

SPECTRUM OF ACUTE GENERAL SURGICAL ADMISSIONS AND
FACTORS ASSOCIATED WITH DISEASE GROUPS: A CROSS-SECTIONAL
STUDY FROM TERTIARY CARE HOSPITAL IN LAHORE, PAKISTAN

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Abstract

Background: Emergency general surgery places a heavy burden on hospitals in low- and middle-income countries, but recent Pakistani data on its case mix and associated patient factors are limited. Hence, this study aims to assess spectrum of acute general surgical admissions and identify associated patient factors.

Methods: This retrospective cross-sectional study reviewed 20 available departmental emergency reports of patients admitted to general surgery ward from May to August 2026 at Surgical Unit 1, Services Hospital, Lahore. Admissions were grouped into eight disease categories and compared with chi-square, Fisher's exact and Kruskal-Wallis tests; diabetes was assessed with logistic regression adjusted for age and sex and p value equal to or less than 0.05 considered statistically significant.

Results: Of 169 general surgery admissions, 61.5% were male; mean age was 38.9 ± 16.3 years. Appendicitis (26.6%) and gallbladder or pancreatic disease (19.5%) were commonest, followed by soft-tissue infections (14.2%), trauma (12.4%), peritonitis (10.1%) and complicated hernias (7.7%). Gallbladder disease was predominantly female (69.7% vs 30.9%, $p < 0.001$) and all managed conservatively in emergency. Appendicitis accounted for 11 of 19 children, while 10 of 12 hernia patients were aged 50 or older. Diabetes was independently associated with soft-tissue infection (adjusted OR 11.9, 95% CI 3.8–37.0, $p = < 0.05$), and 6 of 8 diabetic foot patients underwent major amputation. Typhoid was the commonest

non-appendiceal cause of peritonitis, and 39.3% of laparotomies ended with a stoma.

Conclusion: Appendicitis and gallstone disease dominated emergency admissions, each with a distinct age and sex profile. Diabetes was strongly and independently linked with limb-threatening infection, and much of the remaining workload, including typhoid perforation and diabetic foot sepsis, was potentially preventable.

INTRODUCTION

Emergency general surgery makes up a large share of surgical hospital admissions and carries higher morbidity and mortality than elective surgery.¹ In low- and middle-income countries the burden is heavier still: access to timely surgery is limited, and many patients arrive late.²

The case mix of surgical emergencies differs between settings. Alongside appendicitis, gallstone disease and hernias, surgeons in Pakistan also manage conditions that are uncommon in high-income countries. Extensively drug-resistant typhoid emerged in Pakistan in 2016,³ the country has one of the highest national prevalences of diabetes,⁴ and road traffic injuries remain a leading cause of death and disability, with riders of two-wheelers especially vulnerable.⁵

Knowing the local case mix, and the patients behind it, helps departments plan staffing, theatre time and beds, and shows where prevention outside the hospital could reduce surgical workload. Published data on the emergency workload of general surgical units in Pakistan are limited and mostly older.⁶ This study therefore aimed to describe the case mix and initial management of acute general surgical admissions at a tertiary care hospital in Lahore, and to identify patient factors associated with the main disease groups.

Methods

Study Design, Setting and Population

This retrospective cross-sectional study was conducted in the Department of General Surgery, Surgical Unit 1, Services Hospital, Lahore between May to August 2026. The data

from the 20 departmental emergency reports were retrieved using non-probability convenience sampling. Data of the patients admitted to ward from emergency was collected only. Patients that were cleared from general surgery and admitted to other specialities were excluded.

Disease Groups

Final diagnoses were grouped into eight categories: appendicitis, gallbladder and pancreatic disease, soft-tissue infection, trauma admitted to general surgery, secondary peritonitis, complicated hernia, intestinal obstruction and other conditions. The diagnoses within each group are detailed in the Results.

Variables and Definitions

Data extracted were age, sex, documented diabetes, final diagnosis, management at presentation, procedure performed, stoma formation, mechanism of injury, hernia recurrence and any treatment for the same illness at another facility before arrival. Diabetes was recorded as present only when documented in the report. Management was classed as operative if surgery was performed during that emergency admission, and conservative if the patient was admitted for non-operative care; later surgery was recorded when a subsequent report documented it. Major amputation was defined as amputation above the ankle. Patients were classed as children if younger than 18 years and as older adults if aged 50 years or more.

Statistical Analysis

Data were analysed with SPSS version 26. Categorical data were reported as frequencies and

percentages, and age as mean $\pm$ standard deviation or median and interquartile range (IQR). Age was compared across groups with the Kruskal-Wallis's test and sex with the chi-square test. Spectrum of diseases and associated patients' factors were tested with the chi-square or Fisher's exact test. Because diabetic patients were older, binary logistic regression was used to adjust the association of diabetes with soft-tissue infection for age and sex, and results were reported as odds ratios (OR) with 95% confidence intervals (CI). A p-value below 0.05 was considered significant.

Ethical Considerations

The study protocol was submitted to institutional review board (IRB) of Services Institute of Medical Sciences; however, the study was granted exemption from full review and the requirement for informed consent was waived because the study used anonymised existing record. Patient names were replaced with study numbers before analysis.

Results

The retrieved data yielded 169 admissions to surgical ward, a median of 8 per day (range 4–12). Patient characteristics are shown in **Table 1**. Overall, 97 patients (57.4%) were operated at presentation.

Appendicitis and gallbladder or pancreatic disease together accounted for almost half of all admissions, and the groups differed significantly in age ($p < 0.001$) and sex ($p < 0.001$) (**Table 2**). Diagnoses within each group are detailed in **Table 3** and procedures in **Table 4**.

The main findings within groups were as follows. All 33 gallbladder and pancreatic patients were managed conservatively at presentation. Typhoid ileal perforation was the commonest cause of secondary peritonitis (6 of 17). Of 28 emergency laparotomies, 11 (39.3%) ended with a stoma, including all 6 typhoid perforations. Six of 8 diabetic foot patients underwent major amputation. Motorbikes were involved in 11 of 12 road traffic injuries requiring admission, and

6 of 13 complicated hernias were recurrent or incisional.

Associations with age and sex. Women made up 69.7% of gallbladder and pancreatic cases, compared with 30.9% of other admissions ($p < 0.001$). All 21 admitted trauma patients were male. Appendicitis accounted for 11 of the 19 patients under 18 years, and only 3 of 45 appendicitis patients were aged 50 or older; in contrast, 10 of 12 complicated hernia patients with a recorded age were 50 or older. Diabetes was more frequent in patients aged 50 or older (15 of 50, 30.0%) than in younger patients (12 of 118, 10.2%; $p = 0.003$). These comparisons are summarised in **Table 5**.

Diabetes and soft-tissue infection: Diabetes was documented in 14 of 24 patients with soft-tissue infection (58.3%), compared with 14 of 145 other admissions (9.7%; $p < 0.001$) (**Table 5**). Because patients with soft-tissue infection were also older (mean 47.5 vs 37.5 years), the association was adjusted for age and sex. Diabetes remained independently associated with soft-tissue infection (adjusted OR 11.9, 95% CI 3.8–37.0, $p < 0.001$), whereas age and sex were not (**Table 6**).

Sex and operative management: Men were operated at presentation more often than women (66 of 104, 63.5% vs 31 of 65, 47.7%; $p = 0.055$). After excluding gallbladder and pancreatic cases, which were all managed conservatively and mostly female, the rates were similar (70.2% vs 73.8%; $p = 0.84$) (**Table 5**).

Discussion

In this study, appendicitis and gallstone disease made up almost half of emergency general surgical admissions, and each disease group had a distinct patient profile. A large part of the remaining workload came from largely preventable conditions: typhoid perforation, diabetic foot sepsis, motorbike injuries and neglected hernias.

Seven in ten gallbladder and pancreatic patients were women, compared with three in ten other admissions, in keeping with the well-known

female predominance of gallstone disease.⁷ Appendicitis was a disease of the young and accounted for most admitted children, while complicated hernias were almost exclusively a problem of patients aged 50 or older. Men appeared to be operated more often than women, but the difference disappeared once gallbladder cases were excluded. This shows that it reflected case mix rather than any difference in how men and women were treated.

None of the 33 gallbladder and pancreatic patients was operated at presentation. The Tokyo Guidelines 2018 recommend early laparoscopic cholecystectomy for suitable patients with mild or moderate acute cholecystitis,⁸ and early surgery is as safe as delayed surgery while shortening total hospital stay.⁹ A conservative-first policy may reflect limited emergency theatre time, but it exposes patients to recurrent attacks while they wait for interval surgery, and deserves a separate audit.

Diabetes was the strongest patient factor in our data. Diabetic patients were older, but the association with soft-tissue infection remained after adjustment for age and sex, with about twelve times the odds. Age itself was no longer associated once diabetes was accounted for, suggesting that diabetes rather than age drives these infections. Three in four diabetic foot patients lost a limb, and three diabetic feet were already infested with maggots on arrival, showing how late these patients presented. Given Pakistan's high diabetes prevalence,⁴ structured foot screening and early referral could prevent many of these amputations.¹⁰

Typhoid perforation was the commonest cause of non-appendiceal peritonitis and affected young adults. All six patients received an ileostomy, which adds a second operation, stoma care and cost. Delayed surgery, drug resistance and limited postoperative care keep outcomes poor in low- and middle-income countries.¹¹ The lasting solution lies outside the operating theatre, in safe water, sanitation and typhoid vaccination.^{3,11}

Every trauma patient was male, and motorbikes were involved in 11 of 12 road traffic injuries,

while firearm injuries accounted for almost a quarter of trauma admissions. Helmet use and road safety enforcement are proven measures against two-wheeler deaths.⁵ Five patients with blunt abdominal trauma were managed without laparotomy, in line with current practice of selective non-operative management.

Almost half of the complicated hernias were recurrent or incisional, and several had been known for years before becoming obstructed. Emergency groin hernia repair carries a seven-fold higher mortality than elective repair, rising to twenty-fold when bowel resection is needed.¹² Timely elective repair, and good-quality primary repair, would reduce these emergencies. One in 15 patients overall had already been treated for the same illness at another facility, and some admissions were complications of earlier care, including a uterine perforation after an abortion by an unqualified provider, an injection-site abscess and a suspected retained swab after caesarean section.

Conclusion

Appendicitis and gallstone disease dominated acute general surgical admissions, each with a distinct profile: appendicitis in the young and gallbladder disease predominantly in women. Diabetes was strongly and independently associated with soft-tissue infection, and three in four diabetic foot patients lost a limb. Typhoid perforation, diabetic foot sepsis, motorbike injuries and recurrent hernias made up a large and largely preventable share of the remaining workload.

Beyond the hospital, typhoid vaccination and safe water, structured diabetic foot screening, helmet enforcement and timely elective hernia repair could reduce this workload.

Declarations

Ethical approval: Exemption of full review was granted by the IRB of Services Institute of Medical Sciences, Lahore because the study used anonymised existing record.

Conflict of interest: The authors declare no conflict of interest.

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Author contributions: Muhammad Imran contributed to study conception, design, data collection, analysis, interpretation, and manuscript drafting. Ahmad Alyas, Muhammad Adeel, and Zahwa Alyas contributed to data collection, analysis, and critical revision of the manuscript. Muhammad Adil Abbasi contributed to literature review and manuscript revision. Prof. Dr. Muhammad Nadeem Aslam provided supervision, guidance, and critical revision. All authors approved the final manuscript and agreed to be accountable for the work.

Data availability: Anonymised data are available from the corresponding author on reasonable request.

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Table 1. Patient characteristics (n = 169)

Characteristic	Value
Age, mean $\pm$ SD (range), years*	38.9 $\pm$ 16.3 (12–75)
Age <18 years*	19 (11.3%)
Age 18–30 years*	42 (25.0%)
Age 31–45 years*	53 (31.5%)
Age 46–60 years*	37 (22.0%)
Age >60 years*	17 (10.1%)
Male sex	104 (61.5%)
Documented diabetes	28 (16.6%)
Operated at presentation	97 (57.4%)
Managed conservatively at presentation	72 (42.6%)
Later operated during the same admission	3 of 72 (4.2%)
Treated for the same illness at another facility before arrival	11 (6.5%)

*Age was not recorded for one patient; age data are based on n = 168. SD, standard deviation.

Table 2. Case mix by disease group (n = 169)

Disease group	n (%)	Male, n (%)	Age, median (IQR), years	Operated at presentation, n (%)	Diabetic, n
Appendicitis	45 (26.6)	34 (76)	29 (18–39)	37 (82)	3
Gallbladder and pancreas	33 (19.5)	10 (30)	45 (34–58)	0 (0)	4
Soft-tissue infection	24 (14.2)	13 (54)	46 (42–56)	17 (71)	14
Trauma admitted to General surgery	21 (12.4)	21 (100)	28 (20–44)	13 (62)	1
Secondary peritonitis	17 (10.1)	11 (65)	36 (26–59)	16 (94)	3
Complicated hernia	13 (7.7)	7 (54)	53 (50–57)	10 (77)	3
Intestinal obstruction	8 (4.7)	3 (38)	31 (23–34)	2 (25)	0
Other	8 (4.7)	5 (62)	35 (26–49)	2 (25)	0

Age differed across groups (Kruskal-Wallis test, $p < 0.001$), as did sex (chi-square test, $p < 0.001$). IQR, interquartile range.

Table 3. Diagnoses and mechanisms within disease groups

Disease group and diagnosis	n (% of group)
Appendicitis (n = 45)	
Acute appendicitis treated by appendectomy	37 (82.2)
Appendicular mass	4 (8.9)
Appendicitis managed non-operatively	4 (8.9)
Gallbladder and pancreas (n = 33)	
Acute cholecystitis	24 (72.7)
Acute pancreatitis	5 (15.2)
Choledocholithiasis or obstructive jaundice	4 (12.1)
Soft-tissue infection (n = 24)	
Cellulitis	9 (37.5)
Diabetic foot	8 (33.3)
Necrotising soft-tissue infection	2 (8.3)
Carbuncle	2 (8.3)
Injection-site abscess	1 (4.2)
Infected traumatic wound	1 (4.2)
Infected pressure sore	1 (4.2)
Trauma admitted to General Surgery (n = 21)	
Road traffic injury	12 (57.1)
Motorbike involved	11 of 12
Firearm injury	5 (23.8)
Fall	2 (9.5)
Stab wound	1 (4.8)
Farm machine injury	1 (4.8)
Secondary peritonitis (n = 17)	
Typhoid ileal perforation	6 (35.3)
Peptic ulcer perforation	3 (17.6)
Intra-abdominal abscess	2 (11.8)
Colonic perforation proximal to obstructing rectal cancer	1 (5.9)
Ileocaecal perforation with gangrenous caecum	1 (5.9)
Band strangulation with small-bowel perforation	1 (5.9)

Disease group and diagnosis	n (% of group)
Mesenteric ischaemia	1 (5.9)
Uterine perforation after unsafe abortion	1 (5.9)
Peritonitis with no source identified	1 (5.9)
Complicated hernia (n = 13)	
Inguinal	5 (38.5)
Umbilical or paraumbilical	5 (38.5)
Incisional	3 (23.1)
Recurrent or incisional (all sites)	6 (46.2)
Intestinal obstruction (n = 8)	
Adhesive or postoperative obstruction	3 (37.5)
Subacute obstruction, cause not established	3 (37.5)
Trichobezoar	1 (12.5)
Suspected abdominal tuberculosis	1 (12.5)
Other (n = 8)	
Haemorrhoids	3 (37.5)
Corrosive ingestion	1 (12.5)
Suspected retained surgical swab	1 (12.5)
Abdominal tuberculosis	1 (12.5)
Feeding jejunostomy leak	1 (12.5)
Pain after recent laparotomy	1 (12.5)

Table 4. Operative procedures and findings

Procedure or finding	n
Appendectomy	37
Emergency laparotomy (all indications) *	28
For secondary peritonitis	17
For trauma	4
For perforated appendicitis	2
For complicated hernia	2
For intestinal obstruction	2
Re-exploration for necrotising pancreatitis	1
Ended with a stoma	11 of 28 (39.3%)

Procedure or finding	n
Typhoid perforation treated with ileostomy	6 of 6
Hernia repair without laparotomy	8
Mesh used (all 10 hernia operations)	1 of 10
Bowel or omental resection for compromised contents	2 of 10
Major limb amputation	7
Below-knee (diabetic foot)	4
Above-knee (diabetic foot)	2
Above-elbow (infected pressure sore)	1
Debridement, excision or drainage for soft-tissue infection	10
Trauma procedures other than laparotomy	9
Limb vascular exploration	3
Tube thoracostomy	3
Wound exploration	2
Hand debridement	1
Other procedures	2

*Includes 2 laparotomies in patients initially managed conservatively. A third patient in this group was later explored, but the operation was not described in the reports.

Table 5. Patient factors associated with disease groups and with operative management (n = 169)

Factor and comparison	Compared groups	Group 1, n (%)	Group 2, n (%)	p-value
Sex				
Female sex	Gallbladder and pancreas (n = 33) vs all other admissions (n = 136)	23 (69.7)	42 (30.9)	<0.001
Male sex	Trauma (n = 21) vs all other admissions (n = 148)	21 (100)	83 (56.1)	<0.001
Age*				
Age below 18 years	Appendicitis (n = 45) vs all other admissions (n = 123)	11 (24.4)	8 (6.5)	0.004
Age 50 years or older	Appendicitis (n = 45) vs all other admissions (n = 123)	3 (6.7)	47 (38.2)	<0.001
Age 50 years or older	Complicated hernia (n = 12) vs all other admissions (n = 156)	10 (83.3)	40 (25.6)	<0.001

Factor and comparison	Compared groups	Group 1, n (%)	Group 2, n (%)	p-value
Diabetes*				
Documented diabetes	Aged 50 years or older (n = 50) vs younger than 50 years (n = 118)	15 (30.0)	12 (10.2)	0.003
Documented diabetes	Soft-tissue infection (n = 24) vs all other admissions (n = 145)	14 (58.3)	14 (9.7)	<0.001
Operative management				
Operated at presentation	Men (n = 104) vs women (n = 65)	66 (63.5)	31 (47.7)	0.055
Operated at presentation, excluding gallbladder and pancreatic cases	Men (n = 94) vs women (n = 42)	66 (70.2)	31 (73.8)	0.84

*Age was not recorded for one patient, so age comparisons are based on 168 patients. All comparisons used Fisher's exact test. Percentages are within the group named in the column heading.

Table 6. Factors associated with soft-tissue infection: binary logistic regression (n = 168)

Factor	Soft-tissue infection (n = 24)	Other admissions (n = 144)	Crude OR (95% CI)	Adjusted OR (95% CI)	p (adjusted)
Documented diabetes	14 (58.3%)	13 (9.0%)	14.1 (5.2–38.0)	11.9 (3.8–37.0)	<0.001
Age, per year	47.5 ± 10.5*	37.5 ± 16.7*	1.04 (1.01–1.07)	1.01 (0.98–1.05)	0.51
Male sex	13 (54.2%)	91 (63.2%)	0.69 (0.29–1.65)	1.04 (0.38–2.87)	0.94

*Mean ± standard deviation. One patient with missing age was excluded from this analysis. Adjusted ORs come from a single model including diabetes, age and sex. OR, odds ratio; CI, confidence interval.