Original Article

Morbid pediatric trauma: Our experience in a tertiary care hospital

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ABSTRACT

Background: Injuries, though preventable, are still ranked among the top 10 causes of mortality in low-income countries. Pediatric trauma is one of the leading causes of prolonged morbidity and sometimes even mortality. Recently, we have seen many patients with trauma who needed surgical interventions in our hospital. This study highlights the spectrum, indications for surgical interventions, complications, and outcomes of pediatric trauma.

Methods: This cross-sectional study was conducted in the Pediatric Surgery Unit II of Children's Hospital Lahore. The medical records of patients who needed admission for the management of trauma were reviewed for demographics, mode of injury, severity of injury, indications for intervention, complications, and outcomes. Approval from the IRB was obtained.

Results: During the study period, a total of 652 patients presented with trauma. Over 70% of the patients were boys. More than 85% of the patients suffered either road traffic accidents (41.9%) or falls (46.3%), while 4% had burns. More than 21% were critically ill at presentation, and 10 patients were deceased upon arrival. Forty percent of patients were managed conservatively, whereas 49% required major operations. Major interventions were performed mainly for head, hepatobiliary and pancreatic, gastrointestinal, thoracic, splenic, and renal injuries. Blood transfusions were given to 220 (33.7%) patients. Postoperatively, 19 patients required ventilatory support; 3 patients had wound infections, and 7 developed sepsis. Three patients needed repeat surgery. One hundred (15.3%) patients expired.

Conclusion: The prevalence and severity of pediatric trauma are alarming, with half of the patients requiring interventions. Road traffic accidents and falls are the most common causes of trauma. In our study, every 6th child admitted with trauma did not survive. The community must implement child safety guidelines to ensure a safer environment for future generations

Keywords: Morbid Trauma, Pediatric Trauma, Surgical Interventions, Outcome, Pediatric abdominal trauma

INTRODUCTION

In 2020, the WHO published statistics from 2000 to 2019 for the top causes of death globally. Deaths due to trauma or injuries are no longer among the top 10 causes of mortality in high-income countries. However, they remain one of the major causes of death in low-income countries, ranking number 7 on the WHO list of top 10 causes of death in these regions [1]. Nevertheless, according to the National Centre for Health Statistics (NCHS USA), deaths due to accidents were ranked among the top 5 causes in the USA before 2000 [2]. This reflects that certain measures

taken in highly developed countries have led to a decline in deaths secondary to various types of injuries.

Children are considered a more vulnerable population to trauma. Various types of trauma can affect children, including falls, road accidents, child abuse, firearm injuries, and burns [3]. Significant trauma can have lifelong consequences on the personal well-being of affected children [4]. Delayed referral and improper management can even result in increased morbidity and mortality [5].

As the saying goes, "Prevention is better than cure," and this is also true for trauma. Measures should be taken to implement principles of child safety in society to prevent traumatic experiences for our children.

Recently, we have received several pediatric trauma patients in our department, many of whom required major surgical interventions. This study aims to identify the spectrum of pediatric trauma, the indications for surgical interventions, and the morbidity and mortality statistics in patients presenting to the surgical emergency department of the Children's Hospital Lahore.

METHODS

This is a cross-sectional study conducted from June 1, 2023, to August 31, 2023, in the Department of Pediatric Surgery at the University of Child Health Sciences and Children's Hospital, Lahore. In this study, all children of any age and gender who presented to the surgical emergency with physical trauma during the study period were included. Children with incomplete records were excluded from this review.

Ethical Approval: This study was conducted with IRB approval(687/CH-UCHS).

Data Collection Procedure: The medical records of all patients who presented to the surgical emergency were retrieved via Performa and reviewed for demographic information, mode of trauma, type of trauma, indications for admission, nature of injuries requiring surgical intervention, complications, and all-cause mortality/prognosis.

Statistical Analysis: The data were analyzed using SPSS version 25. Descriptive statistics, describing measures of central tendency and lateral dispersion, were calculated. The spectrum of morbid pediatric trauma was assessed, indications for surgery were reviewed, and the relationship between age and interventions with the etiology of trauma was calculated using the chi-square test. Complications and outcomes were identified. The analyzed data are presented in tables and graphs.

RESULTS

During the study period, a total of 652 patients presented to the surgical emergency department, comprising 457 (70.1%) boys and 195 (29.9%) girls. The mean age was 5.71 ± 3.41 years (Chart 1).

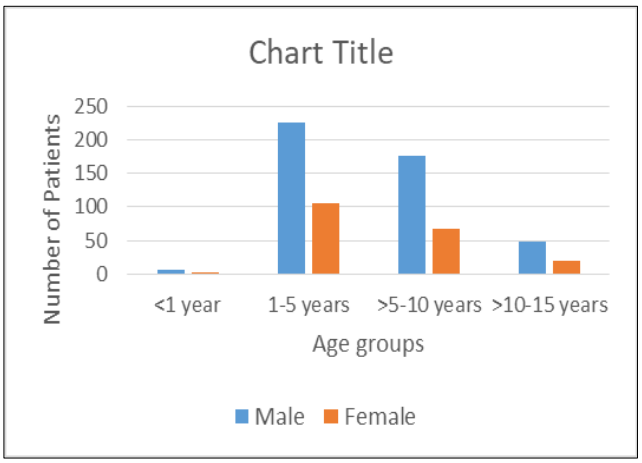

Chart No. 1: Gender distribution in different age groups

Of the 652 cases, 146 (22.4%) were referred from other healthcare establishments, while 506 (77.6%) presented directly to the emergency department. Among them, 200 (30.7%) were brought by the rescue team 1122, 425 (65.2%) were brought by their parents, and 27 (4.1%) arrived via other personnel.

Within the total cohort, 565 (86.7%) arrived within the first 24 hours, 80 (12.3%) arrived after 24 hours, and 7 (1.1%) presented even after 48 hours.

In terms of patient condition, 503 (77.1%) were vitally stable, 139 (21.3%) were critically ill, and 10 (1.5%) were received dead.

Of the 652 cases, 273 (41.9%) were attributed to road traffic accidents (RTA), 302 (46.3%) resulted from falls, 26 (4.0%) were burn cases, 5 (0.8%) involved firearm injuries (FAI), 20 (3.1%) were due to mechanical injury, 4 (0.6%) were related to animal bites, 3 (0.5%) were associated with child abuse, and 19 (2.9%) were classified as other injuries (Table 1).

Table No.1: Etiology of injury

Etiology	Male	Female	Total
RTA	206	67	273 (41.9%)
Fall	193	109	302 (46.3%)
Burn	15	11	26 (4.0%)
FAI	5	0	5 (0.8%)
Mechanical equipment injury	13	7	20 (3.1%)
Animal bite	4	0	4 (0.6%)
Child abuse	2	1	3 (0.5%)
others	19	0	19 (2.9%)
Total	457	195	652 (100%)

Among these cases, 11 (1.7%) had no investigations performed, 159 (24.4%) had only CBC, 292 (44.8%) underwent CBC, chest X-ray, and EFAST scan, while 190 (29.1%) had a comprehensive set of investigations, including CBC, chest X-ray, FAST scan, and CT scan.

Table No. 2: Type Of Injury

Type	Point A
BTA	40(6.1%)
Polytrauma	13(2.0%)
Burn	25(3.8%)
Head Injury	195(29.9%)
Fracture	170(26.1%)
Laceration	127(19.5%)
Swelling	9(1.4%)
Spoke wheel	14(2.1%)
Animal bite	4(0.6%)
Circumcision bleed	19(2.9%)
Crushed limb	4(0.6%)
Amputation	4(0.6%)
others	24(3.7%)
Chest trauma	4(0.6%)
Total	652

In terms of injury types, out of the 652 cases, 40 (6.1%) had blunt abdominal trauma (BTA), 13 (2.0%) suffered polytrauma, 195 (29.9%) had head injuries, 170 (26.1%) had fractures, 127 (19.5%) had lacerations, 9 (1.4%) had swelling of the injured part, 14 (2.1%) had spoke wheel injuries, 4 (0.6%) were bitten, 19 (2.9%) experienced circumcision bleed, 4 (0.6%) had crushed limbs, 4 (0.6%) had amputations, 4 (0.6%) had chest trauma, and 24 (3.7%) had minor injuries (Table 2,3).

A total of 330 (50.6%) cases were managed conservatively, 192 (29.4%) underwent minor operations, and 130 (19.9%) underwent major operations (Chart 2). Among these cases, 163 (25%) received stitches for lacerations, 20 (3.1%) underwent wound debridement, cleaning, and dressing, 10 (1.5%) had stumps formed for amputations, 16 (2.5%) needed exploratory laparotomy (Table 4), 5 (0.8%) required perineal injury repair, 3 (0.5%) had fasciotomy, 22 (3.4%) needed debridement, 4 (0.6%) had tube thoracostomy, 19 (2.9%) needed bleed control for circumcision, 9 (1.4%) had neurosurgical interventions, and 88 (13.5%) underwent other procedures like POP application. Additionally, 16 (2.5%) patients needed multiple operations. Blood transfusions were administered to 220 (33.7%) patients.

Table No. 3: Type of injury in different age groups (p-value:0.000)

Type	<1 year	1-5 years	>5-10 years	>10-15 years	Total
BTA	1	19	15	5	40
Polytrauma	0	3	10	0	13
Burn	1	16	6	2	25
Head Injury	0	97	80	18	195
Fracture	0	83	62	25	170
Laceration	4	83	31	9	127
Swelling	0	1	7	1	9
Spoke wheel	0	3	9	2	14
Animal Bite	0	0	4	0	4
Circumcision Bleed	4	10	5	0	19
Crushed Limb	0	3	1	0	4
Amputation	0	4	0	0	4
Chest Trauma	0	3	1	0	4
Others	0	6	13	5	24
Total	10	331	244	67	652

Of the total 652 cases, 212 (32.5%) were discharged from the emergency department, 53 (8.1%) were admitted to the surgical ICU, 170 (26.1%) were placed in the neurosurgery ward, 171 (26.2%) in the orthopedic ward, 45 (6.9%) in the surgery ward, and 1 (0.2%) in the plastic surgery ward.

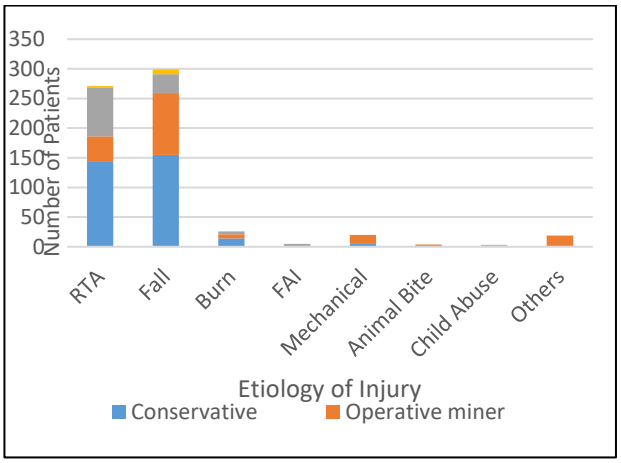

Chart No. 2: Management done in different injuries is statistically significant (p-value:0.000)

Among these cases, 110 (16.9%) experienced post-intervention complications. Out of these 110 cases, 93 (84.5%) required ventilatory support, 7 (6.3%) developed sepsis, 3 (2.7%) had wound infections, 2 (1.8%) had both sepsis and required ventilatory support, 1 (0.9%) developed pneumonia, 1 (0.9%) had foot gangrene, 1 (0.9%) had limb gangrene with sepsis, 1 (0.9%) experienced liver bleeding, and 1 (0.9%) had anastomotic leakage.

Out of the total 652 cases, 532 (81.6%) recovered and were discharged, 100 (15.3%) unfortunately expired, (48% by falls, 45% by RTA, 6% by burns and 1% by FAI). 14 (2.1%) left against medical advice (LAMA), and 6 (0.9%) were still being treated at the time of the study but recovered afterward.

DISCUSSION

Trauma is one of the major preventable causes of morbidity and mortality in children. Identifying situations where preventive actions can be applied is crucial because trauma typically occurs in foreseeable circumstances. Recognizing such situations facilitates the implementation of prevention techniques, which are more cost-effective than late interventions. In both industrialized and developing nations, trauma injuries are the leading cause of morbidity and mortality in children and adolescents. The rise in accidental injuries among children has become a significant social issue [6,7].

Consistent with most epidemiological research, our study found that male children were more commonly afflicted by unintentional injuries across all age groups than female children [8, 9, 10-12]. This disparity can be attributed to the protective environment provided to females in our community and the increased exposure of males to environmental hazards, traffic, and risky sports activities [9, 11, 13]. Studies from Bangladesh, Iran, Nigeria, Singapore, Trinidad and Tobago, and several Indian cities also report higher injury rates in boys than in girls [14-18].

Falls accounted for the majority of injury mechanisms in our study (46.3%), followed by road traffic accidents (RTA) [18-22]. Numerous studies indicate that falls are the primary cause of unintentional injuries, particularly in young children [9, 23, 25].

Table No. 4**:** Major abdominal procedures

Finding	**Intervention**	**Outcome**
Small bowel injury	Stoma	Expired
Small bowel injury	Repaired	Discharge
Small bowel injury	Repaired	Discharge
Large bowel injury	Stoma	Discharge
Large bowel injury	Stoma	Retaining
Jejunal perforation	Repaired	Discharge
Small bowel injury	Stoma	Discharge
Spleen grade III injury	Hemostasis	Discharge
Spleen Grade III injury	hemostasis	Discharge
Liver and spleen injury	Hemostasis	Discharge
Liver Grade IV injury	Segmentectomy and hemostasis	Discharge
Liver Grade IV injury	Hemostasis	Expired
Liver grade IV injury	Segmentectomy and hemostasis	Discharge
Liver grade IV injury	Hemostasis	Discharge
Liver and stomach	Whipple procedure	Discharge
Spleen grade III injury	Hemostasis	Discharge

In our study, falls during running or walking were considered recreational injuries. Falls from

objects like climbing frames, chairs, roofs, trees, and stairs are frequent mechanisms for people of all ages and are often the most common cause of accidents in children [9, 23, 24].

Following falls, motor vehicle accidents accounted for 41.9% of all traumas in our study. This outcome aligns with numerous Indian and Western studies [14, 26, 27]. The age group of children between 1 and 5 years old experienced the most falls, consistent with numerous studies indicating young children are prone to falls [28, 29]. However, our study found that most children who experienced RTA were in the age range of over 1 to 5 years, which contradicts many studies showing that RTA is more prevalent in older children and adolescents [30-33].

All types of injuries, concerning etiology, were more common in children aged 1-5 years, followed by those aged 6-10 years, with a statistically significant p-value of 0.000. Most patients with RTA and falls were managed conservatively, while interventions were required in most cases of firearm injuries (FAI) and mechanical equipment injuries, also with a statistically significant p-value of 0.000.

In our study, more RTA patients (39.5%) needed blood transfusions compared to those with falls (27.5%). In postoperative patients, ventilatory support was the most common complication, comprising 81% of total complications for both RTA and fall patients.

Our study had a mortality rate of 15.3% (n = 100). We found that the study by Simon et al. reported a mortality rate of 12.7% with causes similar to ours [35], contrary to the study by Ameh and Mshelbwala [34]. In our study, most fatalities were due to falls (48%), followed by RTA (45%), with the rest due to burns (6%) and FAI (1%). These findings contrast with those of studies conducted by Adesunkanmi and Oyelami [36]. Mortality was higher in males (67%) than in females (33%).

Our study showed that falls are the major cause of head injuries, likely due to the large head circumference of children compared to adults. A sizable fraction of fall-related injuries in young children occurred during risky work-related activities (3.1%). Half of the blunt abdominal trauma (BTA) cases were caused by RTA, with the rest caused by falls. This finding contradicts the usual assumption that RTA is the major contributor to BTA. Another noteworthy finding is that only 30% of patients were transported via ambulance, while the rest came with parents or guardians, indicating a need for significant improvements in our patient transport system for better management of trauma patients.

A major limitation of our study is the short duration, as the data covers only three months. Six-month or one-year data might show variations in results, as different seasons lead to different activities and types of injuries. Another limitation is that our hospital is a referral unit for all of Punjab, so the actual number of trauma cases in our community cannot be determined.

Currently, there are no injury prevention programs for the pediatric population, and little research has been done into the factors that predispose children to trauma [21]. The high rate of pediatric trauma from falls and traffic accidents indicates a need for increased playtime monitoring and identification of specific risk factors in our environment. To teach children about road safety precautions, there should be frequent school-based activities featuring cartoon and comic book characters.

Stringent adherence to worker safety regulations is also required. Child labor needs to be addressed immediately. This study demonstrates that these epidemiological factors may be beneficial in determining the burden and priority areas for further investigation of specific types of injuries. In our system, creating policies to lessen the burden of pediatric trauma seems to require a more thorough and precise trauma registry [37].

CONCLUSION

This cross-sectional study highlights the alarming prevalence and severity of pediatric trauma, underscoring the need for immediate and effective intervention strategies. Road traffic accidents and falls are the most common causes of trauma. About half of the patients require interventions.

The mortality rate remains concerning, with 15.3% of the patients succumbing to their injuries. Additionally, a notable percentage of patients experienced post-intervention complications, with ventilatory support being the most common requirement. Blood transfusions were administered in 33.7% of cases, reflecting the severity of the injuries.

The study also revealed that a significant number of patients were critically ill upon arrival, highlighting the importance of timely and efficient trauma care. The findings underscore the urgent need for improved trauma prevention strategies, better infrastructure for pediatric trauma care, and heightened awareness about child safety to reduce the incidence and impact of such injuries.

Consent to Publication: Author(s) declared taking informed written consent for the publication of clinical photographs/material (if any used), from the legal guardian of the patient with an understanding that every effort will be made to conceal the identity of the patient, however it cannot be guaranteed.

Authors Contribution: The authors confirm contribution to the paper as follows. **AQ:** Data Collection, Performa design, **US:** Data Collection, **HM:** Results formation, Data analysis, Content Writing, Submission, **MAB**: Concept, Supervision of analysis and writing.

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REFERENCES

1. World Health Organization. The Top 10 Causes of Death Globally [Internet]. WHO. 2020. Available from: https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death
2. National Center for Health Statistics. Top Five Leading Causes of Death: United States, 1990, 1950, 2000 [Internet]. NCHS. 2022. Available from: https://data.cdc.gov/NCHS/NCHS-Top-Five-Leading-Causes-of-Death-United-State/mc4y-cbbv/about_data
3. UpToDate. Pediatric trauma [Internet]. UpToDate. 2023. Available from: https://www.uptodate.com/contents/table-of-contents/emergency-medicine-adult-andpediatric/pediatric-trauma
4. Torrico TJ, Mikes BA. Posttraumatic Stress Disorder in Children. 2024. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 –. PMID: 32644566.
5. Theodorou CM, Galganski LA, Jurkovich GJ,Farmer DL, Hirose S, Stephenson JT, et al. Causes of early mortality in pediatric trauma patients. *J Trauma Acute Care Surg*. 2021;90(3):574-81.
6. Hatamabadi HR, Mahfoozpour S, Alimohammadi H, Younesian S. Evaluation of factors influencing knowledge and attitudes of mothers with preschool children regarding their adoption of preventive measures for home injuries referred to academic emergency centres, Tehran, Iran. *International journal of injury control and safety promotion*. 2014 Jul 3;21(3):252-9.
7. Hatamabadi HR, Mahfoozpour S, Forouzanfar MM, Khazaei AR, Yousefian S, Younesian S. [Evaluation of a parameter related to preventative measures on the child injuries at home.] *Safety Promote Injury Prevention*. 2013; 1:140-9. Article in Persian.
8. Naqvi G, Johansson G, Yip G, Rehm A, Carrothers A, Stöhr K. Mechanisms, patterns and outcomes of paediatric polytrauma in a UK major trauma centre. *The Annals of The Royal College of Surgeons of England*. 2017 Jan;99(1):39-45.
9. Aoki M, Abe T, Saitoh D, Oshima K. Epidemiology, patterns of treatment, and mortality of pediatric trauma patients in Japan. *Scientific reports*. 2019 Jan 29;9(1):917.
10. Albert M, McCaig LF. Injury-related emergency department visits by children and adolescents: United States, 2009–2010. NCHS Data Brief. 2014; 150:1–8.
11. Voth M, Lustenberger T, Auner B, Frank J, Marzi I. What injuries should we expect in the emergency room.2017; 48(10):2119–24.
12. Ruffing T, Danko S, Danko T, Henzler T, Winkler H, Muhm M. [Verletzungen bei Kindern und Jugendlichen im Bereitschaftsdienst. Der Unfallchirurg]. 2016;119(8):654-63.Article in German
13. Pearson J, Jeffrey S, Stone DH. pattern of childhood injury mortality over time in Scotland. *Arch Dis Child*. 2009;94(7):524–30.
14. Chowdhury SM, Rahman A, Mashreky SR, Giashuddin SM, Svanström L, Hörte LG, et al. The horizon of unintentional injuries among children in low-income setting: An overview from Bangladesh health and injury survey. *J Environ Public Health* 2009; 2009:435403.
15. Kirsch TD, Beaudreau RW, Holder YA, Smith GS. Pediatric injuries presenting to an emergency department in a developing country. *Pediatric emergency care*. 1996 Dec 1;12(6):411-5.
16. Ong ME, Ooi SB, Manning PG. A review of 2,517 childhood injuries seen in a Singapore emergency department in 1999—mechanisms and injury prevention suggestions. *Singapore Med J*. 2003 Jan 1;44(1):12-9.
17. Karbakhsh M, Zargar M, Zarei MR, Khaji A. Childhood injuries in Tehran: a review of 1281 cases. *The Turkish journal of pediatrics*. 2008 Aug 25;50(4):317-25.
18. Adesunkanmi AR, Oginni LM, Oyelami AO, et.al Epidemiology of childhood injury. *J Trauma* 1998; 44:506-12.
19. Abhilash KP,VincenT D, George AS, Kalyaniwala K, Prajapathi A, Thomas SM. Pattern and outcome of unintentional pediatric trauma in the emergency department of a tertiary care hospital in South India. *Journal of Medical Sciences*. 2018 Nov 1;38(6):269-74.
20. Kozik CA, Suntayakorn S, Vanghn DW, Suntayakorn C, Snitbhan R, Innis BL. Causes of death and unintentional injury among schoolchildren in Thailand. *Southeast Asian journal of tropical medicine and public health*. 1999 Mar 1; 30:129-35.
21. Kundal VK, Debnath PR, Sen A. Epidemiology of pediatric trauma and its pattern in urban India: A Tertiary care hospital-based experience. *J Indian Assoc Pediatr Surg*. 2017; 22:33-7.
22. Hyder AA, Sugerman D, Ameratunga S, Callaghan JA. Falls among children in the developing world: a gap in child health burden estimations? Acta pediatric. 2007 Oct;96(10):1394-8.
23. Suh D, Jung JH, Chang I, Lee JH, Jung JY, Kwak YH, et al. Epidemiology of playground equipment related/unrelated injuries to children: a registry-based cohort study from 6 emergency departments in Korea. Medicine. 2018 Dec 1;97(50):e13705.

24. Vollman D, Witsaman R, Comstock RD, Smith GA. Epidemiology of playground equipment-related injuries to children in the United States, 1996–2005. *Clinical pediatrics*. 2009 Jan;48(1):66-71.
25. Phelan KJ, Khoury J, Kalkwarf HJ, Lanphear BP. Trends and patterns of playground injuries in United States children and adolescents. *Ambulatory Pediatrics*. 2001 Jul 1;1(4):227-33.
26. Sharma M, Lahoti BK, Khandelwal G, Mathur RK, Sharma SS, Laddha A. Epidemiological trends of pediatric trauma: A single-center study of 791 patients. Journal of *Indian Association of Pediatric Surgeons*. 2011 Jul 1;16(3):88-92.
27. Agran PF, Winn DG, Anderson CL. Surveillance of pediatric injury hospitalizations in Southern California. *Injury Prevention*. 1995 Dec 1;1(4):234-7.
28. Al Rumhi A, Al Awisi H, Al Buwaiqi M, Al Rabaani S. Home accidents among children: a retrospective study at a tertiary care center in Oman. *Oman medical journal*. 2020 Jan 6;35(1):e85.
29. Chini F, Farchi S, Rossi PG, Camilloni L, Borgia P, Guasticchi G. Incidenti stradali e domestici nei bambini e adolescenti della Regione Lazio. *Risultati della sorveglianza integrata*. Epidemiol Prev. 2006;30(4-5):255-62.
30. Bener A, Al-Salman KM, Pugh RNH. Injury mortality and morbidity among children in the United Arab Emirates. *Eur J Epidemiol*. 1998;14(2):175–8.
31. Petroze RT, Martin AN, Ntaganda E, Kyamanywa P, St-Louis E, Rasmussen SK, et al. Epidemiology of paediatric injuries in Rwanda using a prospective trauma registry. BJS open. 2020 Feb;4(1):78-85.
32. Li Q, Alonge O, Hyder AA. Children and road traffic injuries: can't the world do better? *Arch Dis Child*. 2016;101(11):1063–70.
33. Borgman M, Matos RI, Blackbourne LH, Spinella PC. Ten years of military pediatric care in Afghanistan and Iraq. *Journal of Trauma and Acute Care Surgery*. 2012 Dec 1;73(6):S509-13.
34. Ameh EA, Mshelbwala PM. Challenges of managing paediatric abdominal trauma in a Nigerian setting. *Eur J Pediatr Surg* 2007;2:90-5.
35. Simon R, Gilyoma JM, Dass RM, Mchembe MD, Chalya PL. Paediatric injuries at Bugando Medical Centre in Northwestern Tanzania: a prospective review of 150 cases. *Journal of trauma management & outcomes*. 2013 Dec;7:1-9.
36. Adesunkanmi K, Oyelami OA. The pattern and outcome of burn injuries at Wesley Guild Hospital, Ilesha, Nigeria: a review of 156 cases. *The Journal of tropical medicine and hygiene*. 1994 Apr 1;97(2):108-12.
37. Moore L, Clark DE. The value of trauma registries.2008;39(6):686-95.
38. Newsome K, McKenny M, Elkbuli A. Major and minor surgery: Terms used for hundreds of years that have yet to be defined. *Ann Med Surg (Lond)*. 2021;66:102409.