Self-Inflicted Injury-Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP-SI): a new surveillance tool for detecting self-inflicted injury events in emergency departments

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Abstract

Objectives To assess the performance of the Canadian Hospitals Injury Reporting and Prevention Program's newly developed self-harm surveillance tool (CHIRPP-SI) designed to improve emergency department (ED) hospital surveillance of youth self-inflicted injury (SI).

Methods This was a prospective, single-centre cohort study from February 2015 to September 2015. Eligible participants were aged 6–17.99 years and presented to the ED with a primary mental health complaint. The frequency of SI cases was extracted from three data sources (CHIRPP-SI, medical chart, and the National Ambulatory Care Reporting System Metadata (NACRS)). Cohen's kappa statistic was used to examine the level of agreement between data sources.

Results Of the 250 participants who received a medical chart review, 70 completed the CHIRPP-SI. Of those who did not complete the CHIRPP-SI, 86% ($n = 154$) reported no SI related to their presentation, 12% ($n = 22$) declined to participate without specifying self-injury status, and 2% ($n = 4$) were unable to be interviewed prior to discharge. The three sources of surveillance data varied considerably; the medical chart captured the highest frequency of individuals reporting SI related to their ED visit (33.6%), followed by the CHIRPP-SI (28.0%), and the NACRS database (8.4%). The CHIRPP-SI captured the method of SI and the place of occurrence in 100% of individuals, and the bodily location harmed in 98.6% of individuals.

Conclusions Study findings highlight the disparity between different sources of data, in relation to the capture of paediatric SI, presenting to hospital EDs. If greater details of SI events are to be identified, surveillance tools such as the CHIRPP-SI should be considered.

Résumé

Objectifs Évaluer la performance de l'outil du Système canadien hospitalier d'information et de recherche en prévention des traumatismes (SCHIRPT-BAI) pour améliorer la surveillance des blessures auto-infligées (BAI).

Méthode Étude de cohorte prospective menée en 2015. Les participants admissibles étaient âgés de 6 à 17,99 ans et se sont présentés au service des urgences avec une plainte de santé mentale. La fréquence des présentations avec des BAI a été extraite de trois sources de données (SCHIRPT-BAI, dossier médical, système national d'information sur les soins ambulatoires (SNISA)). Le kappa de Cohen a été utilisé pour examiner l'accord entre les sources de données.

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Résultats Des 250 participants qui ont reçu une revue du dossier médical, 70 avaient complété le SCHIRPT-BAI. De ceux sans SCHIRPT-BAI, 86 % ($n = 154$) n'ont déclaré aucune BAI, 12 % ($n = 22$) ont refusé de participer et 2 % ($n = 4$) n'ont pas pu être interrogés avant leur décharge. Les trois sources de données varient considérablement; le dossier médical a saisi le plus grand nombre de personnes ayant signalé une BAI liée à leur visite (33,6 %), comparé à 28,0 % par le SCHIRPT-BAI et 8,4 % par le SNISA. Le SCHIRPT-BAI a saisi la méthode du BAI et le lieu de l'événement pour 100 % des individus, et l'emplacement de la blessure corporelle pour 98,6 % des individus.

Conclusion Il existe une disparité entre les différentes sources de données quant à la capture des BAI pédiatriques au service des urgences. Le SCHIRPT-BAI pourrait être utilisé pour capturer de plus amples détails à propos des cas de BAI.

Keywords Self-harm · Self-injury · Surveillance · Administrative data · Paediatrics · Emergency department

Mots-clés Automutilation · Surveillance · Pédiatrie · Département d'urgence · Données administratives

Introduction

Self-inflicted injury (SI) includes all self-directed violence (e.g., cutting, burning, and poisonings), regardless of purpose or suicidal intent (Crosby et al. 2011). SI behaviour is overrepresented in youth relative to the general population and approximately 18% of youth reported intentionally hurting themselves in their lifetime (Muehlenkamp et al. 2012; Skegg 2005). Within hospital settings, it has been estimated that 1 in 100 visits to the emergency department (ED) is for SI, and that 1 in 20 of those visits results in an admission (Bethell et al. 2013). In fact, the number of hospitalizations among youth for SI in Canada (excluding Quebec) rose from 1324 in 2009–2010 to 2456 in 2013–2014 (Canadian Institute for Health Information 2014). SI can lead to a range of complications such as worsening psychopathology, scarring and infection, and mortality (Borschmann et al. 2017; Fortune et al. 2007; Hawton et al. 2012; Mars et al. 2014; Wilkinson et al. 2011). Due to the potentially severe outcomes associated with SI, and in order to improve healthcare, it is imperative that these behaviours are consistently inquired about and adequately recorded in hospital EDs.

Typically, data on ED visits for SI events are captured through hospital administrative data. A hospital coder assigns relevant International Classification of Diseases, 10th Revision (ICD-10) codes to an individual, based on what is documented in their medical chart. In Canada, ICD-10-CA codes are recorded in the National Ambulatory Care Reporting System (NACRS) (Canadian Institute for Health Information 2015). However, when comparing these data with data from hospital studies, administrative data frequently underestimate SI (Bethell and Rhodes 2009; Clements et al. 2016; Randall et al. 2017; Rhodes et al. 2002). Overall rates of SI captured in the hospital administrative data in England underestimated what was captured in the study data by as much as 60%

(Clements et al. 2016). Similarly, clinicians who looked at medical charts found that the prevalence of deliberate self-poisoning was 63% higher than what was recorded in administrative data (Rhodes et al. 2002). Furthermore, when relying on routinely collected hospital data, SI events are often categorized under undetermined intent (Bethell and Rhodes 2009). The true prevalence of SI is therefore potentially being underreported.

The electronic Canadian Hospitals Injury Reporting and Prevention Program (eCHIRPP) is a sentinel surveillance program designed to capture data on unintentional and intentional injuries, including pre-event details and details of the injury itself (Crain et al. 2016). This program has shown to be a rich source of information on injuries in paediatric EDs; however, there was some evidence that SI were underrepresented (Gupta et al. 2016; Mackenzie and Pless 1999; Morrison et al. 1999). To address this issue, the CHIRPP self-inflicted injury (CHIRPP-SI) form was co-designed with the Public Health Agency of Canada (PHAC) and piloted at a paediatric ED. The objectives of the current study are to (1) describe the SI-related information captured in three data sources: (a) CHIRPP-SI, (b) patient's medical chart, and (c) hospital administrative database, NACRS, and (2) contrast the three data sources to examine the discrepancies in capturing SI, including which specific items are and are not captured in each respective data source.

Methods

Sample

Patient recruitment

Data were collected from a paediatric ED in southeastern Ontario, Canada. We collected SI data through CHIRPP-SI which occurred with the HEADS-ED study on improving

mental health discharge planning. The flow of study enrollment can be observed in Fig. 1. ED volunteers within the patient circle of care asked potentially eligible patients/caregivers whether a research assistant may approach them to discuss participation in either study. If they agreed, the research assistant explained the two studies (CHIRPP-SI and HEADS-ED) in detail. Each study had its own consent form and consenting to either study also included agreeing to have their medical chart reviewed. For the CHIRPP-SI, specifically, the researcher asked the patient if the reason for the ED visit was due to a current SI. If the individual said “Yes”, then they/their legal guardian were asked if they wanted to participate and their consent was obtained before they received the CHIRPP-SI from the research assistant, enquiring about their most current SI event. The province of Ontario has no age restriction for consent, provided that the youth is able to understand the information; if this was not the case in this study, the caregiver provided consent on their behalf. Participants had the option to self-complete the CHIRPP-SI and complete the interview in a separate room from their caregivers.

Eligibility criteria

For inclusion in the HEADS-ED study, participants had to be (1) between ages > 5.99 and < 18 years, (2)

presenting to the ED with a mental health issue as their primary complaint (i.e., all complaints that triage identifies as involving mental health [psychosocial, emotional, and behavioural]), (3) okay with a research assistant approaching them (enquired by individuals in the hospital circle of care), and (4) proficient in English. Participants were excluded if they were (1) a Canadian Triage and Acuity Scale (CTAS) category 1, (2) directly admitted to hospital, (3) requiring intubation/paediatric intensive care unit, and (4) an involuntary hospital patient, brought in by police or on an assessment order. For the CHIRPP-SI substudy, there was the additional requirement of a SI being related to the current ED visit; however, those individuals who stated that they did not have current SI related to their ED visit formed the non-self-injury sample in the CHIRPP-SI data source.

Patient selection

A consecutive sample of patients was screened for enrollment from February 23, 2015, to September 14, 2015, Monday to Friday between the hours of 10:00 and 22:00. Prior studies on temporal trends of mental health presentations to the paediatric ED suggest that about 70% of visits occur within these hours (Ali et al. 2012; Logue

Fig. 1 Flow diagram of study enrollment

et al. 2013). Census data from the study hospital also support this finding.

Measures

CHIRPP-SI

The CHIRPP-SI is a paper tool that was either filled out by a research assistant as they interviewed the patient, or was self-completed, about the circumstances surrounding their most recent SI. The measure includes the following items: (1) When did the injury happen (date and time of day)?; (2) Did you injure/harm yourself on purpose? (yes, no); (3) Where did the injury/harm take place? (e.g., bedroom at home, bathroom at school, park); (4) What did you do to injure/harm yourself? (e.g., overdose, cut, burn); (4) What body part did you injure?; (5) Were you under the influence of drugs or alcohol? (yes, no); if yes, can you describe?; (6) Why did you hurt yourself on purpose?; (7) Do you think it is OK to ask children and youth about self-injury/harm when they come to the emergency department? (yes, no); (8) Sometimes we need to contact patients (or their guardians) for more information about an injury. May we contact you if we need additional information? (yes, no).

Medical chart

The patient's medical chart contains all information from triage to discharge from the ED and includes circumstances surrounding presentation, physician notes/diagnoses, and psychiatric/crisis intervention worker consultation information. Two research assistants reviewed all participant medical charts to identify whether SI was documented in the current ED visit. A 10% sample of all charts was selected for reliability testing.

National Ambulatory Care Reporting System Metadata

The NACRS database is generated by hospital coders who assign ICD-10 codes that correspond to patients' diagnoses in the ED. Multiple codes can be assigned to a single patient visit and are ranked based on whether they are primary or secondary diagnoses. An extraction of all mental health-related NACRS codes was requested for the study sample. Relevant ICD-10 codes were extracted for mental, behavioural, and neurodevelopmental disorders (F01–F99), SI (X60–X84, Y87.0), and events of undetermined intent (Y10–Y34) (Canadian Institute for Health Information 2015). Codes for both intentional and undetermined intents were included as SI. Due to undetermined intent self-injuries being significantly associated with subsequent ED visits for intentional inflicted

injury, undetermined intents were included as SI occurrences (Bethell and Rhodes 2009).

Statistical analysis

Participant's sex, age, triage level, psychotropic medication use, and discharge disposition were described, along with relevant measures of central tendency. A qualitative analysis was conducted to identify main themes for the reasons why youth engaged in SI. Two coders conducted independent analyses of the data. Reasons for self-harm coding categories were drawn from the literature (Martin et al. 2013). A single response may have included multiple reasons, where each coder categorized each reason into the pre-determined categories. Any disagreements were resolved through consensus. The frequency of individuals with an occurrence of SI was reported for each respective data source. Cohen's kappa statistics were reported to show the level of agreement among the three data sources and interpreted using the guidelines by McHugh (2012). To account for possible misclassification bias, patients who declined to participate in CHIRPP-SI without explicitly stating it was because they had no SI, or those who were discharged before enrollment, were excluded from primary analysis. However, a sensitivity analysis was conducted whereby these cases were assumed to have no SI and were categorized as such. The details of SI events were also described for each data source and included method of SI, bodily location injured, and place of occurrence. For those who completed a CHIRPP-SI, the proportion of individuals who were intoxicated at the time of injury, along with the proportion of individuals who thought it was okay to enquire about SI, were also reported. All analyses were conducted using IBM SPSS Statistics for Windows, version 24 (IBM 2015).

Availability of data and material The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Results

Descriptive statistics

As shown in Fig. 1, a total of 388 eligible patients were approached for participation in the HEADS-ED study and 250 (64.4%) consented to participate. The majority of the sample was female ($n = 167$, 66.8%) and the median age was 15 years (IQR = 3). The patients were triaged as emergent ($n = 10$, 4.0%), urgent ($n = 216$, 86.4%), semi-urgent ($n = 23$, 9.2%), and non-urgent ($n = 1$, 0.4%). About half of the sample were on psychotropic medication ($n = 134$, 53.6%) and 23 (9.2%) were admitted to hospital following their ED assessment. Of the 70 participants who completed a CHIRPP-SI

measure, 5 (7%) were under the influence of drugs or alcohol when they injured themselves. Overall, 63 thought it was okay to ask about SI in the ED (90%), 4 did not think it was okay (6%), and 3 did not respond (4%). A total of 53 individuals agreed that, if needed, they could be contacted for additional information (76%).

SI detection by data source

For the medical chart review, a high level of agreement between the two raters was achieved for the capture of SI (Cohen's kappa = 0.92). The three sources of SI surveillance data varied considerably. The medical chart captured the highest frequency of individuals with SI (33.6%), followed by the CHIRPP-SI (28.0%), and the NACRS database (8.4%). Table 1 features three contingency tables showing the level of agreement between the CHIRPP-SI and medical chart, the CHIRPP-SI and NACRS, and the medical chart and NACRS. The displayed results exclude those who declined to participate while also not specifying whether they did or did not self-injure ($n = 22$), as well as those who were discharged before enrollment ($n = 4$). The level of agreement between the data sources was minimal when comparing NACRS with the CHIRPP-SI with the medical chart, and moderate between the medical chart and the CHIRPP-SI. The sensitivity analysis, whereby those who declined to complete a CHIRPP-SI (without specifying self-injury status) or who were discharged before enrollment, were included ($n = 26$), showed similar results but with a weaker level of agreement between the CHIRPP-SI and the medical chart (Cohen's kappa = 0.53; 0.24–0.65).

Characteristics of SI by data source

Table 2 shows the details of the reported SI behaviour. Seven unique methods of SI were identified in the medical chart, while the CHIRPP-SI identified six and NACRS identified two. The CHIRPP-SI identified the largest number of unique body part injuries (7), followed by the medical chart (6), and NACRS (2). In relation to places of occurrence, the CHIRPP-SI captured 14 specific places where injuries occurred, relative to 6 captured in the medical chart and 0 captured in NACRS.

Identification of cases associated with a SI varied by respective data source. The medical chart captured at least one method of SI in 97.6% of individuals, the bodily location harmed in 84.5% of individuals, and the place where the injury occurred in 22.6% of individuals. The CHIRPP-SI captured the method of SI in 100% of individuals, the bodily location harmed in 98.6% of individuals, and the place of occurrence in 100% of individuals. NACRS captured at least one method of SI in 95.2% of individuals, the bodily location harmed in 90.5% of individuals, and the place of occurrence in 0% of individuals.

Qualitative themes

The CHIRPP-SI collected unique information from the individual describing the circumstances associated with the SI, including one or multiple reasons for SI. A total of 86 reasons were provided from 69 unique individuals. Six themes were identified for why youth engaged in SI, which included the following: (1) emotional regulation (58.0%) (e.g., “to relieve

Table 1 Frequency of self-inflicted injury events related to emergency department visit, from each data source

CHIRPP-SI × medical chart					Kappa (95% CI)
		CHIRPP-SI Yes	No	Total	
Medical chart	Yes	52	12	64	0.68 (0.58–0.79)
	No	18	142	160	
	Total	70	154	224	
CHIRPP-SI × NACRS					Kappa (95% CI)
		CHIRPP-SI Yes	No	Total	
NACRS	Yes	19	0	19	0.34 (0.22–0.46)
	No	51	154	205	
	Total	70	154	224	
Medical chart × NACRS					Kappa (95% CI)
		Medical chart Yes	No	Total	
NACRS	Yes	19	0	19	0.38 (0.25–0.50)
	No	45	160	205	
	Total	64	160	224	

CI confidence interval, CHIRPP-SI Canadian Hospitals Injury Reporting and Prevention Program-Self-Inflicted Injury, NACRS National Ambulatory Care Reporting System

Table 2 Frequencies of self-harm method, body part injured, and place of occurrence captured in each data source

	Medical chart (%)	CHIRPP-SI (%)	NACRS (%)
Self-harm related to ED visit?			
Yes	84 (33.6)	70 (28.0)	21 (8.4)
Self-harm method			
Cutting	54 (64.3)	50 (71.4)	4 (19.1)
Poison/ingest	23 (27.4)	19 (27.1)	16 (76.2)
Scratch	10 (11.9)	3 (4.3)	0 (0.0)
Blunt	5 (6.0)	2 (2.9)	0 (0.0)
Asphyxiation	11 (13.1)	2 (2.9)	0 (0.0)
Burn	3 (3.6)	0 (0.0)	0 (0.0)
Other (hair pulling, “attacks self”, biting)	1 (1.2)	1 (1.4)	0 (0.0)
Missing	2 (2.4)	0 (0.0)	1 (4.8)
Body part injured			
Arms/wrists/hands	52 (61.9)	40 (57.1)	3 (14.3)
Legs/thighs/hips	13 (15.5)	17 (24.3)	0 (0.0)
Internal (poisoning)	24 (28.6)	19 (27.1)	16 (76.2)
Neck	11 (13.1)	4 (5.7)	0 (0.0)
Head/face	7 (8.3)	3 (4.3)	0 (0.0)
Torso	5 (6.0)	3 (4.3)	0 (0.0)
Body (general)	0 (0.0)	2 (2.9)	0 (0.0)
Missing	13 (15.5)	1 (1.4)	2 (9.5)
Place of occurrence			
Home (total)	13 (15.5)	63 (90.0)	0 (0.0)
Own bedroom	5 (6.0)	37 (52.9)	0 (0.0)
Sibling bedroom	0 (0.0)	1 (1.4)	0 (0.0)
Parent bedroom	0 (0.0)	2 (2.9)	0 (0.0)
Bathroom	1 (1.2)	15 (21.4)	0 (0.0)
Kitchen	1 (1.2)	6 (8.6)	0 (0.0)
Living room	0 (0.0)	1 (1.4)	0 (0.0)
Unspecified	6 (7.1)	1 (1.4)	0 (0.0)
School (total)	6 (7.1)	10 (14.3)	0 (0.0)
Bathroom	1 (1.2)	1 (1.4)	0 (0.0)
Classroom	0 (0.0)	1 (1.4)	0 (0.0)
Office	2 (2.4)	2 (2.9)	0 (0.0)
Library	0 (0.0)	1 (1.4)	0 (0.0)
Unspecified	3 (3.6)	5 (7.1)	0 (0.0)
Other community (total)	1 (1.2)	4 (5.7)	0 (0.0)
Significant other’s home	0 (0.0)	1 (1.4)	0 (0.0)
Friend	0 (0.0)	1 (1.4)	0 (0.0)
Public bathroom	0 (0.0)	2 (2.9)	0 (0.0)
Outside	1 (1.2)	0 (0.0)	0 (0.0)
Missing	65 (77.4)	0 (0.0)	21 (100.0)

If self-harm method was ingestion and body part was not applicable, this was *not* deemed missing. Percentages are calculated as a fraction of the total number of unique self-injurers for each respective dataset

stress”, “I felt very upset and angry at myself”, “cause I’m depressed”); (2) social influences (17.4%), such as conflicts with family members or peers (e.g., “family issues”, “to distract people from being rude/mean”, or encouragement from others that it helps (e.g., “People talked positively about how

[it] helps”); (3) suicidal intent (15.9%) (e.g., “I wanted to kill myself”, “I wanted to die”); (4) sensation seeking (4.3%) (e.g., “wanted to get high”) and (5) obtaining services, seeking help from professionals (2.9%) (e.g., “I wanted help”); (6) other (26.1%) (e.g., “not a big fan of me”, “felt like it was the

only option”). Three youth did not provide their reason for SI (i.e., “I don’t know”; “I don’t want to write this down”), and one left the question blank.

Discussion

This study sought to compare discrepancies in how paediatric ED presentations associated with SI are captured among different data sources, including medical chart data, hospital administrative data (NACRS), and ED survey data (CHIRPP-SI). Overall, the medical chart captured the highest number of unique individuals presenting to the ED with a current SI concern, followed by the CHIRPP-SI, and last the hospital administrative data. CHIRPP-SI data had the most complete details of the SI events, including the method of injury, the bodily part injured, and the place of occurrence.

An explanation for the low capture rate in NACRS is that the SI event requires medical attention in order to be coded (Canadian Institute for Health Information 2015). Due to this, NACRS likely only identifies more severe forms of SI. Despite an adolescent reporting SI as related to their ED visit, the occurrence will not be identified in the hospital administrative data. The lower capture rate of the CHIRPP-SI, relative to the medical chart, may be explained by the research process. Oftentimes when collecting data, the patient presented with their family and may have denied the injury was self-inflicted because they did not want to disclose in front of them. There is also the possibility that the patient did not wish to discuss details of SI with someone outside of their circle of care and denied its occurrence. Last, the CHIRPP-SI was collected in tandem with another research study (HEADS-ED), each with its own consent documents, possibly creating another barrier to participation. Globally, the CHIRPP-SI, being a direct report from the patient’s perspective, improves the accuracy of the measure relative to NACRS which is many steps removed from the patient experience and intended for administrative purposes.

The highest level of agreement between data sources was observed between the medical chart and the study survey data, but consistent with other literature, the agreement between the three data sources was poor-moderate (Randall et al. 2017). The level of agreement between NACRS and either of the medical chart or the study survey data was poor, primarily due to the low capture rate in NACRS. Similar to other research findings about healthcare surveillance, the current findings support the use of multiple data sources, to capture the most complete details of ED visits (Kuramoto-Crawford et al. 2017). These findings have implications for public health, research, and clinical practice.

PHAC has used NACRS as a source of suicide-related data to conduct surveillance and reporting (Skinner et al.

2017). From a public health perspective, this study demonstrated that NACRS may be less reliable than other data sources and could result in an underestimation of the resources needed to address SI healthcare in paediatric settings. The unreliability of NACRS to capture cases of SI highlights the importance and value of CHIRPP as a complementary data source, but also through the comparison of the CHIRPP-SI and the medical chart offers support for a multiple data source approach for evidence building and decision-making.

The disparity between various forms of SI surveillance observed also raises questions about research findings. A breadth of research has looked at SI in paediatric populations; however, given what the current study has found, this research may underrepresent the true number of SI presentations to the ED. For example, research that uses NACRS, or similar hospital administrative data to group cases, may be introducing study error which could ultimately lead to biased findings and further supports the use of multiple data sources for identifying true cases of SI.

Clinically, this study emphasizes that if adolescents are not asked about their SI behaviour, they may not divulge this information on their own, as we identified cases by using the CHIRPP-SI that were not identified in the medical chart or NACRS. Knowing the serious outcomes associated with SI, it is important to enquire about these behaviours with all mental health patients presenting to the ED. The CHIRPP-SI is a useful prompt for enquiring about SI and also provides details about how and where patients are harming themselves, which could be useful for safety planning.

Strengths of this study include the use of three unique data sources for identifying SI events. A high level of agreement between reviewers was observed when extracting data from the medical chart, which strengthens the estimate of SI events observed. Limited research has compared SI surveillance sources in paediatric populations.

Limitations of this study include the sample size and potential selection bias since the data were not collected 24 h a day, 7 days a week. Furthermore, due to the recruitment process, the current study assumes that all SI cases are a subset of mental illness presentations, possibly missing cases of SI not classified as a mental illness visit. Additionally, the recruitment process also restricted approaching involuntary patients for enrollment. While limited research has looked into involuntary ED patients, research has shown that involuntary admitted patients have a higher risk of suicidality than those admitted voluntarily, suggesting that SI cases in this study may have been missed (Persi et al. 2016). Due to many enrollments taking place in front of caregivers, there is also the possibility of underreporting bias and providing desirable responses. In relation to the CHIRPP-SI, however, this was attenuated by allowing the participant to self-complete the form. Last, the inclusion of undetermined intent NACRS codes

as SI may contribute to misclassification bias; however, considering both the medical chart and CHIRPP-SI identified these cases as SI, this bias is mitigated.

Future research will need to examine the feasibility of using the CHIRPP-SI without a research assistant being involved. This may help to better inform the implementation of the CHIRPP-SI as a standard tool in hospital EDs. It would also be worthwhile to explore how the CHIRPP-SI can be integrated into the clinical assessment, offering potential targets for the clinician to address. Additionally, PHAC is currently in the process of conducting an impact assessment of CHIRPP-SI data to determine the best method for integrating these findings into the existing CHIRPP program in order to surveil populations beyond just those presenting with a mental health concern. Finally, future research should aim to identify a gold standard in the field of SI, as currently no such metric exists to identify true cases (Hawton et al. 1998; Thomas et al. 2013; Mars et al. 2016). Identification of such a standard would offer the opportunity to use classification tests to examine the sensitivity and specificity of tools such as the CHIRPP-SI.

Conclusion

In conclusion, this paper highlights the disparities among different sources of data, in relation to the capture of SI in the paediatric ED. It is important at a public health, research, and clinical level to know exactly what is and what is not captured in specific databases, so that informed decisions can be made in relation to which data sources best address stakeholders' needs. The findings highlight the need for the consolidation of multiple data sources in order to best capture the true rate of SI. The study also highlights that if greater details beyond just the rate of SI events are to be identified, patients must be asked and surveillance tools such as the CHIRPP-SI may offer a standardized process for doing so. Finally, this research highlights that hospital administrative data can greatly underestimate SI cases.

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Compliance with ethical standards

Conflict of interest R. Skinner and S. McFaull are employees of PHAC. The other authors declare that they have no competing interests.

Ethics approval and consent to participate The study received hospital Research Ethics Board Approval (CHEOREB#15/113X). All procedures performed were in accordance with the ethical standards of the

institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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