e-ISSN: 0975-9506, p-ISSN: 2961-6093

Available online on www.ijpqa.com

International Journal of Pharmaceutical Quality Assurance 2026; 17(4); 98-102

Original Research Article

Pediatric Trauma Surgery: Trends, Management, and Outcomes

Jitendra Kumar Chaudhary[1], Kavita Tirkey[2], Anil Kumar[3], Shital Malua[4]

[1]Senior Resident, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

[2]Senior Resident, Department of Paediatric Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

[3]Senior Resident (Non-Academic), Department of Neurosurgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

[4]Professor & HOD, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

Received: 20-02-2026 / Revised: 19-03-2026 / Accepted: 21-04-2026

Corresponding Author: Anil Kumar

Conflict of interest: Nil

Abstract:

Background: Pediatric trauma is a major cause of morbidity and mortality worldwide. Children differ anatomically and physiologically from adults, requiring specialized trauma assessment and surgical management. Understanding injury trends and outcomes is essential for improving trauma care.

Objective: To evaluate trends, management patterns, and outcomes of pediatric trauma surgery cases admitted over a two-year period.

Methods: From January 2021 to December 2022, 100 pediatric trauma patients who needed surgical intervention participated in a retrospective observational study. Analysis was done on demographic information, injury type, mechanism of injury, surgical techniques, complications, hospital stay, and results. SPSS version 24 was used for statistical analysis. A p-value of less than 0.05 was deemed significant.

Results: Road traffic accidents were the commonest cause of trauma (38%), followed by falls (32%) and blunt abdominal trauma (15%). Orthopedic injuries were most frequent (40%), followed by abdominal injuries (28%) and head injuries requiring surgery (18%). Emergency surgery was required in 72% cases. Postoperative complications occurred in 16% patients. Favorable recovery was seen in 90%, while mortality was 4%. Delayed presentation was significantly associated with complications (p=0.01).

Conclusion: Traffic accidents and falls are the main causes of pediatric trauma, which continues to be a major surgical burden. Results can be enhanced by interdisciplinary pediatric trauma care, early intervention, and trauma prevention techniques.

Keywords: Traffic Accidents, Pediatric Trauma, Early Intervention, Trauma Prevention, Surgical Burden.

DOI: 10.25258/ijpqa.17.4.17

Introduction

Trauma is a significant public health issue and one of the main causes of death and disability among children globally. Road traffic accidents, falls, burns, penetrating trauma, sports injuries, and blunt or penetrating abdominal and thoracic injuries are all considered forms of pediatric trauma. Children differ from adults in that they have distinct anatomical, physiological, and psychological traits that affect treatment outcomes as well as the pattern of injury [1].

Even after seemingly little trauma, children are more vulnerable to multisystem injury due to their relatively larger heads, more elastic bones, less protective fat, and undeveloped organ systems. Furthermore, children's physiological adaptation may conceal serious internal injuries or blood loss until much later, underscoring the importance of early detection and close observation. The number of pediatric trauma cases has increased due to a number of factors, including growing urbanization, increased vehicle traffic, poor supervision, hazardous play areas, and a lack of child safety precautions. While falls are frequent among younger children, road accidents continue to be a significant cause of serious trauma in many areas. While fractures usually affect long bones and upper limbs, abdominal trauma might cause splenic, hepatic, or intestinal damage [2].

A systematic approach based on advanced trauma life support concepts, quick stabilization, imaging, and prompt surgical intervention where necessary is needed to manage pediatric trauma. Fracture

fixation, laparotomy for abdominal injuries, wound exploration, chest procedures, and neurosurgery therapies are common pediatric trauma surgeries. Early diagnosis, resuscitation, pediatric anesthetic availability, critical care support, and rehabilitation programs are all necessary for successful outcomes [3].

Pediatric trauma still plays a major role in hospital admissions, long-term impairment, and mortality despite improvements in trauma systems. To enhance preventive tactics and optimize management procedures, it is essential to assess local injury trends and results.

The goal of the current study was to evaluate the clinical outcomes, management styles, and trends of pediatric trauma surgery cases hospitalized between 2021 and 2022. Finding variables linked to adverse outcomes and postoperative complications was another goal of the study [4].

Methods

Study Design: Retrospective observational study.

Study Period: January 2021 to December 2022.

Sample Size: 100 pediatric trauma patients requiring surgery.

Age Group: 0–14 years.

Inclusion Criteria:

- Pediatric trauma patients undergoing surgical intervention
- Complete medical records available

Exclusion Criteria:

- Minor trauma managed conservatively
- Incomplete records
- Non-traumatic surgical emergencies

Data Collected: Age, sex, mechanism of injury, injury type, time to presentation, surgical procedure, complications, ICU stay, length of hospitalization, and final outcome.

Statistical Analysis: Data analyzed using SPSS version 24. Chi-square test and Fisher's exact test applied. $p < 0.05$ considered significant.

Results

Table 1. Mechanism of Injury (n=100)

Cause of Trauma	Frequency	Percentage
Road traffic accidents	38	38%
Falls	32	32%
Sports injuries	10	10%
Penetrating trauma	5	5%
Blunt abdominal trauma	15	15%

Table 2. Types of Surgical Injuries

Injury Type	Frequency	Percentage
Orthopedic fractures	40	40%
Abdominal injuries	28	28%
Head injuries	18	18%
Thoracic injuries	8	8%
Soft tissue injuries	6	6%

Table 3. Time to Presentation Vs Complications

Presentation Time	Complications	No Complications	Total	p-value
<6 hours	6	54	60	
>6 hours	10	30	40	**0.01**

Table 4. Outcomes by Injury Severity

Outcome	Mild/Moderate	Severe	p-value
Recovered	70	20	
Morbidity	4	2	
Mortality	0	4	**0.003**

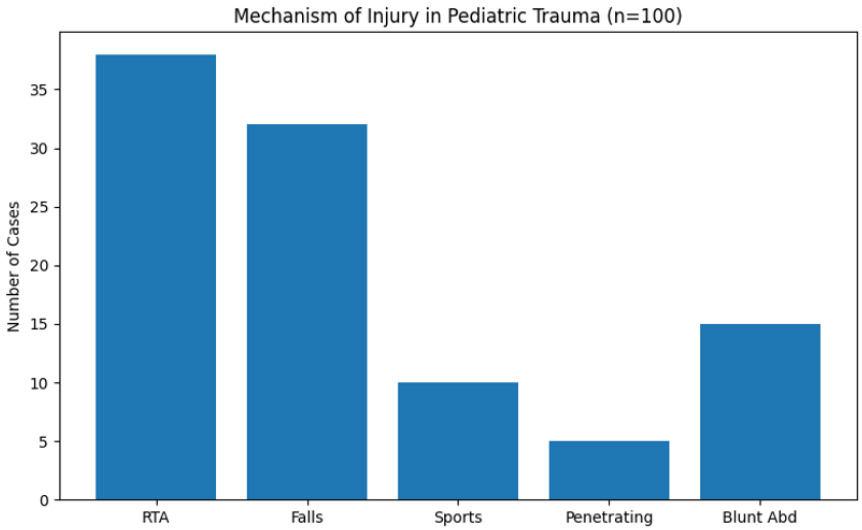

Figure 1: Mechanism of injury in paediatric trauma

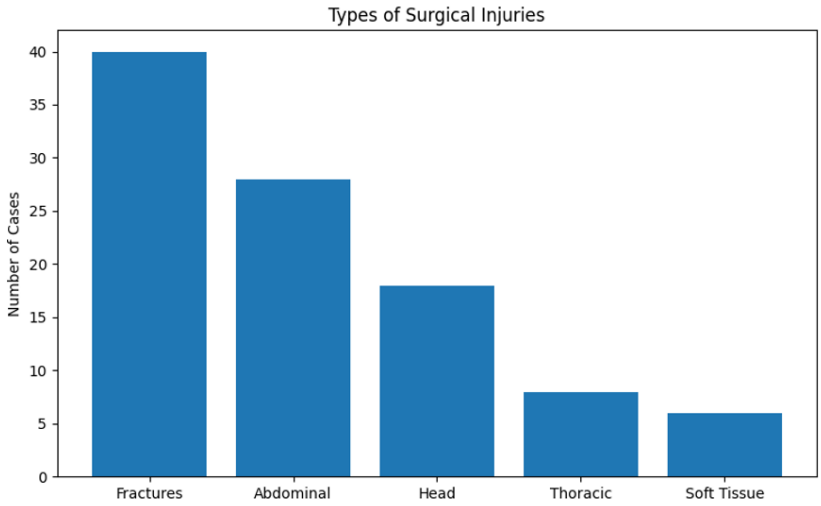

Figure 2: Types of surgical injuries

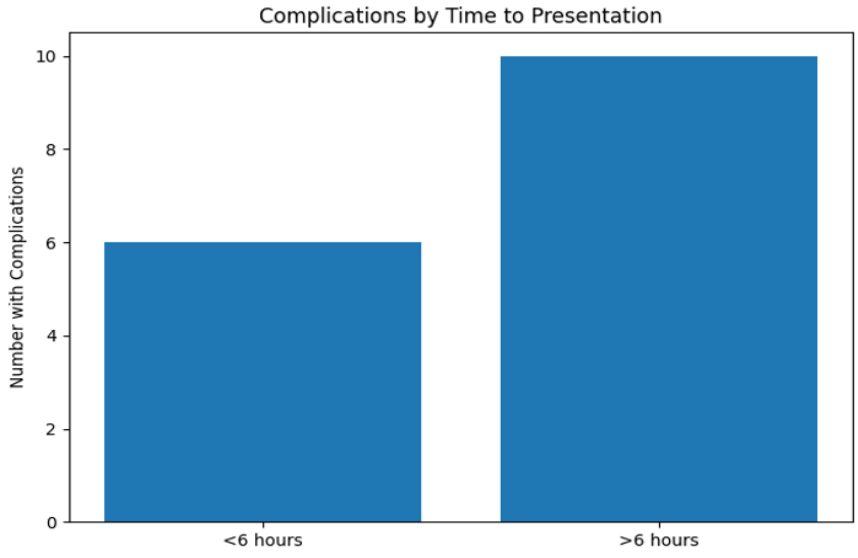

Figure 3: Complications by time to presentation

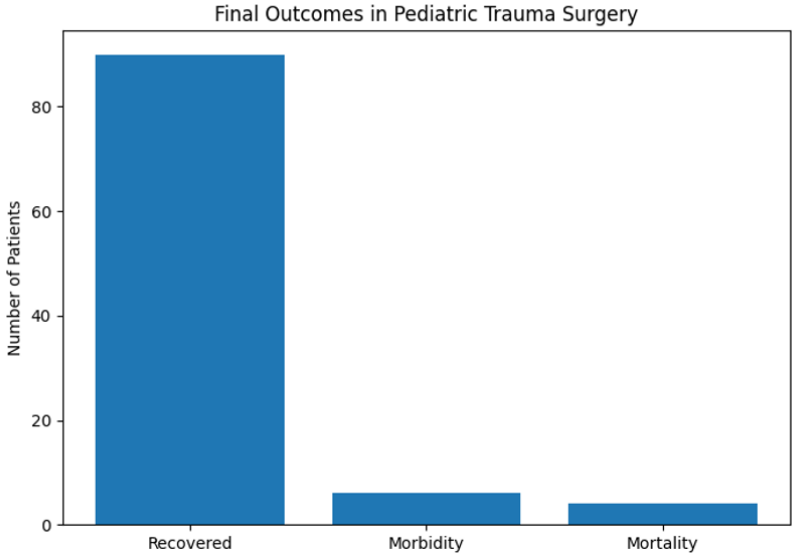

Figure 4: Final outcomes in paediatric trauma surgery

Discussion

Over the course of two years, 100 pediatric trauma patients who needed surgery were included in this retrospective analysis, which assessed trends, treatment, and results. The results show that pediatric trauma remains a significant surgical burden, with the majority of injuries coming from falls and traffic accidents. Although severe damage and delayed presentation were strongly linked to complications and mortality, the majority of children had positive outcomes.

With 38% of cases, automobile accidents were the most common cause of injuries. This is a result of growing urbanization, dense traffic, low awareness of road safety, and insufficient use of helmets or child restraints. Similar research from developing nations has shown that serious pediatric injuries are largely caused by road traffic trauma [5].

Falls were the second most frequent reason (32%), especially in younger children, and could be caused by unsupervised play, dangerous household surroundings, or injuries sustained on the playground. The most common surgical injuries were orthopedic fractures (40%), which were followed by gastrointestinal injuries (28%). Children's high activity levels and risk-taking tendencies make them vulnerable to fractures. Because serious internal damage can happen without noticeable external symptoms, abdominal trauma frequently necessitates an immediate evaluation. If identification is delayed, damage to the mesentery, liver, intestines, or spleen can quickly turn fatal. 18% of cases were head injuries that required surgery, and these injuries continue to be a significant factor in long-term morbidity and mortality [6].

Due to the severe nature of pediatric trauma, the majority of patients needed emergency surgery. In order to stop bleeding, infection, organ failure, and neurological decline, prompt action is essential. Coordinated treatment from emergency physicians, pediatric surgeons, orthopedic surgeons, anesthesiologists, and intensive care experts is necessary for successful pediatric trauma surgery. The substantial correlation between surgical complications and delayed presentation ($p=0.01$) was one of the study's main findings [7]. Complications were more common in children who presented more than six hours after injury than in those who presented earlier. Poor transportation facilities, delayed referrals, parents underestimating the seriousness of their injuries, or restricted access to trauma clinics can all cause delays. Delays like these can exacerbate tissue damage, blood loss, infection, and the risk of sepsis. Therefore, it is crucial to strengthen emergency transportation infrastructure and referral linkages [8].

Ninety percent of patients had a successful overall recovery, proving that prompt pediatric trauma surgery can produce positive results. However, 4% of instances resulted in death, which was substantially correlated with serious injuries ($p=0.003$). Severe head trauma, hemorrhagic shock, multisystem injury, and delayed resuscitation are frequently associated with fatal consequences. This result emphasizes the importance of advanced trauma life support concepts and quick triage for youngsters. 16% of patients experienced postoperative complications, which, depending on the type of injury, most likely included wound infection, breathing problems, delayed healing, or neurological abnormalities. In order to minimize long-term disability, especially following fractures

or brain traumas, early rehabilitation and follow-up are crucial [9].

This study's evaluation of a wide spectrum of pediatric trauma operations and clinically significant results over a two-year period are among its merits. Retrospective methodology, small sample size, and single-center data, however, are drawbacks that could restrict generalizability. Additionally, functional results following discharge were not evaluated.

The study's overall findings highlight the fact that pediatric trauma is mostly avoidable. The use of seat belts and helmets, secure play areas, parental supervision, road safety education, and quick trauma response systems are all crucial tactics. Improving pediatric trauma outcomes still requires early surgical intervention and multimodal care [10].

Conclusion

Surgical admissions, morbidity, and death are still significantly influenced by pediatric trauma. Road traffic accidents and falls were the most frequent causes of injury in the current study, which involved 100 youngsters over a two-year period. The most prevalent reasons for surgery were fractures and abdominal trauma. When prompt surgical care was given, the majority of patients had positive results. Higher complication rates were substantially correlated with delayed presentation, highlighting the significance of early referral and timely trauma assessment. The necessity for quick resuscitation, proper triage, and specialist pediatric trauma care was highlighted by the substantial correlation between severe injuries and mortality. The remarkable recovery rate seen in this study was a result of early surgical intervention, close observation, and multidisciplinary therapy.

These results highlight the significance of preventive measures such enhanced road safety, the usage of seat belts and helmets, safer homes and playgrounds, and more parental knowledge. Enhancing access to trauma centers and emergency transport systems can further minimize preventable complications. In conclusion, prompt diagnosis and well-coordinated care can help pediatric trauma surgery achieve great results. The best course of action is still prevention, though. To lessen the burden of injuries and enhance children's long-term results, investments in pediatric surgical care, trauma systems, and child safety programs are crucial.

References

1. Lyttle BD, Williams RF, Stylianos S. Management of Pediatric Solid Organ Injuries. Children. 2024;11(667):1–20.
2. Statement P. Management of Pediatric Trauma. Pediatrics. 2008;121(4):849–54.
3. Madar T, Madar RT, Goldberg A, Newman N, Waisman Y, Greenberg D. A management model for admission and treatment of pediatric trauma cases. Isr J Health Policy Res [Internet]. 2021;10(73):1–12. Available from: https://doi.org/10.1186/s13584-021-00506-5
4. Reichert M, Sartelli M, Askevold IH, Braun J, Weigand MA, Hecker M, et al. Pediatric trauma and emergency surgery: An international cross - sectional survey among WSES members. World J Emerg Surg. 2023;18(6):1–14.
5. Turaga AH. Comparative Analysis of Outcomes and Complications of Pediatric Trauma Surgeries Performed by General Surgeons Versus Specialized Pediatric Trauma Surgeons: A Review of the Literature. Cureus. 2023; 15(7).
6. Elangovan H, Munnuswamy P. Patterns, Prevalence, and Outcomes of Pediatric Trauma: A Cross-Sectional Study from South India. Cureus. 2025;17(10):1–12.
7. Baškovi M, Lackovi M. The Diagnosis and Management of Pediatric Blunt Abdominal Trauma — A Comprehensive Review. Diagnostics. 2024;14(2257):1–22.
8. Dagnaw Y, Fenta B, Yetwale A, Biyazin T, Sayih A, Dessalegn N. Mechanisms, Pattern and Outcome of Pediatrics Trauma at Agaro General Hospital. Heal Serv Res Manag Epidemiol. 2022; 9:1–8.
9. Alansari AN, Mekkodathil A, Peralta R, Baykuziyev T, Alhussaini NWZ, Asim M, et al. Patterns, mechanism of injury and outcome of pediatric trauma at a level 1 trauma centre: a descriptive retrospective analysis. Front Pediatr [Internet]. 2023;11(April):1–9. Available from: https://doi.org/10.3389/fped.2023.1084715
10. Ríos-pérez ADL, García AF, Gomez P, Arias JJ, Fandiño-losada A. Quality of pediatric trauma care: development of an age-adjusted TRISS model and survival benchmarking in a major trauma center. Front Pediatr [Internet]. 2024;12(December):1–12. Available from: https://doi.org/10.3389/fped.2024.1481467