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Pediatric Intensive Care Unit Forensic Cases Study: 7 Years Profile in a Tertiary Hospital in Indonesia

دراسة حالات جنائية بوحدة العناية المركزة للأطفال بمستشفى مختص بإندونيسيا: سِجل لحالات جُمعت خلال سبع سنوات

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Abstract

The pediatric forensic case study encompasses all pediatric cases with potential legal implications, including violence, poisoning, and drowning. While many of these cases receive initial treatment in emergency departments (ED), certain patients are admitted to pediatric intensive care units (PICU) due to poor outcomes. This study aims to determine the profile of pediatric forensic cases in the PICU of a tertiary hospital in Indonesia. This descriptive-observational study used medical records of PICU patients in a tertiary hospital in Indonesia from 2017 to 2023 with a total sampling technique. Among 51 samples obtained, the majority of cases involved violence (78.4%), followed by fracture as the most common injury (29.4%), and equal distribution between chemical substances and pesticides in poisoning cases (5.9% each). Most of the cases in this study occurred unintentionally (93.3%). Remarkably, this study is the first of its kind in Indonesia and holds the potential to inform legal frameworks.

Keywords: Forensic science; Pediatric forensic case; Clinical forensic; Type of injury; Type of poison; Violence.

المستخلص

تشمل هذه الدراسة الحالات القضايا الجنائية المتعلقة بالأطفال التي لها مضامين قانونية محتملة، بما في ذلك العنف والتسمم والغرق. في حين يتم علاج العديد من هذه الحالات في البداية في أقسام الطوارئ، يتم إدخال بعض المرضى إلى وحدات العناية المركزة للأطفال (PICU) بسبب سوء النتائج. تهدف هذه الدراسة إلى تحديد ملامح الحالات الجنائية المتعلقة بالأطفال في وحدة العناية المركزة للأطفال في مستشفى مختص بإندونيسيا.

استخدمت هذه الدراسة الوصفية - الراصدة سجلات طبية لمرضى وحدة العناية المركزة للأطفال في مستشفى مختص بإندونيسيا من عام 2017 إلى 2023 باستخدام طريقة أخذ عينات كلية. من بين 51 عينة تم الحصول عليها، شملت معظم الحالات العنف (78.4٪)، تليها الكسور كأكثر الإصابات شيوعًا (29.4٪)، وأظهرت توزيع متساوٍ في حالات التسمم بالمواد الكيميائية والمبيدات الحشرية (5.9٪ لكل منهما). وقد حدثت معظم الحالات في هذه الدراسة عن غير قصد (93.3٪). تجدر الإشارة إلى أن هذه الدراسة هي الأولى من نوعها في إندونيسيا وتشكل فرصة لتَعَرُّف الأطر القانوني عليها.

الكلمات المفتاحية: علوم الأدلة الجنائية، حالة إصابة جنائية لأطفال، الأدلة الجنائية السريرية، نوع الإصابة، نوع السم، العنف.

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1. Introduction

Children are categorized as vulnerable due to their lack of cognitive, physical, and emotional ability. Vulnerability makes them suffer more injury damage than other age groups, and they tend to be the victims [1]. This injury (including violence, drowning, and poisoning) is the third of five causes of death in 5-29 years old [2]. Risk factors of injury in children are their posture and behaviours, such as children's tendency to put foreign things into their mouths [3].

A study that was conducted in the Emergency Department of Children's Hospital of Fudan University China by Gong et al. [4] stated that childhood injury commonly caused by fall (72.2%), sport (9.3%), and foreign body (6.4%), while Dave et al. [5] stated that the most common causes of childhood injury were fall (44.3%), traffic-accident (21.3%), and animal attack (17%). Besides injury, poisoning was the cause of death in 45,000 children and under 20-year-old young people annually [3]. Dai et al. [6] in a study conducted in South China, stated that pesticide (37.5%) is the most common substance ingested in acute poisoning, followed by drugs (27.3%) and food (9.2%).

Childhood injury and poisoning cases can be forensic cases if they were caused by accident, abuse, or alleged victim of a criminal offence based on other clues [7]. While a doctor has to treat them as an emergency patient in the emergency room (ER), recording of the forensic aspects should be done by a doctor so it can be processed to the court if there is a request for expert opinion [8,9]. The recording of cases is not limited to ER. However, it includes paediatric intensive care unit (PICU) patients with more severe conditions that need to be evaluated intensively to prevent their deaths [10,11].

A study conducted on 220 children enrolled in the PICU of Bakırköy Dr. Sadi Konuk Training and Research Hospital Turkey in 2019 showed that 71.82% of patients experienced poisoning, and the

Table 1- *Characteristics of pediatric intensive care unit forensic case patients*

Characteristic (Age)	Total (f)	(%) Percentage
Infants (1 month-11 years 11 months 29 days)	4	7,8%
Toddler (1-4 years 11 months 29 days)	10	19,6%
Preschoolers (5-5 years 11 months 29 days)	3	5,9%
Child (6-9 years 11 months 29 days)	16	31,4%
Teenager (10-18 years old)	18	35,3%
Gender		
Male	27	52,9%
Female	24	47,1%
Regional Origin		
Padang City	16	31,4%
Outside Padang City	35	68,6%
Total	51	100%

rest experienced physical trauma [12]. A similar study conducted in Turkey found 153 forensic cases in the PICU, with the most common causes being poisoning/suicide attempts (79.1%), fall from height (5.2%), and child abuse (5.2%) [9].

This study aims to evaluate the profile of the PICU forensic case of Dr. M. Djamil Hospital in Padang West Sumatra. Dr. M. Djamil Hospital is a tertiary hospital in Padang City, West Sumatra. As far as we know, this is the first study conducted in Indonesia. The findings of this study have the potential to legal framework, public health counselling, and evaluation material to current policies.

2. Materials and Methods

The study was descriptive-observational, using medical records of the forensic cases in the PICU of a tertiary hospital in Indonesia during 2017-2023. Since the size of the sample was not determined, total sampling was used as the method if the sample met the inclusion criteria and exclusion criteria. The inclusion criteria were all cases suspected as forensic cases, such as violence, poisoning, and drowning, that occurred in the PICU during the period mentioned before, while the exclusion criteria were incomplete medical records. The data is then extracted and featured as a distribution frequency table.

3. Results

This study had 51 samples that met all the inclusion and exclusion criteria. Teenage was the most frequent age found with 18 patients (35.3%), 27 males were involved (52.9%), and 35 patients (68.6%) came from different city of the tertiary hospital as shown in Table 1.

49 cases (96.1%) occurred unintentionally, Table 2. Two cases that occurred intentionally were a gunshot injury of a 5-year-old child and a suicide attempt of a teenager.

Table 2- *Intentionality of forensic case patients*

Intentionality	Total (f)	(%) Percentage
Intentional	2	3,9%
Unintentional	49	96,1%
Total	51	100%

Table 3- *Type of case of pediatric forensic cases*

Type of case	Total (f)	(%) Percentage
Violence	40	78,4%
Poisoning	6	11,8%
Drowning	5	9,8%
Total	51	100%

Violence was the most common type of case, with 40 cases (78.4%), Table 3. Traffic-related accidents caused twenty-two cases of violence. We analyzed the age of the victims and the pattern of the accident's mechanism. It showed that ≤6 years old became a victim by becoming a passenger or playing on the roadside, while ≥6 years old became a victim by becoming a rider. Six years old was the separator between the two mechanisms due to findings that some were the passengers and the rest were the riders.

Fractures were the most frequent in this study, with 15 cases (29.4%), followed by 13 cases of bruises (25.5%). The details are shown in Table 4. This study found that multiple types of injuries occurred in 27 patients (52.9%).

In this study, we found six poisoning cases, as shown in Table 3. In those cases, it has a similar distribution of type of poison, which is pesticide and chemical substances, as shown in Table 5. The chemical substances used in this study were dish soap, gasoline, and kerosene. Each of them has 3 cases (5.9%), and most of them occurred unintentionally, except 1 case of suicide attempt using pesticides due to depression, although the family

Table 4- *Type of injury in violence pediatric forensic case patients*

Type of Injury	Total (f)	(%) Percentage
Abrasions	10	25%
Bruises	13	32,5%
Lacerations	9	22,5%
Fractures	15	37,5%
Incised wounds	0	0%
Stabbed wounds	3	7,5%
Chop wounds	0	0%
Gunshot wounds	1	2,5%
Chemical burns	0	0%
Temperature burns	6	15%
Electrical burns	1	2,5%
Total	40	100%

Table 5- *Type of poison that was used in poisoning case of pediatric forensic case patients*

Type of Poison	Total (f)	(%) Percentage
Pesticide	3	50%
Drugs	0	0%
Foods	0	0%
Chemical substances	3	50%
Carbon monoxide	0	0%
Alcohol	0	0%
Bee sting	0	0%
Foreign body	0	0%
Heavy metal	0	0%
Total	6	100%

denied it. Unintentional cases in this study resulted from the incautiousness of the children and unawareness of the content in containers.

4. Discussion

The present study indicated that most of the forensic cases occurred among teenagers (35.3%), which is similar to Taplak et al. [13] and in contrast to Duramaz et al., who showed more preschool age in their study [12]. This contrast can be due to the difference in activity patterns in children based on their ages and the posture of their bodies. Young children tend to put something in their mouth and have a more minor posture, so they have a greater risk of falls [12,14].

Males were affected more (52.9%), which was similar to Duramaz et al. [12] findings, while in contrast to Polat et al., who showed more females in their findings [9]. The difference between our findings and Polat et al. was due to the different findings on suicide attempts. Females had more suicide attempts in Polat et al, while in this study, we found only one case of suicide attempt.

Most of the cases in this study occurred unintentionally (96.1%), which was confirmed by Polat et al. [9] and Yin et al. [15]. The forensic case was called intentional if there was the intention from the victim or others, such as a criminal or suicide attempt. Some factors that influenced the intentionality of paediatric forensic cases were the increasing age of males from rural areas, evening time, and school or workplace as scenes of incidents [15].

Violent incidences were the most common type of cases found in this study (78.4%), which is similar to Arslan and Demir [16] but in contrast to Duramaz et al. [12] which showed that poisoning was the most common cause of PICU admission. This study divided violence into three categories: mechanical, physical, and chemical, including traffic accidents, which were the most common causes of violence in this study. Traffic accidents have been preventable global polemic and are usually caused by motorcycle riders of child age who lack mental

and emotional maturity and become victims of this violence [17]. The contrary findings between this study and Duramax et al. were due to the difference in demographical age group, which is dominated by preschool children [12], while the similarity to Arslan and Demir is due to the same majority demographical age group findings (teenagers) that also is the highest number of traffic accident victims in Indonesia based on age group [17].

Contrary to Timsinha and Parajuli [18], in Nepal's ER of tertiary care, fracture was the most common injury type in this study. The difference in study location causes the difference in these findings. ER has emergency-focused care, while PICU has intensive-focused care for children treated in the ER [19].

In this study, multiple injuries were common in pediatric forensic case patients, similar to Shakya et al. [20] findings in the forensic department of tertiary care in Nepal. The recording of injury is vital in forensic and medicolegal cases, which will affect the legal framework of the victims [8].

Poisoning was the minor cause in this study, with 6 cases and two types of poisons: chemical substances and pesticides. These findings differ from Duramaz et al. [12] and Arslan and Demir [16], who showed drugs as the most common poison. However, our results were similar to Dharmawati et al. [21] that stated chemical substances (hydrocarbon) as the most common cause of poisoning case and study by Dai et al. [6] that stated pesticide as the most common cause of childhood acute poisoning. The difference between our findings was due to the high usage of drugs, while the likeliness of findings is due to the high usage of chemical substances in households and the high usage of pesticides in rural or agricultural areas [6,12,16,21]. Children's curiosity & inability to know poisoning substances, inefficient parental care, and laxity in storage of hazardous substances are the common factors influencing the incidence of poisoning among children [6,16].

5. Conclusion

We conclude that the common categorical data of this study was teenager, male, and come from outside of Padang. Most of the cases occurred unintentionally. The most common case in this study was violence, especially from traffic accidents. Most injuries in this study were fractures. Chemical substances and kerosene were the cause of poisoning cases within this study with the same number of cases.

We recommend developing a legal framework regarding motorcycle usage in children and teenagers. We also suggest that the stakeholders make counselling of school going children and their parents with regards to motocycle usage, and this should be done regularly with regards to poisoning substances/drug storage at homes and road safety.

Conflict of interest

The authors declare no conflicts of interest.

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Author Contributions

Muhammad Ihsan Nabil Fadhlurrahman: Writing-Original Draft, conceptualization, software, investigation, resources, data curation, Citra Manela: Supervisor, conceptualization,

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