients (selon les ERC et méta-analyses); cette augmentation est compensée par des réductions globales du suicide dans la population associées au traitement par antidépresseur de la dépression chez les jeunes (selon des études par observation); et la prévention avec interventions psychosociales exige plus d'évaluation. Aucune revue n'a traité systématiquement des différences selon le sexe, des jeunes autochtones en tant que population spéciale, des dommages, ou de coût efficacité. Pour 6 recommandations, le consensus s'échelonnait de 73 % à 100 %.

Conclusions : Notre SAC facilite l'accès aux décideurs pour des interventions efficaces connues de prévention du suicide chez les jeunes. Un réseau national de recherche à la pratique qui relie chercheurs et décideurs est recommandé pour mettre en oeuvre et évaluer les interventions prometteuses, éliminer l'usage des interventions inefficaces ou nuisibles, et clarifier les effets des interventions préventives sur les décès par suicide, les tentatives de suicide, et l'idéation suicidaire. Ce réseau pourrait faire du Canada un chef de file de la prévention du suicide chez les jeunes.

Suicide-related behaviours in children and youth are a global public health problem.¹ In Canada, death by suicide is the second leading cause of mortality among 15- to 24-year-olds (about 10.8 deaths per 100 000 in 2011).² As many as 8% of youth are thought to attempt suicide, annually, and one-third of all attempts (that is, about 2.5% of youth) are considered medically serious.³ Suicidal ideation in the last 12 months, a predictor of suicide attempts,⁴ is reported by about 15% of youth.³ Even though about 50% of youth who die by suicide are seen by a primary care provider in the 6 months prior to death, well-documented modifiable risk factors for SRB, namely, untreated or inadequately treated mental health problems (particularly depression and substance abuse), are present at death in as many as 90% of these youth.⁵ In Canada, SRB cost \$2.4 billion in 2004, including \$707 million in direct costs (that

is, health care services) and \$1.7 billion in indirect costs (that is, societal costs of lost productivity).⁶

The need for strengthened policies and programs to prevent SRB and reduce the associated high cost and burden of suffering has received increased attention in Canada. Specifically, the recent passage of Bill C-300 (*An Act Respecting a Federal Framework for Suicide Prevention in Canada*)⁷ calls for evidence-informed guidelines that identify when, where, and how to intervene to reduce suicide risk across the life-course, and a mechanism to make them available to regional, provincial, and federal decision makers. The goal is to break down barriers that limit decision maker access to and use of research about effective prevention interventions. Within this context, we report the findings of an EKS conducted to derive evidence-informed recommendations regarding effective

SRB prevention interventions relevant to Canadians aged 24 years and younger. This work was carried out within the Canadian Institutes for Health Research Evidence on Tap program, which aims to facilitate the use of rigorous research knowledge by linking researchers with decision makers to address their specific knowledge needs. Two synthesis questions relevant to the implementation of Bill C-300 are addressed⁷:

- 1) What universal and targeted school-based interventions are effective in preventing death by suicide, attempted suicide, and (or) suicidal ideation in youth aged 0 to 24 years? Schools provide a convenient way to reach large numbers of youth, using both universal and targeted interventions, and by targeting a wide range of modifiable risk factors.
- 2) What is known about the effectiveness of interventions to prevent death by suicide, attempted suicide, and (or) suicidal ideation in youth aged 0 to 24 years who have made one or more suicide attempts? A previous suicide attempt is thought to be one of the most potent predictors of youth suicide.⁸ Among youth who attempt suicide and present to a hospital setting, the risk of death due to a subsequent suicide attempt is about 10 times that of the rates observed among their peers.⁹

For each question, we also sought to synthesize what is known about sex and (or) gender differences in intervention effects¹⁰ and effectiveness in First Nations, Métis, and Inuit youth.

Methods

No established method for conducting an EKS currently exists.¹¹ We carried out a systematic review of reviews to enable completion within the 6-month Evidence on Tap time frame. Our protocol is unregistered because this review method was not eligible for inclusion in the PROSPERO database at project start-up.¹²

An international EAG composed of youth suicide researchers, knowledge synthesis and translation experts, mental health service providers, and knowledge users representing national initiatives and provincial government decision makers was formed. The core research team (Dr Bennett and Stephanie Duda) brought decision

Abbreviations

AMSTAR a measurement tool to assess systematic reviews

CBT	cognitive-behavioural therapy
CCS	controlled cohort study
EAG	expert advisory group
ED	emergency department
EKS	expedited knowledge synthesis
RCT	randomized controlled trial
SRB	suicide-related behaviour

Clinical Implications

- Interventions that increase contact between youth and trained professionals show promise in preventing youth suicide attempts and suicidal ideation.
- School-based interventions may reduce suicide attempts and suicidal ideation.
- Interventions to prevent repeat suicide attempts show promise for youth who seek care, but little is known about how to reduce attempts among youth who do not seek care.

Limitations

- Very few RCTs of youth suicide prevention programs exist.
- Little data exist regarding the impact of youth suicide prevention programs on death by suicide.
- Both the benefits and harms of interventions need to be evaluated before widespread use.
- Little or no evidence exists regarding sex and (or) gender differences in intervention effectiveness or suicide prevention in First Nations, Inuit, and Métis youth.

points regarding methodology, summary of findings, and interpretation to the EAG at regular intervals, using an iterative, consultative approach.^{13,14}

Our approach was derived from Cochrane methods¹⁵ and conforms to PRISMA reporting standards.¹⁶

Literature Search

A research librarian (Maureen Rice) searched the following databases from January 1980 to May 2012 to identify reviews of youth suicide prevention interventions: MEDLINE (including HealthSTAR), PsycINFO (including Dissertation Abstracts International), Embase, CINAHL, the Cochrane Library and Child Health Field Register, the Campbell Collaboration SPECTR database, Canadian Electronic Library, Proceedings First, Social Science Abstracts, and Applied Social Sciences Index and Abstracts (commonly referred to as ASSIA). The search strategy was developed for MEDLINE and adapted for the other databases as required. The MEDLINE 6-step search strategy was as follows: exp Suicide/pc [Prevention & Control]; (suicide adj prevent*). tw; 1 or 2; limit 3 to English language; limit 4 to "review"; limit 5 to yr="1980–Current." Strategies for other databases are available from the correspondence author.

The 3 review inclusion criteria comprised the following: systematic review or meta-analysis; suicide prevention interventions in youth aged 0 to 24 years; and peer-reviewed, English-language publication.

Two reviewers completed these tasks independently in duplicate following training. Disagreements were resolved through consultation with the principal investigator (Dr Bennett). Eligible reviews were quality-assessed using AMSTAR (a measurement tool to assess the methodological

quality of systematic reviews).¹⁷ Quality scores were based on the 5 AMSTAR items that align with Cochrane risk of bias criteria: a priori design provided; comprehensive literature search; included and excluded studies provided; characteristics of included studies provided; and appropriate use of scientific quality in formulating conclusions. Data from reviews that obtained a quality score of 3 or more out of 5 were abstracted using a standardized form.

EAG members were asked to nominate primary studies published after included reviews, as a comprehensive search of primary studies was not feasible in the 6-month Evidence on Tap time frame. Inclusion criteria comprised the following: RCT or CCS; suicide prevention intervention in youth 0 to 24 years of age; and peer-reviewed, English-language publication. Cochrane risk of bias criteria were selected to assess primary study quality.¹⁸

Interventions were organized using 7 categories derived from Mann et al¹⁹: education and awareness for the general public and professionals; screening tools for at-risk people; treatment of psychiatric disorder; treatment of SRB; restricting access to lethal means; responsible media reporting; and other (to accommodate any additional intervention types).

Evidence of intervention effectiveness was sought in the following 2 areas: reductions in death by suicide, suicide attempt, and suicidal ideation; and proxy measures of reduced suicide risk, which included the following 4 aspects: increased suicide awareness (knowledge and attitudes); decreased risk factors (for example, hopelessness, depression, suicide risk score, and loneliness); increased protective factors (for example, coping skills, problem solving skills, resiliency, empathy, and self-efficacy); and increased access to health services (for example, increased help seeking behaviour, referral rates, and entry into treatment).

Nominal group methods were used to quantify EAG consensus on 6 recommendations derived from the EKS findings.²⁰ First, members ($n = 15$) indicated their level of agreement with a set of draft recommendations, using a 7-point scale (1 = strongly disagree; 7 = strongly agree). Ratings were collected anonymously using an online survey. EAG members were then provided with a collated summary of the scores and participated in a conference call to discuss and revise each recommendation as necessary. Finally, EAG members re-rated their agreement with each revised recommendation in a second anonymous online exercise.

Results

Search and Screening

Twenty-eight reviews were deemed eligible as shown in Figure 1.¹⁶ Ten included primary studies of school-based prevention (4 of 10 focused solely on school-based interventions). Twenty-three of the 28 reviews reported on interventions that were nonschool-based and relevant to youth who have attempted suicide at least once. Two primary studies were nominated, but both were included in 1 or more reviews.

Eligible Review Characteristics (Table 1)

Seven of 10 reviews were judged of high quality (AMSTAR score $\geq 3/5$). Among them, the number of included primary studies varied from 3 to 27, with 22 unique primary studies. Overlap of included studies between reviews was low to moderate. The number of primary studies conducted in Canadian populations ranged from 0 to 2. Education of the public (suicide awareness curricula, skills training, and gatekeeper training) and professionals (gatekeeper training and postvention), and screening for suicide risk were addressed in 1 or more of the 7 reviews. Eligible reviews focused exclusively on studies of prevention in elementary and secondary school, with the exception of one review²¹ that included one primary study conducted in junior college students.²²

Fourteen of 23 relevant reviews received an AMSTAR score of 3 or more out of 5. Among them, the total number of primary studies relevant to youth ranged from 2 to 17; the number of primary studies conducted in Canadian populations ranged from 0 to 2. Twelve reviews focused on pharmacologic or psychosocial treatment of psychiatric disorder or SRB, 2 addressed education of the public and professionals, and 1 addressed means restriction.

Findings: School-based Prevention (Table 2)

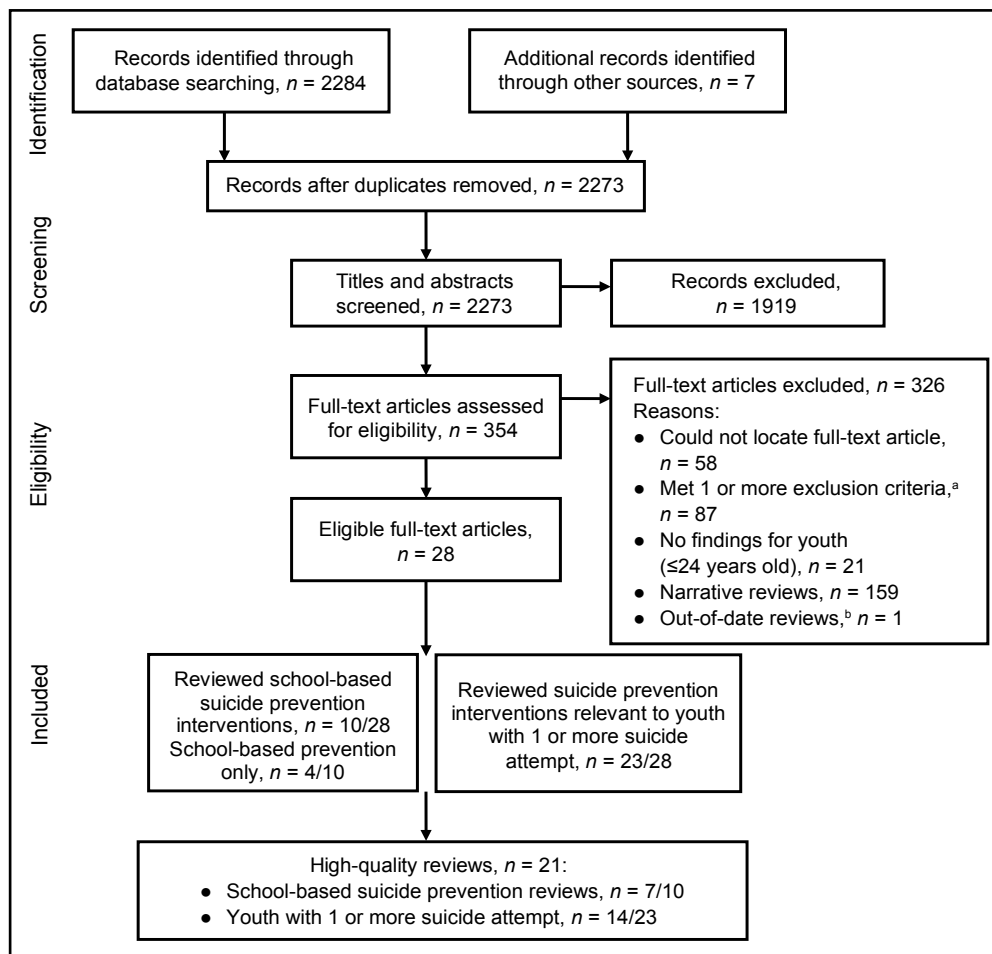
Six reviews reported on curricula.^{19,21,23–26} Reductions in death by suicide were reported in 2 reviews^{23,24} derived from uncontrolled studies of low quality. Reductions in suicide attempts based on youth self-report were noted in 4 reviews,^{19,23,25,26} in each case derived from a single RCT (Signs of Suicide).^{27,28} Improvements in knowledge and attitudes were reported in all 6 reviews. Three reviews reported reductions in risk factors,^{21,23,24} with 2 reviews also noting studies where no change in risk factors was observed.^{21,23} Four reviews noted improvements in protective factors,^{19,21,23,24} but one also reported primary studies where no change occurred.²³ Two of 6 reviews reported increased help seeking,^{23,25} while one reported no change.²⁶

Two reviews addressed skills training.^{23,26} One²⁶ reported reductions in suicidal ideation and attempts based on 1 RCT (Good Behaviour Game).²⁹ Both reviews reported improvements in knowledge and attitudes, but 1 review²³ also noted at least 1 primary study showing no change. Both reviews cited studies showing mixed effects (improvements and no change) in risk and protective factors and increased help seeking behaviour.

Two reviews^{26,30} noted increased knowledge and attitudes, and increased protective factors for gatekeeper training based on 1 RCT (Sources of Strength).³¹ Both reviews reported that the impact of gatekeeper training on death by suicide, suicide attempts, and suicidal ideation was not known.

One review²³ found reductions in death by suicide and suicide attempts based on one uncontrolled study of low quality. The other review²¹ reported no change in risk factors associated with postvention based on an uncontrolled study of low quality.

Figure 1 PRISMA flow diagram



^a Exclusion criteria includes the following: not English; not focused on effectiveness of suicide prevention interventions or strategies; not a review; focused on a specific, nonpsychiatric disorder (for example, cancer, brain injury, and multiple sclerosis); focused on adults 60 years or older; focused on military personnel or veterans; and focused on prisons or inmates.

^b For updated reviews, only the most current version was included.

Three reviews^{23–25} reported reductions in suicide attempts for screening combined with a suicide awareness curriculum based on one RCT (Signs of Suicide).^{27,28} A fourth review²⁶ addressed screening alone, and concluded screening was not associated with harm due to labelling, based on one RCT (TeenScreen).³² All 4 reviews noted improved knowledge and skills. One review reported screening decreased risk factors and increased protective factors.²³ Finally, 1 of 4 reviews reported increased help seeking,²⁶ while 2 reported no change.^{23,25}

None of the 7 reviews distinguished between universal and targeted intervention strategies in their findings. Further analysis of the included primary studies showed that the 7 reviews evaluated 26 universal and 5 targeted programs. Nineteen of the 26 universal programs included suicide awareness curricula; 17 of 26 included at least 1 other intervention component. Three of 5 targeted programs included skills training; awareness curricula were included in 2. Gatekeeper training was not included in any.

No review presented systematically derived findings comparing intervention impact in males and females.

No eligible review addressed Aboriginal youth as a special population.

Findings: Prevention in Youth Who Have Attempted Suicide (Table 3)

The 14 high-quality reviews relevant to preventing repeat SRB addressed 2 themes: strengthened health and social system responses to prevent repeat SRB in youth who seek care ($n = 12$ reviews); and (or) strategies to prevent repeat SRB in youth who do not seek care ($n = 3$). Findings for interventions relevant to each theme are presented below.

Two of the 12 reviews addressed this intervention strategy.^{19,33} One concluded, based on RCTs and CCS, that ED interventions combined with postdischarge follow-up reduced death by suicide, SRB hospitalizations, and treatment adherence.³³ The second review¹⁹ reported that training primary care clinicians to treat depression reduced

Table 1 Characteristics of included suicide prevention reviews

Study (year)	AMSTAR RoB score	Total included studies, n	Relevant youth studies, n	Relevant youth Canadian sample, n	Years searched	Study design inclusion criteria										Intervention categories reviewed					
						RCT					Other					Education		Treatment		Access to means	Media
						CC	NCC and (or) Other	SR and (or) MA	Public	Pros	Screening	Psychiatric disorder	SRB								
Reviews relevant to school-based prevention																					
Ploeg et al (1996) ²¹	4	11	11	0	1980–1995	✓					✓										
Miller et al (2009) ²³	4	13	13	0	1967–2008	✓	✓														
Katz et al (2013) ²⁶	4	27	27	0	1960–2012	✓	✓														
Cusimano and Sameem (2011) ²⁵	3.5	8	8	0	1966–2009	✓	✓														
Mann et al (2005) ¹⁹	3	93	6	2	1966–2005	✓	✓	✓													
Isaac et al (2009) ³⁰	3	13	3	1	1806–NR	✓	✓														
Takada and Shima (2010) ²⁴	3	34	14	1	1967–2007	✓	✓														
Breton et al (2002) ⁵⁵	2	15	9	9	1970–1996	✓	✓														
Fountoulakis et al (2011) ⁵⁶	2	48	11	0	NR–2010	NR	NR	NR													
Peña and Caine (2006) ⁵⁷	1	17	9	0	NR	✓	✓														
Reviews relevant to youth with ≥1 suicide attempt																					
Newton et al (2010) ³³	5	10	10	1	1985–2009	✓	✓														
Hawton et al (2009) ⁴¹	5	23	2	0	1966–1999	✓	✓														
Crawford et al (2007) ⁴²	5	18	3	0	1966–2005	✓	✓														
Ougrin et al (2012) ³⁸	5	14	14	0	NR–2010	✓	✓														
Tarrier et al (2008) ³⁷	5	28	6	1	1980–NR	✓	✓														
Robinson et al (2011) ³⁹	4	15	15	0	1980–2010	✓	✓														
Corcoran et al (2011) ⁴³	4	17	17	2	NR–2010	✓	✓														
Hahn et al (2005) ⁴⁸	4	NR	2	0	1979–2001	✓	✓												✓		
Daigle et al (2011) ⁴⁴	4	35	4	0	1966–2010	✓	✓														
Burns et al (2005) ⁴⁵	4	10	10	1	NR	✓	✓														
Isaac et al (2009) ³⁰	3	13	2	1	1806–NR	✓	✓														
Hall and Lucke (2006) ³⁶	3	25	6	0	NR	✓	✓														
Mann et al (2005) ¹⁹	3	93	11	2	1966–2005	✓	✓														
Hepp et al (2004) ⁴⁶	3	25	3	0	1996–2003	✓	✓														
Durkee et al (2011) ⁵⁸	2	NR	1	NR	NR	✓	✓														
Fountoulakis et al (2011) ⁵⁶	2	48	4	NR	NR–2010	NR	NR	NR													
Breton et al (2002) ⁵⁵	2	15	6	6	1970–1996	✓	✓														
Links and Hoffman (2005) ⁵⁹	2	34	3	NR	1994–2004	NR	NR	NR													
Macgowan (2004) ⁶⁰	2	10	10	NR	NR–2002	✓	✓														
Peña and Caine (2006) ⁵⁷	1	17	1	0	NR	✓	✓														
McMyler and Pryjamchuk (2008) ⁶¹	1	10	1	0	NR	✓	✓														
Sakinofsky (2007) ⁶²	1	NR	5	NR	NR	✓	✓														
Möller (2006) ⁶³	1	NR	1	0	NR	✓	✓														

AMSTAR = a measurement tool to assess systematic reviews; CC = controlled cohort; MA = meta-analysis; NCC = noncontrolled cohort; NR = not reported; Pros = professionals; RCT = randomized controlled trial; RoB = risk of bias; SR = systematic review; SRB = suicide-related behaviour

Table 2 Summary of findings—school-based prevention

Study (year)	↓SRBs		Knowledge and (or) attitudes		Risk factors ^a		Protective factors ^b		Help seeking	
	D	A	I	NC	↓	↑	NC	↓	↑	NC
Education of the public										
Suicide awareness curricula										
Ploeg et al (1996) ²¹			✓		✓		✓			
Mann et al (2005) ¹⁹	✓		✓				✓			
Miller et al (2009) ²³	✓		✓		✓		✓		✓	
Takada and Shima (2010) ²⁴	✓		✓		✓		✓			
Cusimano and Sameem (2011) ²⁵	✓		✓						✓	
Katz et al (2013) ²⁶	✓		✓							✓
Skills training										
Miller et al (2009) ²³			✓		✓		✓		✓	
Katz et al (2013) ²⁶	✓		✓		✓		✓		✓	
Education of professionals										
Gatekeeper training										
Isaac et al (2009) ³⁰			✓				✓			
Katz et al (2013) ²⁶			✓				✓			✓
Postvention										
Ploeg et al (1996) ²¹									✓	
Miller et al (2009) ²³	✓									
Screening (with and without suicide awareness curricula)										
Miller et al (2009) ²³	✓		✓		✓		✓			✓
Takada and Shima (2010) ²⁴	✓		✓							
Cusimano and Sameem (2011) ²⁵	✓		✓							✓
Katz et al (2013) ²⁶			✓						✓	

A = attempt; D = death; I = ideation; NC = no change; SRB = suicide-related behaviour

^a Includes hopelessness, depression, suicide risk, and loneliness

^b Includes coping skills, problem solving, resiliency, empathy, and self-efficacy

suicide attempts by more than 50%, compared with 18% in the control group (difference not statistically significant in one underpowered RCT)³⁴; and that training primary care physicians to recognize psychological distress and suicidal ideation increased the identification of suicidal youth by 130% in a single pre–post study.³⁵

Two of the 12 reviews addressed the effect of medication treatment for psychiatric disorder on SRB prevention in youth.^{19,36} One³⁶ concluded based on 2 meta-analyses and 4 observational studies that: antidepressants may increase short-term suicide risk in some adolescents; and that this increase is balanced by overall population-based reductions in SRBs associated with drug treatment of adolescent depression. The second review¹⁹ drew similar conclusions. Three reviews^{37–39} addressed the impact of treatment of psychiatric disorder with psychosocial interventions on SRB. Tarrrier et al³⁷ concluded, based on RCTs and CCSs in youth and adults, that CBT interventions do not prevent repeat SRB when focused on symptoms such as depression or distress. The second review³⁹ reported promising results for dialectical behaviour therapy based on one RCT. Specifically, suicidal ideation and attempts were reduced in youth presenting to a clinical service with a psychiatric diagnosis.⁴⁰ The third review³⁸ drew similar conclusions.

Nine reviews^{37–39,41–46} examined the treatment efficacy of psychosocial interventions for SRB. One³⁹ reported that CBT reduced suicidal ideation in adolescents based on a single RCT.⁴⁷ Another review⁴³ found psychosocial interventions decreased suicidal events and self-harm (composite outcome) at posttest, but not at follow-up, based on RCTs and CCSs. All 9 reviews conclude that the role of psychosocial interventions in SRB prevention requires further evaluation. No reviews of medication treatment for SRB were found.

Gatekeeper training and postvention are relevant to increasing help seeking in youth at risk for repeat SRB who do not seek care. One review³⁰ reported that gatekeeper training increased gatekeeper trainee knowledge and skills based on one RCT (Sources of Strength), but impact on help seeking behaviour, death by suicide, suicide attempts, and suicidal ideation was not assessed in this trial. No review reported whether postvention increases help seeking behaviour.

One review⁴⁸ reported reductions in death by suicide based on 2 ecological studies^{49,50} of safe-storage gun laws. However, the decrease in death by firearm suicides was small and not statistically significant.^{49,50} Impact on other SRB was not addressed.

No review reported on these interventions in youth who do not seek care.

Again, conclusions regarding sex and (or) gender differences in intervention effects were not possible. One review⁴⁴ noted that females were overrepresented in studies that reported the proportion of males and females, and that differences in outcome were almost never reported.

Again, no reviews addressed Aboriginal populations, specifically.

Recommendations and Consensus Results (Table 4)

Table 4 presents 6 recommendations derived from the findings. All EAG members ($n = 15$) rated their agreement with each recommendation in the consensus exercise: 100% of members strongly agreed or agreed with the final versions of recommendations 2, 5, and 6; 93.3% of members strongly agreed or agreed with recommendation 4; 80% strongly agreed or agreed with recommendation 3 (1 member disagreed somewhat and 1 strongly disagreed); 73% strongly agreed or agreed with recommendation 1 (1 member strongly disagreed).

Discussion

We conducted an EKS that included consensus-derived recommendations to facilitate the use of research knowledge by decision makers responsible for the implementation of effective youth suicide prevention policies and programs. Twenty-one high-quality reviews were identified—7 relevant to school-based interventions and 14 relevant to the prevention of repeat suicide attempts. Findings are summarized by intervention type, SRB outcomes reported, and the availability of evidence from RCTs. The review of reviews methodology complements one other systematic review, which addresses prevention in all age groups¹⁹ by providing a comprehensive, up-to-date analysis of youth relevant suicide prevention intervention literature.

The provision of consensus-based recommendations addresses the recognized value added when expert groups such as ours provide guidance to decision makers that goes beyond a detailed synthesis of available evidence and its quality. For example, decision makers working in real time often have limited time and resources. Consequently, their ability to conduct a thorough evaluation of decision-relevant evidence and associated trade-offs is limited, compared to an expert panel. Moreover, as noted by the US Preventive Services Task Force (see Petitti et al⁵¹), clinicians “indicate frustration with the lack of guidance”^{pp 199} when the Task Force fails to make recommendations. “Decision makers do not have the luxury of waiting for certain evidence. Even though evidence is insufficient, the clinician must still provide advice, patients must make choices, and policy makers must establish policies.”^{51, p 202}

The synthesized findings of the 21 included reviews reveal the limited quantity and quality of evidence available to inform decisions about youth suicide prevention policies and programs. To date, no school-based intervention has demonstrated reduced rates of death by suicide in an RCT or CCS although reductions in suicide attempts and suicidal ideation, and other proxy measures of suicide risk have been reported. Findings for interventions relevant to the prevention of repeat suicide attempts also reveal the lack of RCTs and knowledge gaps regarding impact on death by suicide, suicide attempts, and suicidal ideation. We were unable to draw conclusions about sex or gender differences in intervention effectiveness because none of the reviews addressed this issue systematically. The absence of reviews addressing First Nations, Inuit, and

Table 3 Summary of findings—prevention of repeat suicide attempts in youth

Study (year)	↓SRBs			Proxy outcomes	
	D	A	I	↓	↑
Theme 1 Youth who seek care					
Education of health professionals					
Emergency department responses					
Newton et al (2010) ³³	✓			Suicide-related hospitalizations	Treatment adherence
Primary health care providers					
Mann et al (2005) ¹⁹		✓			Identification of suicidal patients
Treatment of psychiatric disorder					
Pharmacological interventions					
Hall et al (2006) ³⁶	✓				
Mann et al (2005) ¹⁹	✓				
Psychosocial interventions					
Tarrier et al (2008) ³⁷					
Ougrin et al (2012) ³⁸					
Robinson et al (2011) ³⁹	✓		✓	Self-harm	Self-harm
Treatment of SRBs					
Psychosocial interventions					
Hawton et al (2009) ⁴¹					Self-harm
Tarrier et al (2008) ³⁷					
Ougrin et al (2012) ³⁸				Suicidal or nonsuicidal self-harm episodes	
Crawford et al (2007) ⁴²					Rates of all-cause mortality
Corcoran et al (2011) ⁴³		✓			
Daigle et al (2011) ⁴⁴				Self-harm	Self-harm
Robinson et al (2011) ³⁹			✓	Self-harm	Self-harm
Burns et al (2005) ⁴⁵				Self-harm; missed appointments	Self-harm; missed appointments
Hepp et al (2004) ⁴⁶					Self-harm
Theme 2 Youth who do not seek care					
Education of public and professionals					
Gatekeeper training					
Isaac et al (2009) ³⁰					Gatekeeper knowledge and skills
Postvention					
No reviews					
Screening					
No reviews					
Treatment of psychiatric disorder					
No reviews					
Treatment of SRBs					
No reviews					
Means restriction					
Hahn et al (2005) ⁴⁸		✓			
Responsible media reporting					
No reviews					

Table 4 Recommendations

- 1) School-based prevention: No RCT or CCS has demonstrated the effect of prevention interventions provided in school settings on death by suicide. Only 2 RCTs have reported reductions in suicide attempts and ideation. Most available trials show reductions in proxy measures of SRB. Other primary studies use weaker designs (controlled or uncontrolled cohort studies). Therefore, we provide a qualified recommendation—that decision makers consider the following intervention options, considering the limited evidence currently available regarding the impact of these interventions on death by suicide, suicide attempts, and suicidal ideation and the need for implementation to be linked to rigorous evaluation. Universal prevention interventions: a) suicide awareness curriculum plus screening (that is, Signs of Suicide); b) skills training (that is, Good Behaviour Game); and c) gatekeeper training, including peer support (that is, Sources of Strength). Targeted prevention interventions: a) suicide awareness curriculum (that is, Signs of Suicide); b) skills training (that is, Good Behaviour Game); c) screening (that is, Signs of Suicide and [or] TeenScreen).
- 2) Prevention of repeat suicide attempts in youth who seek care: One RCT reported that an ED intervention (brief intervention and contact) reduced death by suicide. Reductions in suicide attempts and suicidal ideation were reported based on RCTs of ED transition programs, training primary care providers to provide evidence-based depression care, and treatment of adolescent depression with antidepressants, but more evidence is needed to determine the magnitude of impact on death by suicide, suicide attempts, and suicidal ideation. To date, psychosocial interventions (manualized or nonmanualized psychotherapeutic strategies) have not been shown to reduce death by suicide, suicide attempts, or suicidal ideation or other proxy suicide risk measures—further research is needed. Therefore, we provide a qualified recommendation—that decision makers consider the following intervention options, considering the limited evidence currently available regarding the impact of these interventions on death by suicide, suicide attempts, and suicidal ideation and the need for implementation to be linked to rigorous evaluation: a) ED transition programs; b) training of primary care providers in the provision of evidence-based care for adolescent depression; b) treatment of adolescent depression with antidepressants.
- 3) Prevention of repeat suicide attempts in youth who do not seek care: Almost no research has been conducted to determine the effect of prevention interventions on repeat SRB in this group of youth. Gatekeeper training and postvention may increase help seeking in these youth, which could reduce their risk of a repeated suicide attempt. Therefore, we provide a qualified recommendation—that decision makers consider the following intervention options, considering the overall lack of evidence and the need for implementation to be linked to rigorous evaluation: a) gatekeeper training (that is, Sources of Strength); and b) postvention.
- 4) Sex and gender differences: Conclusions cannot be drawn regarding sex or gender differences in intervention effectiveness. However, it is known that male youth are more likely to die by suicide, with suffocation the most frequent means in Canada. Female youth are more likely to attempt suicide but less likely to die by suicide, compared with male youth. We recommend the design and evaluation of prevention interventions that are sensitive to the distinct SRB profiles of males and females.
- 5) Relevance to First Nations, Inuit, and Métis Youth: Our EKS identified almost no studies conducted with First Nations, Inuit, and Métis youth meeting defined search criteria (empirical studies published in peer-reviewed academic journals). However, we are aware of numerous ongoing community and culture-based interventions across Canada, and internationally that build on emerging knowledge about why some Aboriginal communities have elevated SRB rates while others do not. Currently, we suggest that First Nations, Inuit, and Métis colleagues, non-Indigenous clinical and research collaborators, and community-based service providers review our EKS general findings, and then consider their own unique cultural and contextual factors when formulating conclusions regarding relevance to the needs of the youth in their communities. We also acknowledge and support the need for community-led and -based suicide prevention initiatives, including evaluation resources, such that unique contextual and cultural needs of Aboriginal communities are respected and incorporated into shorter- and longer-term planning.
- 6) National youth suicide research to practice network: We recommend coordinated implementation of recommendations 1 through 5 within a national collaborative youth suicide research-to-practice network. The role of the network would be to identify and facilitate increased implementation of promising programs (existing or newly developed) linked to rigorous evaluation, and to eliminate the use of ineffective ones at the regional, provincial, and federal level. The network would also create the national capacity needed to conduct new research to fill priority knowledge gaps identified in our EKS, including: adequately powered RCTs to clarify the magnitude of intervention impact on death by suicide, suicide attempts, and suicidal ideation; effectiveness of programs in common use for which no evaluative data are currently available; effective, gender-sensitive prevention interventions; and effective suicide prevention strategies for Aboriginal youth.

CCS = controlled cohort study; ED = emergency department; EKS = expedited knowledge synthesis; RCT = randomized controlled trial; SRB = suicide-related behaviour

Métis as a special population also emerged as a major gap, and contrasts with recent reports of ongoing community and culture-based interventions for these youth in Canada.⁵² We found little or no consideration of the potential harms of suicide prevention interventions in the eligible reviews. The recent RCT reporting a trend for increased suicidal ideation among Aboriginal people who receive ASIST (Applied Suicide Intervention Skills) gatekeeper training (that is, the gatekeepers) illustrates the need to evaluate both the benefits and the harms of interventions before widespread use.⁵³ No review addressed questions related to cost-effectiveness.

Although significant gaps exist, the findings suggest that interventions to increase contact between youth and trained professionals working in schools or effective systems of care show promise in preventing SRB. For example, school-based suicide awareness curricula plus screening (that is, Signs of Suicide) and skills training (that is, Good Behaviour Game) have been shown to reduce suicide attempts and (or) suicidal ideation in RCTs. For youth who have attempted suicide at least once and seek care, ED interventions that include postdischarge follow-up may reduce death by suicide. Training primary care professionals to provide evidence-based care for adolescent depression may reduce suicide attempts.³⁴ Increased access to treatment of depression with antidepressants is also a potentially effective youth suicide prevention strategy. Preventing repeat suicide attempts in youth who do not seek care (that is, most youth with one or more suicide attempt) emerged as a challenging problem, with little available research. Interventions to increase help seeking behaviour by these youth may reduce risk for repeat suicide attempts. Effective postvention may also decrease the risk of contagion or copycat factors that result in repeated suicide attempts, as suggested by the recent Canadian study that documented an increased risk of suicidality outcomes in youth exposed to suicide.⁵⁴ However, currently, both strategies require focused intervention development and evaluation.

Potential EKS limitations include the following. First, systematic review of review methods rely on existing systematic reviews and meta-analyses that may be subject to incorrect reporting and interpretation of primary studies, omission of important primary studies, and inclusion of poor-quality primary studies by review authors. We addressed these issues as follows. When reviews disagreed, the primary study was examined to determine whether the disagreement was factual or due to different interpretations of the same results. All appeared to be factual misinterpretations. Regarding omitted studies, both primary studies nominated by EAG members were included in the eligible high-quality reviews. The inclusion of low-quality uncontrolled studies in some reviews was addressed by limiting our conclusions to findings based on RCTs or CCSs. A second limitation concerns the scarcity of RCTs of youth suicide prevention interventions. We have noted the few available RCTs in our findings and recommendations. Third, it is unclear whether

available youth suicide prevention interventions prevent death by suicide. This gap is due, in part, to the large sample size needed to study low event rates, and hence the need for adequately powered, multi-centre studies.

Conclusion

The 6 recommendations derived from our findings provide guidance to decision makers concerning school-based interventions and the prevention of repeat suicide attempts. They also provide the foundation for an evidence-informed action plan for Canada. The sixth recommendation, which calls for a national network of youth suicide research to practice centres, could position Canada as a leader in youth suicide prevention. Through the dissemination of what is known about effective, ineffective, and harmful prevention interventions, and the implementation of promising strategies linked to rigorous evaluation, the network could provide the leadership needed to clarify prevention intervention effects on death by suicide, suicide attempts, and suicidal ideation, strengthen our understanding of sex and (or) gender differences, address the unique needs of Aboriginal youth, and accordingly, promote and protect the health and well-being of Canadian youth and their families.

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