

ORIGINAL ARTICLE**Observational Study on Patterns of Pediatric Surgical Emergencies in a Tertiary Hospital**¹Jagveer Singh, ²Siddarth Jain¹Assistant Professor, Department of Pediatrics, F H Medical College Hospital, Firozabad, Uttar Pradesh, India;²Assistant Professor, Department of General Surgery, Rama Medical College Hospital & Research Centre, Hapur, Uttar Pradesh, India**ABSTRACT:**

Background: Pediatric surgical emergencies present unique challenges due to the varying age-related conditions, often requiring rapid diagnosis and timely intervention. These emergencies include acute abdominal conditions, trauma, congenital anomalies, and infections, among others. Tertiary hospitals play a crucial role in managing complex cases, but patterns and outcomes can vary based on demographic and regional factors. Understanding these patterns is essential for improving management strategies and outcomes. **Aim:** This study aims to investigate the patterns of pediatric surgical emergencies in a tertiary hospital, focusing on the demographic characteristics, types of surgical emergencies, clinical presentation, management approaches, and early outcomes. The findings aim to contribute to the optimization of clinical practices in managing pediatric surgical emergencies in similar healthcare settings. **Materials and Methods:** An observational, descriptive study was conducted on 65 pediatric patients who presented with surgical emergencies to a tertiary pediatric surgery department. Data were collected prospectively using a structured proforma, which included demographic details, presenting symptoms, diagnostic findings, management strategies, and immediate outcomes. Statistical analysis was performed to examine associations between clinical features, surgical interventions, and patient outcomes. **Results:** The study cohort consisted of 42 males (64.62%) and 23 females (35.38%), with the majority of patients (30.77%) being in the 1–5 years age group. Acute abdominal conditions were the most common (43.08%), followed by trauma (21.54%) and congenital anomalies (15.38%). The most common presenting symptoms were abdominal pain (50.77%), vomiting (44.62%), and fever (33.85%). Operative management was required in 63.08% of cases. Most patients (73.85%) had uneventful recoveries, with 10.77% requiring ICU care. No fatalities were recorded. **Conclusion:** This study provides valuable insights into the patterns and outcomes of pediatric surgical emergencies in a tertiary hospital. The findings emphasize the importance of early recognition and intervention, especially in acute abdominal cases, and highlight the need for appropriate resource allocation to manage surgical emergencies effectively. Further studies are needed to explore long-term outcomes and refine emergency protocols.

Keywords: Pediatric Surgery, Surgical Emergencies, Acute Abdominal Conditions, Trauma,

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INTRODUCTION

Children represent a distinct patient population in surgical care, characterized not only by differing anatomy, physiology and developmental needs compared to adults, but also by a unique spectrum of surgical emergencies that demand timely recognition, rapid decision-making, and specialized resources. Surgical emergencies in the pediatric age group are inherently challenging because of the narrow time window for intervention, increased risk of morbidity and mortality when diagnosis or management is delayed, and the long-term consequences of a surgically correctable condition in a growing child. In many tertiary referral hospitals, the burden of urgent paediatric surgical work—both congenital and acquired emergencies—constitutes a significant proportion of the workload, yet remains under-explored in many regions. Globally, although infectious and obstetric-neonatal conditions have dominated child health agendas for decades, the contribution of surgical emergencies to childhood

morbidity and mortality is increasingly recognised. For example, surveys in low- and middle-income countries (LMICs) estimate that up to 19% of children have a surgically treatable condition, and many children lack access to safe timely surgical care.¹ Children with surgical emergencies present a particularly vulnerable group: they often arrive late, in unstable condition, and their outcomes are influenced by both intrinsic factors (age, physiology, underlying pathology) and extrinsic factors (referral delays, resource constraints, specialist availability).² Within the tertiary hospital setting, understanding the patterns of pediatric surgical emergencies is essential for resource allocation, service planning, workforce training, and perioperative care pathway development. In the paediatric age group, the distribution of surgical emergencies varies widely by age. Neonates and infants face congenital anomalies (intestinal atresia, malrotation with volvulus, diaphragmatic hernia, abdominal wall defects) and also acquired conditions like necrotising enterocolitis

and volvulus; whereas older children more commonly present with acute abdomen (appendicitis, intussusception), trauma, and obstructive uropathy.³ The “rule of six” mnemonic—approximating age of presentation for certain abdominal surgical emergencies (e.g., malrotation at ~6 days, pyloric stenosis ~6 weeks, intussusception ~6 months, appendicitis ~6 years)—recognises this shifting age-based spectrum.⁴ In tertiary care settings, a knowledge of which age-groups contribute most to emergency surgical admissions supports efficient triage, diagnostic imaging availability, and dedicated operative scheduling. Beyond age distribution, gender differences, referral patterns and sociocultural factors inform the presentation of emergencies. Several reports reveal a male predominance in paediatric surgical admissions, possibly reflecting gender-based differences in health-seeking behaviour or risk exposures. The tertiary hospital remains the primary destination for complex or late-presenting cases; in resource-constrained settings, district hospitals may lack paediatric surgical expertise, resulting in delayed referral and worsened outcomes.⁵ The relationship between demographic characteristics (age, gender, residence), presenting pathology, and the need for operative intervention is under-documented in many regions, particularly in South Asia and Africa. Acute abdominal emergencies continue to form the largest category of paediatric surgical emergencies, with conditions such as appendicitis, small-bowel obstruction, typhoid ileal perforation, and incarcerated hernia being frequently reported.⁶ Trauma is also emerging as a major contributor to paediatric surgical emergencies, driven by road traffic injuries, falls, and burns in children. Congenital anomalies that present acutely (for example, malrotation with midgut volvulus, obstructed congenital diaphragmatic hernia) span neonatal to older age ranges and add complexity to the emergency workload. Recognising the relative proportions of these categories at a given tertiary hospital enables tailored staffing, theatre readiness, and postoperative critical care planning. From a diagnostic viewpoint, the presenting features of paediatric surgical emergencies can diverge from adult patterns. Children often present with nonspecific symptoms, atypical signs, and may decompensate rapidly due to lower physiological reserve. Symptoms such as abdominal pain, vomiting, distension, fever or trauma-related complaints are common but may carry different predictive values compared to adults. Timely diagnosis correlates with better outcomes and lower complication rates; conversely, signs of sepsis, hemodynamic instability, or delayed presentation are known to increase morbidity.⁷ Therefore, capturing the symptom-profile in a tertiary centre helps define alert thresholds, activate surgical teams earlier, and optimise perioperative resuscitation.

MATERIALS AND METHODS

This study was conducted as an observational, descriptive analysis focusing on paediatric surgical emergencies presenting to the tertiary-level paediatric surgery department. The design aimed to evaluate the clinical patterns, demographic characteristics, diagnostic profiles, and emergency management approaches among children requiring urgent surgical care. All observations were recorded prospectively at the time of presentation and during the course of emergency evaluation and treatment. The study included a total of 65 paediatric patients who presented with conditions meeting the criteria for surgical emergencies. Children from birth to 18 years of age were enrolled irrespective of gender, socioeconomic background, or referral status. Each case was evaluated by the on-call paediatric surgery team immediately on arrival. Patients who were treated primarily by other specialties such as paediatric medicine, neurology, or orthopedics, without surgical indication, were excluded. Additionally, incomplete case records or patients who left against medical advice before evaluation were not considered.

Inclusion and Exclusion Criteria

Children presenting with acute abdominal conditions, obstructive symptoms, traumatic injuries requiring surgical intervention, congenital anomalies presenting as emergencies, and inflammatory surgical pathologies were included. Cases that did not require surgical evaluation, such as isolated medical emergencies, minor trauma not requiring surgical care, or stable postoperative follow-ups, were excluded. Patients whose guardians did not provide consent for participation were also omitted from the analysis.

Methodology

Data were collected systematically using a structured proforma completed at the time of admission. Information included demographic details such as age, sex, place of residence, and referral source. Clinical parameters recorded were presenting symptoms, vital signs, duration of symptoms, physical examination findings, and provisional diagnosis. Diagnostic investigations, including hematological tests, radiographs, ultrasonography, or other imaging modalities, were documented as indicated. Emergency management details, operative procedures, intraoperative findings, and need for postoperative intensive care were recorded. The final diagnosis and immediate short-term outcomes were captured for every patient. The primary variables included pattern and distribution of presenting complaints, frequency of specific surgical emergencies, and correlation between clinical findings and definitive diagnoses. Additional parameters assessed were type and timing of interventions, complications at presentation, hemodynamic stability, presence of sepsis or dehydration, and the requirement for resuscitation.

Operative versus non-operative management decisions, length of hospital stay, and early postoperative complications were also evaluated to identify trends in emergency care. Data were compiled and processed using appropriate statistical software. Categorical variables such as diagnosis, gender distribution, and intervention type were expressed as frequencies and percentages. Continuous variables, including age and physiological parameters, were summarized using means and standard deviations wherever applicable. Comparative analysis was performed to evaluate associations between clinical findings and outcomes. Statistical results were interpreted to identify predominant patterns of pediatric surgical emergencies.

RESULTS

Table 1 shows that the majority of pediatric surgical emergency patients belonged to the age group of 1–5 years (30.77%), followed by those aged 11–18 years (27.69%) and 6–10 years (23.08%), while infants below one year contributed 18.46% of the cases. This distribution indicates that emergencies were more commonly seen in early and mid-childhood. The table also shows a clear male predominance, with 64.62% males and 35.38% females presenting with surgical emergencies. This suggests that boys were almost twice as likely to present with surgical emergencies compared to girls. However, the comparison between gender and age-group distribution did not show a statistically significant association ($p = 0.214$), indicating that although males were more in number, the distribution of ages among males and females was not significantly different.

Table 2 shows that acute abdominal conditions formed the largest proportion of pediatric surgical emergencies, accounting for 43.08% of all cases, making it the most frequent reason for emergency surgical consultation. Trauma requiring surgical intervention was the second most common category, constituting 21.54% of patients, while congenital anomalies presenting as emergencies represented 15.38%. Infectious conditions like abscesses and complicated hernias accounted for 13.85%, and urological emergencies were the least common at 6.15%. The comparison between trauma versus non-trauma emergencies showed a statistically significant difference ($p = 0.031$), indicating that the frequency of

trauma-related cases differed significantly compared to other categories and may reflect specific epidemiological or environmental factors influencing injury patterns in children.

Table 3 shows that the most common presenting symptom was abdominal pain, reported in 50.77% of the patients, followed closely by vomiting (44.62%) and fever (33.85%), suggesting that gastrointestinal and inflammatory symptoms were predominant among pediatric surgical emergencies. Abdominal distension was seen in 27.69%, while trauma-related presentations constituted 21.54%. Signs of sepsis were observed in 12.31%, indicating that a subset of children presented with advanced infection requiring urgent intervention. The association between abdominal pain and final surgical diagnosis was statistically significant ($p = 0.018$), meaning abdominal pain was strongly correlated with conditions that ultimately required surgical management.

Table 4 shows that a majority of patients were managed through operative intervention, with 63.08% undergoing surgery, while 36.92% were treated non-operatively. This demonstrates that nearly two-thirds of pediatric surgical emergencies required definitive surgical procedures. The association between the type of emergency and the need for surgery was statistically significant ($p = 0.009$), indicating that certain emergencies—particularly acute abdominal conditions—were significantly more likely to require operative management compared to others.

Table 5 shows that most patients had an uneventful recovery, accounting for 73.85% of the study population, reflecting favorable immediate outcomes in the majority of cases. Postoperative complications occurred in 15.38%, indicating that a small but important proportion experienced adverse outcomes such as infections, wound issues, or systemic complications. ICU care was required in 10.77% of patients, reflecting the severity of certain clinical conditions. Notably, there were no mortalities (0.00%), suggesting effective early recognition and management of pediatric surgical emergencies. The association between ICU requirement and the presence of sepsis was statistically significant ($p = 0.004$), demonstrating that septic children were much more likely to require intensive supportive care.

Table 1: Age and Gender Distribution of Patients (N = 65)

Variable	Frequency	Percentage (%)
Age Groups		
<1 year	12	18.46%
1–5 years	20	30.77%
6–10 years	15	23.08%
11–18 years	18	27.69%
Gender		
Male	42	64.62%
Female	23	35.38%

Comparison of gender vs. age-group distribution: $p = 0.214$ (not statistically significant)

Table 2: Pattern of Pediatric Surgical Emergencies

Type of Emergency	Frequency	Percentage (%)
Acute abdomen (appendicitis, obstruction, peritonitis)	28	43.08%
Congenital anomalies presenting as emergency	10	15.38%
Trauma requiring surgical intervention	14	21.54%
Infections (abscess, complicated hernia, etc.)	9	13.85%
Urological emergencies	4	6.15%

Comparison between trauma vs. non-trauma emergencies: $p = 0.031$ (statistically significant)

Table 3: Presenting Symptoms and Clinical Profile

Clinical Parameter	Frequency	Percentage (%)
Abdominal pain	33	50.77%
Vomiting	29	44.62%
Abdominal distension	18	27.69%
Fever	22	33.85%
Trauma-related complaints	14	21.54%
Signs of sepsis	8	12.31%

Association between abdominal pain and final surgical diagnosis: $p = 0.018$ (significant correlation)

Table 4: Management Approach (Operative vs. Non-operative)

Management Type	Frequency	Percentage (%)
Operative management	41	63.08%
Non-operative management	24	36.92%

Association of emergency type with operative requirement: $p = 0.009$ (significant; acute abdomen more likely to need surgery)

Table 5: Post-Intervention Outcomes

Outcome Parameter	Frequency	Percentage (%)
Uneventful recovery	48	73.85%
Postoperative complications	10	15.38%
ICU requirement	7	10.77%
Mortality	0	0.00%

Correlation between ICU requirement and presence of sepsis: $p = 0.004$ (statistically significant)

DISCUSSION

In this study a predominant age-group of 1-5 years (30.77%) in our cohort, followed by 11-18 years (27.69%) and 6-10 years (23.08%), while infants under one year contributed only 18.46%; male patients made up 64.62% vs. 35.38% females ($p = 0.214$ for gender versus age-group). This pattern of early childhood predominance and male preponderance aligns with prior literature. McCollough et al. (2003) noted that infants and toddlers presenting with surgical abdominal emergencies often show delayed diagnoses due to nonspecific symptoms and that the age distribution tends toward younger children.⁸ Although their exact age breakdown differs, the concept of a younger predominant group is consistent. Further, global reviews have emphasised a higher male representation in paediatric surgical and trauma cases, suggesting gender differences in exposure or referral patterns.⁹ Thus, our finding of ~65% male aligns broadly with that expectation and the age-distribution reinforces the need to focus on the pre-school age group for sentinel surgical emergency surveillance. Turning to the spectrum of emergencies, In our study shows acute

abdominal conditions at 43.08%, trauma at 21.54%, congenital anomalies 15.38%, infections (abscess/complicated hernia) 13.85% and urological emergencies 6.15%. The statistically significant difference between trauma and non-trauma ($p = 0.031$) underlines a meaningful distribution of surgical emergencies. In the review by Barber-Berent & Kornblith (2013), they emphasised that abdominal emergencies (intussusception, volvulus, appendicitis) are among the most common in children requiring urgent surgery.¹⁰ While that review did not provide precise percentages for developing-country distributions, it corroborates the dominance of abdominal emergencies in children. Another retrospective study of neonatal/infant abdominal emergencies (2013) noted that acute abdomen remains the commonest entity requiring urgent surgery in children.¹¹ Thus, our 43.08% for acute abdominal emergencies is consistent with literature, though the relatively high trauma proportion (21.54%) may reflect regional referral or injury patterns in our setting, making the p-value significance relevant for policy focusing on injury prevention. In this study presenting symptom profile shows abdominal pain in

50.77% of patients, vomiting in 44.62%, fever in 33.85%, abdominal distension in 27.69%, trauma-related complaints in 21.54%, and sepsis signs in 12.31%. The association of abdominal pain with definitive diagnosis ($p=0.018$) highlights its diagnostic value. In the 2013 review by Klingensmith et al., it was stated that in children, presentation of acute abdomen often includes vomiting and abdominal pain though younger children localise pain less well and may present with more subtle signs.¹² Our findings are compatible with that: the lower than 100% rate of pain likely reflects younger children's difficulty in localisation. Also, the 12.31% sepsis rate underscores delayed presentation risk; Pandey et al. (2011) found that in low and middle income hospital settings children presenting late with infection signs carry worse outcomes in emergency surgery.¹³ Hence our symptom profile reinforces established patterns while quantifying them in our tertiary-hospital cohort. This study demonstrates that 63.08% of our patients underwent operative management, while 36.92% were managed non-operatively; the association between type of emergency and operative requirement was significant ($p=0.009$). This operative rate is broadly consistent with earlier literature emphasising that the majority of urgent paediatric surgical emergencies require operative interventions. Höllwarth et al. (2008) reported that in tertiary-level paediatric surgery units, more than half of emergency admissions eventually needed surgery.¹⁴ Our ~63% figure fits this expectation and the significant p-value suggests that categorisation of emergencies (for instance acute abdomen) can reliably predict operative requirement—a useful finding for resource-planning and triage. Finally, Table 5 shows that 73.85% had uneventful recovery, 15.38% had postoperative complications, 10.77% required ICU care and mortality was 0%. The correlation between ICU requirement and sepsis ($p=0.004$) indicates the impact of systemic illness on resource-intensive care. In developing-country series, mortality in paediatric surgical emergencies has been higher: for example, Peled et al. (2010) reported mortality rates of ~2–3% in emergency paediatric laparotomies in a tertiary referral hospital in a lower-resource context.¹⁵ Our zero-mortality is favourable and may reflect effective early care or selection bias; however the complication (15.38%) and ICU rates highlight that significant morbidity remains. The strong link of sepsis to ICU need reinforces the imperative of early resuscitation and sepsis control in surgical emergencies.

CONCLUSION

In conclusion, this observational study highlights the key patterns of pediatric surgical emergencies in a tertiary hospital, emphasizing the predominance of acute abdominal conditions and trauma, with a higher male incidence. The findings underscore the importance of timely diagnosis, surgical intervention,

and appropriate resource allocation to improve patient outcomes. The low mortality rate and favorable recovery in the majority of cases reflect effective emergency management, while the identified associations between symptom presentation, surgical need, and postoperative outcomes provide valuable insights for improving pediatric surgical care. Further studies in diverse settings are recommended to validate these results and optimize emergency protocols.

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