

REVIEW ARTICLE

Youth violence secondary prevention initiatives in emergency departments: a systematic review

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ABSTRACT

Objective: Youth violence continues to trouble Canadians. Emergency department (ED) visits by youth after a violent injury may represent a “teachable moment,” and thus secondary violence prevention interventions may be effective. We conducted a systematic review to identify the success rates of any interventions, the populations likely to benefit and the outcome measures used.

Data source: We searched 8 databases (i.e., MEDLINE, EMBASE, PubMed, CINAHL, the Cochrane Database of Systematic Reviews, the ACP Journal Club, DARE and CENTRAL).

Study selection: Studies were included if they described and evaluated an intervention, were health care-based and targeted youth who were injured by violence. Two blinded investigators selected 15 articles from 181 abstracts. After full-text review, 8 articles were excluded, leaving 7 articles from 4 intervention programs.

Data extraction: All interventions used ED case management of the violently injured patient. One randomized control trial (RCT) demonstrated a significant reduction in reinjury rates (treatment group 8.1% v. control group 20.3%, $p = 0.05$). Another small RCT found no statistically significant reductions in repeat violence or service use. One retrospective cohort study demonstrated a lower relative risk (RR) in future criminal justice involvement (RR = 0.67, 95% confidence interval 0.45–0.99). A retrospective study of pediatric patients with violent injuries found only 1% of these youth returned with injuries as a result of repeat violence.

Data synthesis: Although all 4 case management interventions that we reviewed showed promise in the United States, small sample sizes and incomplete follow-up limited their ability to demonstrate significant decreases in reinjury.

Conclusion: Future research is necessary to help EDs capitalize on the opportunity to effectively reduce youth violence.

Keywords: systematic review, emergency department, youth, violence, prevention

RÉSUMÉ

Objectif : La violence chez les jeunes au Canada continue d’être une préoccupation. Les visites à l’urgence de jeunes victimes de blessures reçues lors d’actes violents peuvent représenter des « occasions d’apprentissage »; les interventions visant à réduire la répétition de telles blessures pourraient ainsi être efficaces. Nous avons effectué une revue systématique afin de déterminer les taux de réussite de toute intervention, les populations susceptibles d’en tirer profit et les mesures de résultats utilisées.

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Source des données : Nous avons effectué une recherche dans 8 bases de données électroniques (MEDLINE, EMBASE, PubMed, CINAHL, Cochrane Database of Systematic Reviews, ACP Journal Club, DARE et CENTRAL).

Sélection des études : Nous avons inclus les études qui décrivaient et évaluaient de telles interventions, qui étaient axées sur les soins de santé et qui ciblaient les jeunes victimes de blessures causées par un acte violent. Deux chercheurs ont sélectionné à l'insu 15 articles de 181 résumés. Après avoir fait un examen des textes intégraux, 8 articles ont été exclus. Il restait donc 7 articles portant sur 4 programmes d'intervention.

Extraction des données : Toutes les interventions s'inscrivaient dans le cadre de programmes de gestion de cas à l'urgence de patients victimes de blessures consécutives à un acte violent. Une étude sur échantillon aléatoire et contrôlé (ÉÉAC) a montré une réduction significative des taux de nouvelles blessures (groupe de traitement = 8,1 % par rapport à 20,3 % pour le groupe témoin, $p = 0,05$). Selon une autre ÉÉAC plus petite, aucune réduction statistiquement significative de répétition de la violence ou d'utilisation des services n'a été observée. Une étude de cohorte rétrospective révèle une réduction du risque relatif (RR) que les jeunes aient ultérieurement des démêlés avec la justice (RR = 0,67; intervalle de confiance à 95 %, 0,45 à 0,99). Une étude rétrospective de jeunes victimes de blessures subies lors d'actes violents a révélé que seulement 1 % de ces jeunes sont retournés à l'urgence en raison de nouvelles blessures consécutives à un acte de violence.

Données de synthèse : Bien que les 4 programmes d'intervention que nous avons examinés soient prometteurs aux États-Unis, la taille réduite des échantillons et le suivi incomplet ont limité leur capacité de montrer une baisse significative de nouvelles blessures.

Conclusion : Il faut réaliser d'autres recherches pour aider les services d'urgence à tirer profit de l'occasion de réduire efficacement la violence chez les jeunes.

Introduction

Youth violence continues to be a very troubling problem in Canada. Although overall homicide rates have decreased substantially since the early 1990s, the rate of youths accused of homicide in Canada was at its highest in 2006 since 1961 (the first year these statistics were collected).¹ Homicide is the fourth leading cause of death in Canadian youth aged 15–19.² Youth violent crime increased by 3% in 2005.¹ The Youth Self-Reported Delinquency Survey, which was completed in Toronto in 2006, demonstrated that 13% of youth in grades 6–9 reported participating in violent delinquent behaviour in the preceding 12 months.³ This survey also examined victimization. Three percent of respondents reported that they had been hit so violently that medical attention was required. Additionally, 56% of youth reporting delinquent behaviour had been victims of either bullying, assaults requiring medical assistance, threats of extortion or thefts. These figures demonstrate a continued need for youth violence prevention efforts and the fact that victims of violence have a disproportionately high rate of delinquent behaviour.

Primary violence prevention programs are designed to prevent violence before it happens. An example of a primary prevention program is a Baltimore-based program where youth visit a trauma centre and are exposed to

graphic depictions of injuries as a result of gun violence.⁴ This program demonstrated short-term reductions in aggression, but long-term impacts have not been studied. However, primary violence prevention strategies may not be ideal for use in the emergency department (ED) since they target a larger population rather than a high-risk group, and they do not take advantage of the fact that victims of violence are more likely to become repeat victims and often become perpetrators of violence in the future.⁵ Rates of repeat visits for subsequent violence-related injury have been estimated to range from 6% to 44%.^{6–9} A population-based New Zealand study demonstrated that after admission to hospital for an injury due to assault, the risk of future admission to hospital because of a subsequent assault was 39.5 times higher than the risk after admission to hospital for an unintentional injury. Moreover, this second injury was most likely to occur within 30 days of the index injury.⁶ A US-based study demonstrated that subsequent homicides may be as high as 20% in those who have been injured by violence.⁸

Secondary prevention programs are designed for those who have already been affected by violence. Secondary prevention programs take advantage of the “teachable moment,” which has been described as an event that motivates an individual to reduce risk-taking behaviours.¹⁰ When applied to youth injured by violence, this concept

may engage youth by discussing the perceived severity, susceptibility and preventability soon after the injury.¹¹ A recent study in Toronto, Ont., showed that a large proportion (89%) of youth injured because of violence are discharged directly from EDs.¹² As such, efforts to prevent future occurrences of injury by targeting the teachable moment need to be deployed in the ED itself. Like any intervention, it is important to understand whether ED-based secondary prevention of youth violence is effective.

The purpose of our systematic review was to assess existing evidence on the effectiveness of secondary intervention programs for violently injured youth who could be identified in the ED. Specifically, the primary objective of our review was to estimate the success rates reported on all published evaluations of hospital-based interventions for preventing youth violence. Our second goal was to identify which intentionally injured youth benefit from youth violence intervention programs. Our third goal was to assess what measures of progress and outcome have been used to evaluate ED-based secondary intervention programs in order to plan the evaluation of future violence-prevention programs.

Methods

Search strategy

The electronic search strategy included 8 databases: MEDLINE, EMBASE, PubMed, CINAHL, the Cochrane Database of Systematic Reviews, the ACP Journal Club, DARE and CENTRAL. We searched medical subject headings, truncation terms and text words, since not all databases support the use of medical subject headings (Box 1). A hand search of key researchers in the field of youth violence was also completed.

Studies were retained if they evaluated an intervention

Box 1. Search strategy

1. youth.mp or exp Adolescent/
2. exp Violence/ or violence.mp
3. 1 and 2
4. intervention.mp or exp Intervention Studies/
5. prevention.mp
6. 4 or 5
7. emergency department.mp
8. (accident and emergency).mp
9. hospital.mp
10. clinical
11. 7 or 8 or 9 or 10
12. 3 and 6 and 11

exp = explode; mp = multipurpose.

program that targeted youth treated for violent injuries in a health care setting. These patients were described in the abstracts as youth, but varying age ranges were acceptable. Articles were removed if they pertained to intimate partner violence, child neglect, sexual abuse, substance abuse or primary prevention programs.

Abstracts were reviewed by both authors, who were blinded to the citation. Discrepancies were resolved by consensus. Unblinded review of the full-text articles was completed by one author (C.S.) using a standardized selection and abstraction form. We did not blind the data abstractor to the citation of the article under review because it has not been shown that this changes the outcome of systematic reviews.¹³ Given the expected diversity in demographics, methods and outcomes, a critical qualitative analysis of the intervention and results was performed.

Results

Search results

We retrieved 174 articles from the electronic search and 7 additional articles were added after a search of key researchers in the field was performed. Of these 181, we retained 15 studies for full-text review.^{4,14-27} The kappa for interobserver agreement was substantial (0.66). Eight articles were subsequently excluded during the full-text review for the following reasons: the subjects did not include youth,¹⁷ no intervention was evaluated (solely a description of a planned intervention)¹⁸ and interventions were primary prevention only.^{4,15,19,20,22,24} Additionally, 3 of the articles evaluated a previously reported intervention.^{14,23,25-27} As such, 7 articles describing 4 interventions are included in this review (Fig. 1).^{14,16,21,23,25-27} All 4 interventions involved youth ranging in age from 10 to 24 years identified either in the ED or in the trauma inpatient service as having been injured by violence.

Study # 1: Chicago, Illinois

Zun and colleagues²⁵⁻²⁷ designed a randomized, non-blinded study in Chicago to test the effectiveness of a case management program in the ED. They included patients aged 10–24 (mean 19) years who were victims of violence, after excluding cases of child abuse, sexual assault and domestic violence. The patients in the control group received a list of available social services in the area. The intervention patients were assigned to a case manager who assessed and then referred the patient to suitable resources. Available resources included education, job readiness, mental health support, health care, legal assistance, substance abuse counselling, and training for anger

management and conflict resolution. The intervention patients were linked with the case manager for 6 months; they met weekly for the first 2 months, then biweekly for the second 2 months and monthly for the last 2 months. An envelope selection method was used for randomization, and the groups were well balanced for age, ethnic origin and sex. The investigators reported 3 outcomes evaluated at 6- and-12 months follow-up in separate reports.

The authors' first report examined the use of services.²⁷ In the intervention group, 81.2% (78/96) made use of recommended services, compared with only 9.8% (9/92) of controls. The most commonly used services were educa-

tion, job readiness and mental health. The use of services and case management were strongly correlated (Pearson correlation coefficient 0.728). In their second report, a 10-item tool was used to compare pre- and postintervention attitudes on issues of "parenting, family, delinquency, stress, peer delinquency, future expectations, achievements, aspirations, values and social competency."²⁵ Using time series analysis, χ^2 and analysis of covariance, the investigators found no statistically significant difference in attitudinal change between the 2 groups. In the authors' third report,²⁶ self-reported repeat violence, return visits to the ED, arrests and incarceration within 6 and 12 months

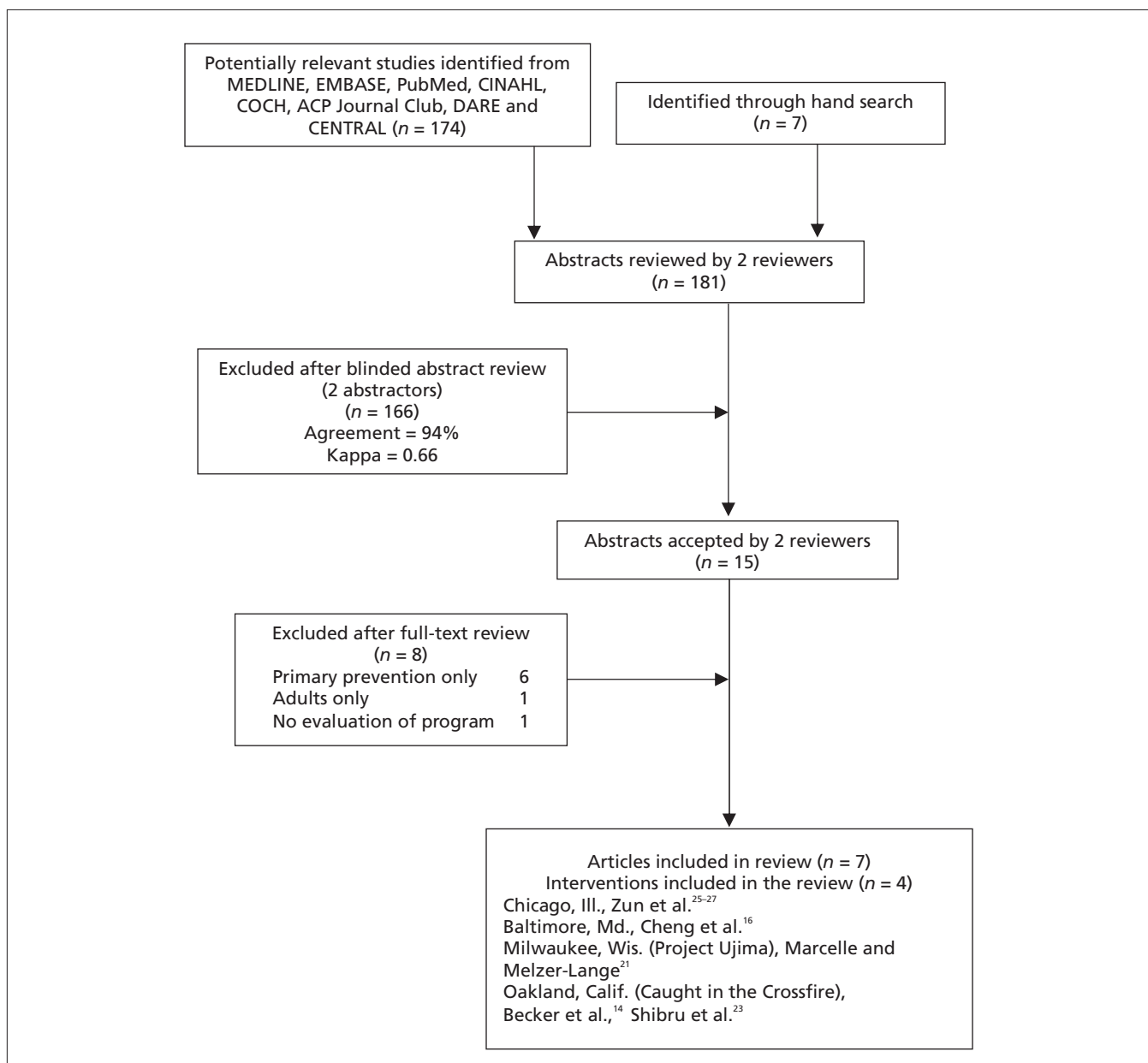


Fig. 1. Search results. COCH = Cochrane Database of Systematic Reviews.

after entry into the program were examined. The intervention caused a significant reduction in self-reported repeat violence at 12 months after entry into the program (treatment group 8.1%, control group 20.3%, $\chi^2 = 3.87$, $p = 0.05$), but not in return to ED, arrest or incarceration rates.

Despite the randomized design, there were difficulties implementing a behavioural intervention trial in this population. Seventy-one patients were lost between entry and the 6-month evaluation. A further 34 were lost between the 6- and 12-month evaluations. Intention-to-treat analysis was not used and the group assignment of patients lost to follow-up is not clear. Different methods were used to ascertain the primary outcome in the intervention and control group, potentially introducing measurement bias. The number of referrals to services was determined using the records of case managers for treated subjects, compared with self-report for controls.

Study # 2: Baltimore, Maryland

Cheng and coworkers¹⁶ recently published a randomized controlled trial of a case management program for youth aged 12 to 17 (mean 14) years attending a pediatric ED following injury due to violence. The intervention was very similar to that used by Zun and colleagues.²⁷ All patients received a list of community resources during the index ED visit. Patients and their parents were then contacted in the weeks after the ED visit for a baseline interview (average time interval 19.5, standard deviation 19, d). All patients and their parents were asked to prioritize their top 3 service needs (from youth and family counselling, substance abuse services, support groups, parenting education, tutoring, youth mentoring programs, anger management, legal assistance and crises intervention). Participants were then randomized using opaque, sealed envelopes to either intensive case management or control groups. The intensive case management consisted of counselling by telephone or in person for 4 months. The top 3 services self-identified at baseline were the primary focus for case management. The case managers also discussed sequelae of the assault, assessed family needs and facilitated access to outside services. A follow-up interview was conducted after 6 months to assess repeat injury based on youth or parent reports of physical fights, fight injuries and weapon carrying, and to measure use of services.

Eighty-eight families were enrolled in Cheng and coworkers' study, with 45 allocated to the intervention group and 43 allocated to the control group. Seventeen were lost to follow-up in each group. There were no significant effects on either service use or repeat injury, but confidence intervals (CIs) were very wide.

This randomized study was also limited by the large loss to follow-up. Additionally, enrolment and intervention often did not begin until weeks after the index injury. The teachable moment that begins immediately after the violent injury may be short-lived.

Study # 3: Milwaukee, Wisconsin (Project Ujima)

Marcelle and Melzer-Lange²¹ performed a retrospective record review of more than 200 patients aged 10–18 (mean 15) years who were injured because of conflict and attended a pediatric ED in Milwaukee, Wis. A case management service had been in place in this ED for 3 years at the time of the study. The intervention was called Project “Ujima” from a Swahili word that means “collective work, collective responsibility.” A social worker and a Project Ujima representative offered the program services, such as home visitation, mental health services and youth activities, to the youths and their families during the initial ED visit. They provided both in-hospital and community support through counselling and case management, with referrals to outside services, such as youth development programs, family development programs, housing and school support, legal assistance and job preparation.

Physical assault was the most common mechanism of injury, accounting for 62% of the injuries. Firearm use accounted for 31% and assault with another weapon for 7% of the injuries. During the 1-year study period, the ED treated 394 youth injured by violence. Project Ujima staff attended 218 of these youth and referred 72% to counselling. Only 3 (1%) of these youth returned to the ED with a new injury as a result of violence during the calendar year after enrolment in the study closed. The outcomes of youth who did not receive intervention were not tracked, which precluded comparison.

Study # 4: Oakland, California (Caught in the Crossfire)

The Caught in the Crossfire program is an intervention program based in Oakland, Calif., for youth admitted with injuries due to violence.^{14,23} The premise of this program is that interventions must be “at the right time and with the right person.” When a young person visits the hospital with a violent injury, hospital staff summon an “intervention specialist.” These individuals are young adults from similar communities who have experienced violence themselves. The intervention specialist provides case management and mentorship, working with the patient and family for up to 1 year. Initially, they help the patient and family cope with the injury and talk about alternatives to retaliation. They identify short- and long-term needs, and connect the patient and family with local resources to

promote a nonviolent lifestyle. These resources include educational programs, job training, counselling, legal assistance and life skills training.

Becker and colleagues¹⁴ evaluated this program using a retrospective case-control design comparing youth admitted to hospital, aged 12–20 years, who were enrolled in the program versus those in the control group from the previous year. Forty-three cases were in the treatment group, and were compared with 69 admitted controls. None of the measured outcomes was statistically significant, but there was a trend toward benefit from the program. Cases had a 70% relative risk (RR) reduction in subsequent arrest for any offence (odds ratio [OR] 0.26, 95% CI 0.05–1.22) and a 60% RR reduction in any criminal involvement (OR 0.36, 95% CI 0.09–1.35).

This study enrolled youth who were admitted to hospital, and its findings may not be generalizable to ED patients. Although patients are often first enrolled into the program in the ED, this study only evaluated admitted patients (Dean Calhoun, Youth ALIVE!, Oakland, Calif.: personal communication, 2006). Patients who are discharged directly from the ED have less severe injuries and shorter in-hospital contact time, and might therefore benefit less from the program. Conversely, admitted patients with more severe injuries may be engaging in more violent behaviour, which is more difficult to modify. Thus it is not known whether this population is more or less susceptible to intervention than an ED population. The small sample size limited statistical power. Additionally, 8 youth were lost to follow-up and 5 had missing data and thus were not included in the analysis.

Shibru and coworkers²³ performed a more recent evaluation of the Caught in the Crossfire program. They evaluated the program using a retrospective cohort. The treatment group consisted of patients aged 12–20 (mean 18) years admitted to a trauma centre for intentional injury who participated in the intervention program. They were required to have a minimum of 5 interactions, at least 2 of which were in person with the intervention specialist. The control group comprised admitted patients matched by sex, age, race or ethnic origin, type of injury and year of admission, but who had not participated in the program. The control group included patients who could not be contacted, were treated and released outside business hours, lived outside the program's catchment area for providing services, were missed during admission or failed to appear for their initial appointment. The total sample size was 75 treatment group patients and 79 control group patients.

The outcomes assessed were the rates of criminal justice involvement, traumatic reinjury and readmission to hospital

because of intentional violence, and violence-related deaths over 18 months. All outcomes were treated as binary variables. Criminal justice data were obtained from the police department. Data on injury was collected from the trauma centre's medical record database. Death records were obtained from the coroner. The only statistically significant difference was a lower risk of criminal justice involvement (RR 0.67, 95% CI 0.45–0.99, $p = 0.04$). Violence-related reinjury or death were rare outcomes, prompting the authors to perform a post hoc power analysis. They estimated a sample size of 300 treatment group patients and 300 control group patients would be necessary to identify reductions in these clinically relevant outcomes.

Although larger, this study had similar limitations to the study by Becker and colleagues.¹⁴ It is also unclear if some of the controls were initially enrolled in the program, but did not complete the initial assessment and therefore should have been evaluated in the intervention group.

Discussion

Injury control literature has convincingly shown that passive protection through legislation, regulation and bioengineering can reduce injury.^{28,29} Changing behaviour is much more difficult. However, the potential for emergency physicians to prevent injury has been reported for intimate partner violence and impaired driving.^{30–32} Capitalizing on the teachable moment is an integral part of the advocacy and injury prevention roles of emergency physicians. According to Johnson and colleagues,¹¹ youth injured by violence are in a reflective and receptive state of mind in the ED, rendering this setting appropriate for intervention.

The primary goal of our review was to assess the success of existing intervention programs designed to prevent repeat injury or death due to violence among injured youths. Most interventions reviewed showed positive results, but few were statistically significant because of small sample size and limited power.^{14,16,21,23,25–27}

The second goal of our systematic review was to identify which intentionally injured youth may benefit from a youth violence intervention program. The programs targeted youth whose ages ranged from 10 to 24 years. The Baltimore and Milwaukee (Project Ujima) studies occurred in pediatric EDs, and the Chicago and Oakland (Caught in the Crossfire) studies occurred in general EDs and thus included young adults as well.^{16,21,23,26} Enrolled patients were predominantly black (range 60%–93%) and male (range 69%–82%). None of the studies assessed the effects of individual demographics and injury characteristic roles on

reinjury rates. Such analyses could help predict which interventions would work best for specific groups of youth, but require larger sample sizes.

The final goal of our review was to identify outcome measures used to evaluate secondary intervention programs. The most commonly used outcomes were postintervention criminal offences and arrests, and reinjury either by self-report^{16,26} or using hospital, coroner and criminal justice databases.^{14,23} Because victims of violence are more likely to be both repeat victims and future perpetrators of violence,⁵ it is difficult to separate these 2 outcomes or to prefer one over the other.

Strengths and limitations

The strengths of our systematic review lie in its exhaustive scope of search, data extraction and blinded abstract selection. The search included standard databases, review of key researchers in the field and hand searching of review articles for further interventions. The abstract selection was blinded and strict inclusion and exclusion protocol were adhered to, reflected in strong interrater agreement. The data from the studies were extracted using a standardized data extraction sheet. The strict inclusion and exclusion criteria may have excluded important studies, especially primary intervention programs.⁴

Conclusion

The vast majority (89%) of youth victims of violence are discharged directly from EDs.¹² Moreover, youth who are injured by violence are at risk of repeat injury due to violence.⁶⁻⁹ Given that the ED provides potential for a teachable moment, an opportunity exists for the development of youth violence secondary prevention initiatives in EDs.¹¹ Four case management interventions reported in 7 articles suggest these programs can reduce future criminal involvement. Future randomized controlled trials should enroll sufficient participants, use intention-to-treat analysis and ideally take place in Canada. Such studies will be necessary to establish whether an ED-based intervention can reduce youth reinjury and death due to violence in our communities.

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