A needle in a haystack: The use of routinely collected emergency department injury surveillance data to help identify physical child abuse

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Word Count:
Text: 4462
Abstract: 149

Keywords*:* Child maltreatment, injury surveillance, emergency department, physical abuse

ABSTRACT:

A retrospective, descriptive analysis of a sample of children under 18 years presenting to a hospital emergency department (ED) for treatment of an injury was conducted. The aim was to explore characteristics and identify differences between children assigned abuse codes and children assigned unintentional injury codes using an injury surveillance database.

Only 0.1% of children had been assigned the abuse code and 3.9% a code indicating possible abuse. Children between 2-5 years formed the largest proportion of those coded to abuse. Superficial injury and bruising were the most common types of injury seen in children in the abuse group and the possible abuse group (26.9% and 18.8% respectively), whereas those with unintentional injury were most likely to present with open wounds (18.4%).

This study demonstrates that routinely collected injury surveillance data can be a useful source of information for describing injury characteristics in children assigned abuse codes compared to those assigned no abuse codes.

INTRODUCTION

The true incidence of physical child abuse or "intentional injury" in Australia and other countries is difficult to estimate. In 2009-2010 there were 31,000 substantiated cases of child maltreatment, which includes inflicted injury, within the child protection system in Australia (Australian Institute of Health and Welfare (AIHW), 2011). This figure is known to under-represent the extent of the problem of child maltreatment in this country and more work is needed to better understand risk and protective factors. This is particularly so for children presenting to health services for treatment of their injuries.

The emergency department (ED) plays a key role in recognition of child physical abuse. Children frequently present to the ED with minor injuries prior to abuse being identified (Keshavarz, Kawashima, & Low, 2002;),(Rifkinson-Mann, 2005).Children admitted to hospital for abuse are more likely to present via ED than any other route (Rovi, Chen, & Johnson, 2004;),(Keshavarz, et al., 2002). At least one pre-school child in six attends an ED due to injury, and between 1% and 10% of these children have suffered physical abuse (Benger & Pearce, 2002). Moreover, child victims of abuse have been found to present frequently to the ED before abuse is recognised. For example, one study reported that abuse and neglect cases had presented, on average, 4.5 times to a New York ED before child abuse was recognised and identified. (Keshavarz, et al., 2002).

Research has demonstrated that parents may attempt to conceal the real reason for presentation to the ED. Keshavarz et al found that 10% of patients presenting to an ED had a chief complaint unrelated to the stated reason for the child's presentation to the department and that the child abuse diagnosis was made following investigations for other ailments. 11% of cases had a history significant for asthma {Keshavarz, 2002 #807; }. Often, infants are

presented to an ED with vague symptoms that prove to be head injury {Rifkinson-Mann, 2005 #889}.

ED data is a critical injury surveillance tool to inform injury prevention initiatives internationally. ~~.~~ Quigg, Hughes, & Bellis, (2012) demonstrated the value of collecting and sharing ED based injury surveillance with key stakeholder agencies in the reduction of violence-related and alcohol-related injury presentations. In Queensland, Australia, specific injury surveillance data are collected from a convenience sample of participating hospital EDs and collated by the Queensland Injury Surveillance Unit (QISU) for injury prevention and advocacy purposes. Initial injury presentation data are collected, regardless of the severity of injury. Other trauma databases collect injury information but are restricted to more severe cases or only those who are admitted for treatment. To date, data regarding unintentional injury has been the main type of data utilised from QISU, with little focus on intentional injury~~To date, QISU has data has largely only been accessed in terms of unintentional injury. only.~~

The aim of this study was to examine emergency department injury surveillance data in Queensland, Australia to ~~identify~~ examine and compare characteristics of children who were identified as abused or not abused within the coded surveillance data.

METHODS

QISU data are collected at triage, by triage nurses, for all patients who present to an ED for the initial treatment of an injury. Details of injuries where patients represent for follow-up or complications due to that injury are not collected. There are no unique identifiers in Queensland Health data that are consistent across multiple sites. Where a child presents to more than one hospital for treatment of the same injury there is a possibility that there could

be multiple entries related to the same injury, though triage staff are trained to collect information only on the initial presentation.

The injury surveillance screen is embedded in the ED patient management software and activated when the triage nurse identifies a presentation as due to injury. The triage nurse questions the child and/or parent/caregiver to identify the details of the injury event. (All Queensland nurses undertake compulsory annual updates on the identification and reporting of child abuse to maximise the likelihood of recognising abuse related ED presentations or hospital admissions.)

Relevant National Data Standards for Injury Surveillance Level 2 (NDS-IS II), (National Injury Surveillance Unit (NISU), 2010) codes are then selected from the injury surveillance screen. Triage nurses receive training in the use of NDS-IS II. This training ~~and all nurses undertake compulsory annual updates on the identification and reporting of child maltreatment since mandatory reporting legislation (introduced in August 2005) requires nurses to report suspected abuse and neglect cases to child protective services. Included in the training for~~ nurses includes information on ~~is~~ how to capture the injury intent – that is, if the injury is considered to be ~~accidental~~ unintentional or intentional. Coded variables also include details on the mechanism and external cause of the injury, place of injury occurrence, activity when injured and any object/s ~~object~~ associated with the injury. The treating physician assigns a three character diagnosis code from the International Classification of Diseases and Related Health Conditions 10th Revision Australian Modification (ICD-10 AM) diagnosis code when the patient is discharged. If this code is an injury diagnosis code, and if the injury surveillance screen has not been completed at triage, the screen is activated for the physician to complete. This enables capture of the few cases that are not identified as an injury at triage.

The coded data from the injury surveillance screen is amalgamated into a file with the assigned triage level, demographic details, discharge details, ICD-10-AM discharge diagnosis

code, date and time of injury, date and time of ED presentation and the textual description of the presenting problem. These data items are extracted from the ED management software by Queensland Health and provided to QISU in an electronic format. Trained QISU coders clean the data by reviewing each case and, where clear discrepancies exist between the coded data and the presenting problem text, recode the data according to the presenting problem information. Where the text provides no contradictory information or no further information, the assigned codes are not changed. These data are subsequently ~~used~~ examined to inform evidence-based state injury prevention initiatives and policy development.

Hospital participation in the QISU data collection is voluntary and relies on the willingness to participate by the ED at each site. Since 1998 between 12 and 20 hospitals have submitted injury surveillance data with 12 hospitals providing data in 2003, 14 in 2004 and 16 in 2005-2006. Between 2003 and 2006 a total of 147,964 records were submitted, 84,765 of which related to children under the age of 18 years. QISU estimates that these data represent approximately 25% of all injury events presenting for treatment to a Queensland Health hospital ED (Swaminathan, Baker, & Scott, 2010). Some sites have consistently good ascertainment rates over long periods of time and others have demonstrated ascertainment rates that vary from year to year. Generally speaking, QISU ascertainment rates are higher in hospitals where the staff see the importance of the data collection and so are prepared to collect it accurately and reliably. Because of the variability in the data collections across sites and time, the QISU data may be an underestimate of Queensland injury cases presenting to EDs, and therefore, may also underestimated causes of abuse.

Capture of injury intent by the NDS-IS variable ‘human intent’ describes the role that human intent played on the injury event. The available codes are described in Table 1.In circumstances where the injury intent is unclear for any reason, including circumstances there the triage nurse is suspicious of the injury or concerned that the injury details are inconsistent

with unintentional injury, the triage nurses are trained to assign a code of undetermined, other, or intent not specified to the injury event.

~~In order to be able to~~To identify and analyse cases of abuse captured in the QISU data, intent codes were categorised into 3 groups 'Abuse coded' 'Possible abuse coded' and 'No abuse coded' for comparison purposes. The NDS-IS code for 'Possible or stated maltreatment by parent' was considered definitive for abuse and cases with this code assigned were categorised into the 'Abuse coded' group. 'Possible abuse' were those cases where the intent could not be clearly determined and 'event of undetermined intent', 'intent not specified', 'maltreatment by spouse or partner', 'other or unspecified assault', 'other specified intent' and 'sexual assault by body force 'were included in this group. Where the presentation was due to sexual assault by a parent or caregiver in a child, the intent of 'Possible or stated maltreatment by parent' is assigned so these cases were grouped with the abuse coded group. The perpetrator and circumstances of the 'Alleged assault (sexual) – by bodily force' includes many cases that are not defined as physical child maltreatment per se (such as sexual assault by strangers) and therefore could not be grouped with the 'Abuse coded' group. These were included with 'Possible abuse'. Cases assigned an NDS-IS code of 'accident; injury was not intended' 'Possible or stated self harm', 'Legal intervention' or 'Adverse affect, complication of medical or surgical care' were categorised into the 'No abuse coded' group as shown in Table 1.

Insert Table 1

Ethics approval from Queensland Health and Queensland University of Technology Human Research Ethics Committees were obtained for this study.

Analysis

A descriptive analysis of children under 18 years who presented to a QISU participating hospital ED for treatment of an injury between 1 January 2003 and 31 December 2006 was conducted. ~~This four-year range was chosen to explore the effects of mandatory reporting of suspected child abuse and neglect legislation for nurses, enacted in August 2005, which was one of the broader aims of a larger study for which this work is a sub-component.~~ Frequencies and proportions were used to describe the characteristics and potential risk factors for injury among these children. Trends and population rates could not be calculated because of the variability in the data collection due to varying ascertainment rates across EDs over the years and a lack of certainty around the population denominator for hospital catchment regions.

RESULTS

Between 2003 and 2006 84,765 children younger than 18 years of age presented to a QISU participating hospital for treatment of an injury. Males represented the larger proportion of the sample (n=51,035, 60.2%).) as did children aged between ~~2~~two and five years (n= 30,661, 36.2%)~~.~~.

Table 2 shows the largest group of children was those categorised as 'No abuse coded' with 96% of injuries coded to this group 3.9% (n=3303) of cases were coded to the 'Possible abuse coded' group and 0.1% (n=108) to the 'Abuse coded' group. Males represented 57% of those children with an abuse code. Children between the ages of two and five years formed the largest proportion for the 'Abuse coded' group (n=36, 33.3%) and those between 15 and 17 years of age represented the smallest proportion (n=14, 13%). Children between the ages

of 10 and 14 years of age were most commonly coded to the 'Possible abuse coded' group (n=1,026, 31.1%). and those between two and five years comprised the largest proportion of the 'No abuse coded' group (n=29,814, 36.6%)

~~with males representing the larger proportion of the sample (n=51,035 60.2%). The largest proportion of children were aged between 2 and 5 years (n= 30,661, 36.2%).~~ The mean age of all children in the 'Abuse coded' group was ~~6~~ six years for both males and females~~, .~~ . In the 'Possible abuse' group, the average age of females (nine~~9~~ years) was younger than males (11 years), and in those categorised as 'No abuse' the average age of females was eight~~8~~ years and for males was nine~~9~~ years.

Hospital localities were grouped by geographic region and type of hospital (urban, regional and remote, and specialist paediatric), with the largest proportion of children presenting to paediatric hospitals (63.5%) in the QISU sample, regardless of coded abuse group, followed by regional and remote hospitals (26.5~~%)~~%) and urban hospitals (10%). Similar geographic patterns were ~~seen~~ observed for males and females. ~~Table 2 shows the largest group of children was those categorised as 'No abuse coded' with 96% of injuries coded to this group 3.9% (n=3303) of cases were coded to the 'Possible abuse coded' group and 0.1% (n=108) to the 'Abuse coded' group. Males represented 57% of those children with an abuse code. Children between the ages of 2 and 5 years formed the largest proportion for the 'Abuse coded' group (n=36, 33.3%) and those between 15 and 17 years of age represented the smallest proportion (n=14, 13%). Children between the ages of 10 and 14 years of age were most commonly coded to the 'Possible abuse coded' group (n=1026, 31.1%). and those between 2 and 5 years comprised the largest proportion of the 'No abuse coded' group (n=29814, 36.6%)~~

INSERT TABLE 2

The external cause of injury varied across intent classification. The most frequently reported external cause of injury overall was 'Fall' (n=32,653, 38.5%) but the frequency varied by coded abuse group (Table 3). Cases in the 'Abuse Coded' and 'Possible abuse' groups were more commonly ~~coded~~ classified ~~to~~ as 'Struck by or collision with person' (n=90, 83.3% and n=1,744, 52.8% respectively). No case in the 'Abuse coded' group had an external cause of injury for transport related, animal related, poisoning, machinery, drowning, electricity or firearm causes.

INSERT TABLE 3

The activity being undertaken at the time of injury also varied by coded abuse group. Cases assigned to the 'Abuse coded' group were most commonly ~~coded to~~classified as 'Unspecified activity' (34.3%) followed by 'Resting, sleeping, eating, other personal activity' (23.1%). No case in the 'Abuse coded' group was reported as involved in 'Sports activity', 'Engaged in formal educational activity', 'Working for an income' or 'Other type of work'. In the 'Possible abuse coded' group, unspecified activity again ~~formed~~ comprised the largest proportion (28.8%). In those children where there was no abuse coded the most common activity was 'Leisure activity' (43.9%) followed by 'Sports activity' (13.2%). Fewer cases in the 'No abuse' category were ~~coded to~~classified as 'Engaged in formal educational activity' (3.5%) than those in the 'Possible abuse coded' group were similar in number to cases ~~coded~~ classified as 'Being nursed or cared for' (6.3%).

The most commonly ~~coded~~ classified object associated with injury in the total sample, regardless of coded abuse group was 'Natural object or animal' which includes people (22.2%). ~~However, I~~in the 'Abuse Coded' group, the proportion of 74.1% for 'Natural Object or animal' was much larger than the 47.4% in the 'Possible abuse coded' and 21.1% in the 'No abuse coded' groups. Approximately 8.9% of cases coded to the 'No abuse' coded group

and 2.3% in the ‘Possible abuse coded’ groups were injured by furniture, 5.7% and 2.8% respectively by chemical substances and 0.6% and 1.1% by appliances in the ‘Possible abuse’ and ‘No coded abuse’ groups.

The most common nature of injury overall was open wound (18.4%). In cases coded as ‘Possible abuse’ and ‘Abuse’, the largest proportions were ~~coded~~ classified as~~to~~ ‘Superficial injury’ (14.8% and 26.9% respectively). Fracture was the next most commonly ~~coded~~ classified nature of injury overall (17.7%). There were 17.8% of the ‘No Abuse’ group and 14.6% of the ‘Possible Abuse’ group who presented for treatment of a fracture. The smallest ~~proportion of cases were~~proportion of cases was ~~coded~~ classified to ‘Asphyxia or other threat to breathing (not drowning)’ with only 30 cases assigned this ~~code~~classification, none of which were coded to the ‘Abuse Coded’ group.

The most commonly injured body region for cases both in the ‘No abuse coded’ (16.1%) and ‘Possible abuse’ (17.0%) groups was the head. The ~~code~~ classification ‘Body region not required’ may be applied for those injuries or circumstances where there are systemic or multiple injuries (i.e. drowning, multiple injuries) and this formed the largest proportion (30.6%) in the ‘Abuse coded’ group, followed by ‘Unspecified body region’ (17.6%). Similar to the ‘Abuse coded group’, 15.3% of cases in the ‘Possible abuse’ group were ~~coded~~ classified to ‘Body region not required’ and 15.1% to face. Table 3 shows that in cases with an abuse code, injuries due to being ‘Struck by or against’ were spread across all body regions, with the largest proportion (19.3%) being to the head. All head injury in this group was ~~coded~~ classified to the ‘Struck by or against’ external cause category. Almost 50% of all ‘Abuse coded’ injury, was ~~coded~~ classified to the dump category ~~of~~ ‘Not required/not specified’, which was higher than for either the ‘Possible abuse’ (22.9%) or ‘No abuse’ (14.5%) categories.

~~Table 4~~Table 4 also shows that injuries in the 'No coded abuse' and 'Possible abuse coded' groups were distributed across body regions and external causes of injury with no external cause of injury being the sole cause of injury in any body region. In the 'Possible abuse coded' group injuries to the hand/arm/shoulder were the sites affected by most external causes of injury, regardless of the cause of injury, and for cases in this group with a head injury, the largest proportion (n=356, 64%) were due to 'Struck by or against'.

Falls were the most commonly ~~coded~~ classified cause of injury in cases with no coded abuse and this was true for most injuries to most body regions except neck (injuries in this group were most commonly due to 'Struck by or against), multiple injuries (transport) or those ~~coded~~ classified to the 'Other or unspecified' dump code as shown in Table 4~~Table 4~~.

INSERT TABLE 4

Over one third (37.6%) of children presented to the ED for treatment of the injury within an hour of the injury occurring. Importantly, however, there were 2,089 (2.5%) children who were presented for treatment more than 5 days after the injury had reportedly occurred. There were 60 (2.9%) children in this group who were coded to either the abuse (0.14%) or possible abuse group (2.7%).

The largest proportion of cases were ~~coded~~ classified ~~to~~ with the 'Semi-Urgent' triage category (59.5%) and this was similar across all abuse groups (59.6%, 56.8% and 43.5% for 'Abuse coded', 'Possible abuse coded' and 'No abuse coded' respectively). The smallest ~~proportion of cases were~~proportion of cases was ~~coded~~ classified to the most severe triage category of 'Resuscitation' with 0.4% of injured children requiring resuscitation. Of the 298 cases ~~coded~~ classified to the resuscitation group, 20 (6.7%) were coded to the abuse coded group (0.34%) and the possible abuse group (6.4%) with the majority of injuries due to being 'struck by or against' something. This contrasts with the 'Possible abuse' category where the

majority of injuries were due to ‘poisoning’ or ‘transport’ incidents. For cases in the resuscitation category with no abuse coded (93.3%), most sustained facial injuries in transport-related incidents. There were 2 children (1 drowning and 1 transport related, both coded to ‘No abuse’ group) who died in the ED.

Most children (80.8%) were discharged from the ED following treatment with similar proportions identified across all abuse groups. Proportions of children who were admitted for further treatment (n=12,997, 15.3%) varied across coded abuse groups with 15.3% of the no abuse coded group and 16.3% of the possible abuse group admitted and 30.6% of the abuse coded group admitted for further treatment. -There were 3.7% of children in the ‘Abuse coded’ group, all coded to the ‘struck by or against’ external cause category who did not wait for treatment following presentation at the triage desk. In those coded to the ‘Possible abuse’ group, of the 103 children (3%) who did not wait, 70% were coded to the ‘struck by or against’ category.

DISCUSSION

Few studies have investigated patients with injuries presenting to an ED for treatment and compared intentional with unintentional injuries (Guenther, Knight, Olson, Dean, & Keenan, 2009; McKinney, Lane, & Hickey, 2004; O'Donnell, Nassar, Jacoby, & Stanley, 2011; Palazzi, Girolamo, & Liverani, 2005; Spivey, Schnitzer, Kruse, Slusher, & Jaffe, 2009; Wright & Litaker, 1996).

This study found that only 0.1% of all children reporting to a QISU participating ED were assigned to a category for abuse and 3.9% to a category indicating possible abuse. This is a smaller percentage than other similar research using the ED population, with O’Donnell identifying 0.3% in a Western Australian (WA) study associated with maltreatment

(O'Donnell et al., 2011) and Spivey et al (2009) identifying 2% of their sample as being suspicious for maltreatment(12).

This study found one third of children in the abuse group were between the ages of 2 and 5 years, forming the largest proportion of those with coded abuse, with those between 15 and 17 being the smallest proportion (13%) within that group. Other research has found children under 12 months to be the age group most at risk (Spivey, et al., 2009) and in WA those under 12 months and those over 12 years had the formed the greatest proportion of abused children (O'Donnell, et al., 2011). The difference between our results and those in WA, particularly within the less than 12 month age group may be due to our sample being derived from an injury surveillance system, rather than all maltreatment and injury cases. For example, children with shaken baby syndrome often present with vague symptoms (Ettaro, Berger, & Songer, 2004~~),(~~Karandikar, Coles, Jayawant, & Kemp, 2004). The diagnosis for shaken baby syndrome relies on sophisticated assessment undertaken over a few days which is not possible in the ED setting. The WA study included children with the T74 Maltreatment code, which includes neglect as well as physical abuse. However, in our study only those children who presented to an ED for treatment of an injury were included. In some cases the injury may not be identified during the ED assessment. ~~If the ICD discharge diagnosis code is an injury code, the surveillance screen would be completed on discharge, however, the ICD discharge codes available for selection in the software in the ED, are a subset of all ICD codes and do not include any external cause codes. Therefore I~~in circumstances where a parent describes vague symptoms and no trauma is identified as the principal diagnosis, the injury screen is unlikely to be completed and the case would not be included in the QISU data. This could result in an under-identification of neglect for those presentations where ~~the for~~ the child was assessed for maltreatment but did not ~~requiring~~ require treatment of an injury. Some circumstances relating to sexual abuse may also be missed.

Superficial injuries and bruising were the most common types of injury seen in children who were coded to the abuse and the possible abuse groups (26.9% and 18.8% respectively). On the other hand those coded to unintentional injury were most likely to present with open wounds (18.4%). This is similar to previous research relating to a group of admitted patients in ~~QLD~~ Queensland where children who were assigned codes based on documentation indicating contusions on the extremities where documented were 12 times more likely to link to a child protection record than other children (McKenzie, Scott, Fraser, & Dunne, 2011). Also, research by Spivey et al (2009) found the most common injuries in maltreated children to be open wounds, contusions and superficial injury ~~(Spivey, et al., 2009).~~ Wright, on the other hand found the most common inflicted injury for admitted patients with maltreatment coded was to internal organs (Wright & Litaker, 1996).

Being struck by or colliding with a person or object was the most common injury mechanism for children coded to the abuse and possible abuse groups (83.3% and 52.8% respectively). This is similar to results from another study where one of the most common injuries was being struck by or against for the sample coded as maltreated (Spivey, et al., 2009). Those coded to the no abuse group were more likely to present following a fall (39.8%).

In this study, nearly twice as many children in the abuse group (36.1%) were admitted to hospital after their ED attendance than those in the no abuse group (19.2%). This is slightly higher than reported in Western Australia where ~~1/5~~one in five maltreated children were admitted (O'Donnell, et al., 2011). This difference could be due to a number of reasons including higher injury severity in Queensland requiring more admissions than in WA or admission practices within hospitals where protocols in Queensland Hospitals require admissions for assessment where a diagnosis of maltreatment is suspected. Another possible explanation for the higher Queensland admission rates may be due to differences in practices or policies of child protection officers~~/~~ and/or departments between Queensland and WA

when maltreatment is identified in a hospital setting. One jurisdiction may be more inclined to leave the child in hospital for further assessment and/or the availability of temporary out of home care may vary across jurisdictions. There is no way to determine a definitive answer to this question within the scope of the current study.

If the injury is due to maltreatment, families may not disclose or may even attempt to conceal the real reason for an ED visit (Paavilainen et al., 2002). The determination of intentionality of an injury event in childhood injury, particularly in very young children, is difficult. Clinicians may have to rely on child or parental behavioural clues, the type of injury, the history (and its consistency) given by the parent, the severity of the injury relative to that history and the developmental stage of the child. This study may provide assistance to health professionals trying to determine injury intentionality by providing population-based information on the nature of intentional and unintentional injury, and serve as a reminder to consider maltreatment in the diagnosis of any childhood injury.

Of particular concern are the 4 children (3.7%) who were coded to the abuse group but left the ED before any treatment. The proportion of children who did not wait for treatment was highest for the abuse group compared to the 2.2% and 2.1% of no abuse and possible abuse coded groups who did not wait for treatment. Though numbers are small, this finding is concerning because it suggests that despite concerns about maltreatment being identified, these children were allowed to leave the department without further assessment or treatment. There was no other literature identified where this was discussed. Consideration should be given to ensuring ED policies, including triage, prevent these children from leaving without a complete assessment, including consideration of a definitive diagnosis of maltreatment, with treatment of their injury and, where appropriate, referral or reporting to appropriate child protection authorities.

Results from this study are qualified by a number of limitations. QISU coded data is primarily collected at triage, before a complete assessment of the child is conducted and the data are not updated to reflect additional information gleaned during the ED assessment. Given abuse is most likely to be determined during the more complete assessment, QISU data is likely to underestimate the true extent of maltreatment intent and overestimate unintentional intent.

Emergency department participation in QISU data collection is made on a voluntary basis, and there may be characteristics associated with those hospitals that choose to participate that could affect the generalisability of the results, but it is beyond the scope of this study to explore this further. Data collection activity can vary from nurse to nurse and shift to shift. QISU ascertainment rates vary from 70% through to 94%, with large paediatric hospitals consistently collecting in excess of 80% of childhood injury presentations (Harrison, Carswell, Vardon, & Barker, 2010). The reasons for the high ascertainment rates in paediatric EDs are not clear but could be due to the commitment of staff working in those departments who see the value in data collection to inform injury prevention initiatives.

While ED injury data is a rich source of information, the primary concern of ED staff is patient care. When the department is particularly busy or if seriously ill patients present for treatment, triage staff may not code details of the injury event correctly. At such times variables may be defaulted to 'dump' codes of 'other or unspecified' categories to speed the triage process. Identification of intentional injury in ED surveillance data is further complicated if the data are collected at ~~triage. Parents are unlikely to disclose abuse during the busy, public triage process.Despite~~triage. Despite this, validation studies of ED surveillance data conducted in Western Australia and Queensland have found that the intent code is the most reliable variable with agreement between coders and a gold standard in over

90% of cases (Gillam, Meuleners, Versluis, Hendrie, & Sprivulis, 2007; Hockey, Horth, & Pitt, 2000).

In variables where 'other or unspecified' codes formed a large proportion of the coded data, the results may be influenced more by a loss of information than if more specific information was available for analysis. However, if intent is reliably coded in 90% of cases as suggested by Hockey et al (Hockey, et al., 2000), results for the abuse group would be stable.

Another consideration is that due to the large numbers of children in the 'No abuse coded' group, statistical comparisons using Chi Squared analyses could not be performed with any reliability. Further research designed to consider ED medical records and validate the assignment of cases to the coded abuse group using child protection data is important.

Information about the Indigenous status and postcodes were unable to be analysed due to ethical and privacy constraints, and hence researchers could not investigate the effects of geographic location or cultural status further.

Despite these limitations, this study demonstrates that routinely collected injury surveillance data can be a useful source of information for describing injury characteristics in children assigned intentional injury codes compared to those assigned to unintentional injury codes. The similarity between children coded to the abuse group and those coded to the possible abuse group suggests difficulty in certainty in identification of maltreatment related injury and therefore less specific documentation which results in less certain code assignment.

Further investment into improvements in routinely collected health data for trend analysis and to help identify risk factors associated with maltreatment would enable a better understanding of the magnitude of child maltreatment related injury.

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