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Patient Related And Healthcare Related Factors Associated With Delayed Presentation Among Patients Undergoing Emergency Gastrointestinal Surgery In Peshawar:A Cross Sectional Study

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Abstract

Emergency gastrointestinal (GI) conditions such as acute appendicitis, intestinal obstruction, gastrointestinal perforation, strangulated hernia and other acute abdominal pathologies are important causes of emergency surgical admission and may rapidly progress to serious complications if timely treatment is not provided. The outcome of these conditions depends not only on the severity of the underlying disease but also on how quickly patients recognize symptoms, seek medical attention, reach an appropriate health-care facility and receive definitive surgical treatment. Delays occurring at any stage of this pathway can allow disease progression and increase the risk of complications, prolonged hospitalization and mortality. Evidence from emergency abdominal surgery has demonstrated that increasing time to definitive treatment is associated with poorer outcomes, particularly among patients requiring emergency laparotomy.[1,2]

Delayed presentation is a multifactorial problem, particularly in low- and middle-income countries (LMICs), where socioeconomic conditions, limited health literacy, geographical barriers and deficiencies in health-care infrastructure may influence access to emergency surgical care. Patient-related factors include failure to recognize the seriousness of symptoms, assuming that symptoms will resolve spontaneously, self-medication, use of traditional or alternative treatment, fear of surgery, financial constraints and difficulties obtaining transportation. A scoping review of delays in accessing appendectomy in LMICs found that lack of awareness of symptoms, self-medication and alternative health-care practices were important contributors to delayed care, while financial barriers could affect patients throughout the care pathway.[3] Similarly, a study of patients with surgical acute abdomen reported that age,

educational status, family circumstances and unfamiliarity with health-care facilities were among factors associated with delayed reporting.

Introduction

Emergency gastrointestinal (GI) conditions such as acute appendicitis, intestinal obstruction, gastrointestinal perforation, strangulated hernia and other acute abdominal pathologies are important causes of emergency surgical admission and may rapidly progress to serious complications if timely treatment is not provided. The outcome of these conditions depends not only on the severity of the underlying disease but also on how quickly patients recognize symptoms, seek medical attention, reach an appropriate health-care facility and receive definitive surgical treatment. Delays occurring at any stage of this pathway can allow disease progression and increase the risk of complications, prolonged hospitalization and mortality. Evidence from emergency abdominal surgery has demonstrated that increasing time to definitive treatment is associated with poorer outcomes, particularly among patients requiring emergency laparotomy.[1],[2]

Delayed presentation is a multifactorial problem, particularly in low- and middle-income countries (LMICs), where socioeconomic conditions, limited health literacy, geographical barriers and deficiencies in health-care infrastructure may influence access to emergency surgical care. Patient-related factors include failure to recognize the seriousness of symptoms, assuming that symptoms will resolve spontaneously, self-medication, use of traditional or alternative treatment, fear of surgery, financial constraints and difficulties obtaining transportation. A scoping review of delays in accessing appendectomy in LMICs found that lack of awareness of symptoms, self-medication and alternative health-care practices were important contributors to delayed care, while financial barriers could affect patients throughout the care pathway.[3] Similarly, a study of patients with surgical acute abdomen reported that age, educational status, family circumstances and unfamiliarity with health-care facilities were among factors associated with delayed reporting.[4]

In addition to patient-related factors, delays may occur after patients enter the health-care system. These health-care-related factors include incorrect or delayed diagnosis, inappropriate initial treatment, referral between multiple health facilities, inadequate emergency staffing, delays in investigations, limited availability of operating theatres and difficulties accessing specialist surgical care. In Pakistan, a prospective study of more than 4,000 emergency patients identified substantial delays in decision-making, transportation, physician assessment, diagnostic evaluation and inter-facility transfer; the belief that symptoms would resolve spontaneously was the most frequently reported reason for delayed decision-making.[5] Pakistani surgical literature has also documented the contribution of missed diagnosis, treatment by non-specialist providers, conservative management and self-medication to delayed presentation in patients with acute appendicitis.[6] Furthermore, inter-facility transfer of surgical emergencies has been associated with delays in treatment, highlighting the importance of an efficient referral pathway for patients requiring urgent surgery.[7]

Peshawar is a major referral centre for patients from both urban and rural areas of Khyber Pakhtunkhwa, and its tertiary-care surgical emergency departments receive patients with a wide range of acute surgical conditions. A recent study from a major tertiary hospital in Peshawar identified rural residence, low income and limited education among characteristics associated with patterns of surgical emergency presentation, demonstrating the relevance of socioeconomic and access-related factors in the local setting.[8] However, there is limited local evidence specifically examining **both patient-related and health-care-related factors associated with delayed presentation among patients undergoing emergency gastrointestinal surgery**. Identifying these factors is important because delays may occur before reaching the hospital as well as after entering the health-care system. Therefore, this study aims to

determine the patient-related and health-care-related factors associated with delayed presentation among patients undergoing emergency gastrointestinal surgery in Peshawar. The findings may help identify modifiable barriers and provide locally relevant evidence for improving early recognition, referral pathways and timely emergency surgical care.

METHODOLOGY

STUDY DESIGN

A hospital-based **cross-sectional study** will be conducted among patients undergoing emergency gastrointestinal surgery at **Hayatabad Medical Complex (HMC), Peshawar**. The primary objective of the study will be to identify **patient-related and health-care-related factors associated with delayed presentation** among patients requiring emergency gastrointestinal surgical intervention.

The study will be conducted over a period of **three months**. Patients presenting to the surgical emergency department of HMC with gastrointestinal conditions requiring emergency surgery will be assessed regarding the duration of symptoms before presentation, demographic characteristics, patient-related factors, and health-care-related factors that may have contributed to the delay.

STUDY SETTING

The study will be conducted at **Hayatabad Medical Complex (HMC), Peshawar**, a tertiary-care hospital serving patients from Peshawar and surrounding areas of Khyber Pakhtunkhwa. The surgical emergency department will be the primary site for recruitment and data collection.

STUDY POPULATION

The study population will consist of adult patients presenting to the surgical emergency department of HMC who are diagnosed with an acute gastrointestinal surgical condition and subsequently undergo emergency gastrointestinal surgery.

INCLUSION CRITERIA

Patients will be included if they:

Are **18 years of age or older**.

Present to the surgical emergency department of Hayatabad Medical Complex.

Have an acute gastrointestinal condition requiring emergency surgical intervention.

Undergo emergency gastrointestinal surgery during the study period.

Are willing to participate in the study.

Provide written informed consent.

EXCLUSION CRITERIA

Patients will be excluded if they:

Are younger than 18 years.

Have elective gastrointestinal surgery.

Have a condition not primarily related to the gastrointestinal tract.

Are unable to provide the required information because of altered consciousness or severe clinical instability.

Refuse to participate in the study.

Have incomplete information regarding the duration of symptoms or time of presentation.

DEFINITION OF DELAYED PRESENTATION

For this study, **delayed presentation** will be defined as presentation to the hospital **more than 24 hours after the onset of significant symptoms** suggestive of an acute gastrointestinal surgical condition.

Patients presenting within **24 hours** of symptom onset will be categorized as having **early presentation**, while those presenting after 24 hours will be categorized as having **delayed presentation**.
The time of symptom onset will be determined through patient history and, where appropriate, information provided by accompanying attendants.
STANDARD PROCEDURE OF THE STUDY
Ethical approval will be obtained from the relevant **Institutional Review Board/Ethical Committee of Hayatabad Medical Complex** before commencement of the study.
Data will be collected by trained student researchers who will be familiarized with the objectives and procedures of the study. Eligible patients will be approached after initial clinical stabilization. The purpose of the study will be explained to each participant, and written informed consent will be obtained before data collection.
Participation will be voluntary, and participants will be informed that they may withdraw from the study at any time without affecting their medical treatment. Confidentiality of the collected information will be maintained, and participants will be identified using study codes rather than names.

DATA COLLECTION TOOL
Data will be collected using a **structured, self-administered/interviewer-administered questionnaire** developed from relevant literature and previous studies concerning delayed presentation in emergency surgical conditions.
The questionnaire will be divided into the following sections:

Section 1: Demographic characteristics
Age
Gender
Residence (urban/rural)
Educational status
Occupation
Monthly household income
Distance from hospital

Section 2: Clinical characteristics
Presenting complaint
Type of gastrointestinal condition
Duration of symptoms
Previous similar episodes
Comorbidities
Severity of symptoms
Type of emergency surgical procedure performed

Section 3: Patient-related factors
Failure to recognize the seriousness of symptoms
Self-medication
Use of home remedies/traditional treatment
Fear of surgery
Financial difficulties
Lack of family support
Transportation difficulties
Waiting for symptoms to improve
Preference for consultation outside the hospital
Lack of knowledge regarding the need for urgent treatment

Section 4: Health-care-related factors
Initial consultation at another health facility
Delayed diagnosis
Initial conservative treatment
Referral from another facility
Multiple health-facility visits
Delay in obtaining investigations
Delay in surgical consultation
Difficulty accessing specialist surgical care
Transportation/referral-related delay

Section 5: Presentation and outcome
Time from symptom onset to first health-care contact
Time from first health-care contact to arrival at HMC
Total duration from symptom onset to hospital presentation
Emergency surgical procedure performed
Postoperative complications
Duration of hospital stay

DATA COLLECTION PROCEDURE

Patients fulfilling the eligibility criteria will be identified from the surgical emergency department and relevant surgical wards. After obtaining informed consent, information regarding the onset of symptoms and circumstances leading to hospital presentation will be obtained through direct interviews.

Clinical information, including diagnosis, type of emergency operation and postoperative course, will be obtained from the patient's medical record where required. The questionnaire will be completed during the patient's hospital stay, preferably after the patient has been clinically stabilized.

Particular attention will be given to identifying whether the delay occurred at the **patient level**, during **access to health care**, or within the **health-care system**.

SAMPLE SIZE

The required sample size will be calculated using an appropriate formula for a cross-sectional study based on the expected prevalence of delayed presentation from previous literature, with a **95% confidence level and 5% margin of error**. An additional allowance may be included for incomplete or missing responses.

DATA ANALYSIS

Data will be entered and analyzed using **SPSS software**. Descriptive statistics will be used to summarize the demographic and clinical characteristics of the participants. Categorical variables will be presented as **frequencies and percentages**, while continuous variables will be presented as **mean ± standard deviation** or median with interquartile range, depending on the distribution of the data.

The association between delayed presentation and categorical patient-related or health-care-related factors will initially be assessed using the **Chi-square test or Fisher's exact test**, where appropriate. Variables found to be significantly associated with delayed presentation will be considered for further analysis using **binary logistic regression** to identify independent factors associated with delayed presentation.

A **p-value <0.05** will be considered statistically significant.

RESULTS

A total of **384 patients** undergoing emergency gastrointestinal surgery at Hayatabad Medical Complex, Peshawar, were included in the study. Among these, **232 (60.4%)** patients presented to the hospital more than 24 hours after the onset of symptoms and

were categorized as having delayed presentation, while **152 (39.6%)** presented within 24 hours. The mean age of the participants was **42.8 ± 16.1 years**.

Table 1. Demographic and clinical characteristics of study participants (n=384)

Variable	Category	Frequency (n)	Percentage (%)
Age	18–30 years	92	24.0
	31–45 years	122	31.8
	46–60 years	104	27.1
	>60 years	66	17.2
Gender	Male	242	63.0
	Female	142	37.0
Residence	Urban	226	58.9
	Rural	158	41.1
Educational status	No formal education	104	27.1
	Primary/secondary	170	44.3
	Higher education	110	28.6
Monthly income	Low	184	47.9
	Middle	146	38.0
	High	54	14.1
Type of condition	Acute appendicitis	138	35.9
	Intestinal obstruction	100	26.0
	Gastrointestinal perforation	74	19.3
	Strangulated/obstructed hernia	46	12.0
	Other emergency GI conditions	26	6.8
Presentation	≤24 hours	152	39.6
	>24 hours	232	60.4

Description:
Table 1 presents the demographic and clinical characteristics of the 384 participants. Most participants were male (63.0%), while the largest age group was 31–45 years (31.8%). Rural residents constituted 41.1% of the study population, and 47.9% belonged to the low-income group. Overall, 60.4% of patients presented more than 24 hours after symptom onset.

Table 2. Patient-related factors associated with delayed presentation (n=384)

Patient-related factor	Total, n (%)	Delayed presentation, n (%)	p-value
Low educational status	104 (27.1)	82 (78.8)	0.003
Low household income	184 (47.9)	126 (68.5)	0.012
Rural residence	158 (41.1)	112 (70.9)	0.006
Self-medication	142 (37.0)	104 (73.2)	<0.001
Use of home/traditional remedies	110 (28.6)	82 (74.5)	<0.001
Waiting for symptoms to improve	174 (45.3)	134 (77.0)	<0.001
Fear of surgery	92 (24.0)	68 (73.9)	0.003
Transportation difficulties	124 (32.3)	88 (71.0)	0.004
Lack of family support	72 (18.8)	54 (75.0)	0.008
Lack of awareness about	166 (43.2)	130 (78.3)	<0.001

Patient-related factor	Total, n (%)	Delayed presentation, n (%)	p-value
seriousness			

Description:

Table 2 demonstrates the association between patient-related factors and delayed presentation. Delayed presentation was more frequent among patients with low educational status, low household income and rural residence. Self-medication, use of home or traditional remedies, fear of surgery and transportation difficulties were also significantly associated with delayed presentation. Waiting for symptoms to improve and lack of awareness regarding the seriousness of symptoms showed particularly strong associations ($p<0.001$).

Table 3. Health-care-related factors associated with delayed presentation (n=384)

Health-care-related factor	Total, n (%)	Delayed presentation, n (%)	p-value
First consulted another health facility	158 (41.1)	118 (74.7)	<0.001
Delayed diagnosis	106 (27.6)	82 (77.4)	<0.001
Initial conservative treatment	132 (34.4)	98 (74.2)	<0.001
Referral from another facility	138 (35.9)	102 (73.9)	<0.001
Multiple health-facility visits	88 (22.9)	72 (81.8)	<0.001
Delay in diagnostic investigations	82 (21.4)	64 (78.0)	<0.001
Delay in surgical consultation	70 (18.2)	58 (82.9)	<0.001
Difficulty accessing specialist care	98 (25.5)	74 (75.5)	<0.001

Description:

Table 3 shows the relationship between health-care-related factors and delayed presentation. Patients who had initially consulted another health facility, experienced delayed diagnosis or received initial conservative treatment had a higher frequency of delayed presentation. Multiple health-facility visits, delays in investigations and delayed surgical consultation were also significantly associated with delayed presentation. Delayed surgical consultation had one of the highest proportions of delayed presentation (82.9%).

Table 4. Comparison of early and delayed presentation according to selected characteristics

Variable	Early presentation ≤24 h (n=152)	Delayed presentation >24 h (n=232)	p-value
Mean age (years)	39.7 ± 15.3	44.8 ± 16.3	0.003
Male, n (%)	96 (63.2)	146 (62.9)	0.956
Rural residence, n (%)	46 (30.3)	112 (48.3)	<0.001
Low income, n (%)	62 (40.8)	122 (52.6)	0.023
Self-medication, n (%)	38 (25.0)	104 (44.8)	<0.001
Home/traditional remedies, n (%)	26 (17.1)	82 (35.3)	<0.001
Previous health-facility visit, n (%)	42 (27.6)	118 (50.9)	<0.001
Delayed diagnosis, n (%)	22 (14.5)	82 (35.3)	<0.001
Multiple health-facility visits, n (%)	12 (7.9)	72 (31.0)	<0.001

Variable	Early presentation ≤24 h (n=152)	Delayed presentation >24 h (n=232)	p-value
Delayed surgical consultation, n (%)	10 (6.6)	58 (25.0)	<0.001

Description:
Table 4 compares patients presenting within 24 hours with those presenting after 24 hours. Rural residence, low income, self-medication and use of home or traditional remedies were significantly more common among patients with delayed presentation. Previous health-facility visits, delayed diagnosis and multiple health-facility visits were also substantially higher in the delayed group. Delayed surgical consultation was reported in 25.0% of delayed presenters compared with 6.6% of early presenters (p<0.001).

Table 5. Multivariable logistic regression analysis of factors associated with delayed presentation

Factor	Adjusted Odds Ratio (AOR)	95% CI	p-value
Rural residence	1.82	1.18–2.81	0.007
Low household income	1.67	1.09–2.56	0.019
Self-medication	2.11	1.35–3.30	0.001
Waiting for symptoms to improve	2.69	1.70–4.25	<0.001
Lack of awareness of symptom severity	2.84	1.82–4.43	<0.001
Multiple health-facility visits	2.56	1.45–4.52	0.001
Delayed diagnosis	2.31	1.38–3.87	0.002
Delayed surgical consultation	3.08	1.65–5.75	<0.001

Description:
Table 5 presents the multivariable logistic regression analysis of factors independently associated with delayed presentation. Rural residence, low household income and self-medication remained significantly associated with delayed presentation after adjustment for other variables. Waiting for symptoms to improve and lack of awareness of symptom severity were also independently associated with delay. Delayed surgical consultation demonstrated the highest adjusted odds of delayed presentation (AOR 3.08, 95% CI 1.65–5.75).

DISCUSSION

The present study assessed patient-related and health-care-related factors associated with delayed presentation among patients undergoing emergency gastrointestinal surgery at Hayatabad Medical Complex, Peshawar. Among 384 patients, 60.4% presented more than 24 hours after symptom onset, indicating that delayed presentation constituted a substantial proportion of emergency gastrointestinal surgical admissions. This finding is clinically important because acute gastrointestinal conditions can progress from localized disease to perforation, ischemia, gangrene, contamination and sepsis when treatment is delayed. A systematic review of

emergency gastrointestinal pathology found that delays throughout the pathway from symptom onset to surgery are associated with worse outcomes, while delays may arise from diagnosis, imaging, decision-making, staffing and theatre availability.[9]

The relatively high proportion of delayed presentation in the current study is consistent with evidence from Pakistan and other low- and middle-income countries (LMICs), where timely access to emergency surgical care remains challenging. A prospective Pakistani study involving 4,226 emergency patients identified substantial delays at several stages, including decision-making, transportation, physician assessment, diagnostic evaluation and inter-facility transfer. The belief that symptoms would resolve spontaneously was the most frequently reported reason for delayed decision-making.[10] Similarly, a recent study from Mardan among adults undergoing emergency abdominal surgery found that delayed presenters had more advanced operative pathology and greater postoperative morbidity than early presenters.[11] These findings support the importance of examining delay as a continuum rather than considering hospital arrival alone.

In the present study, rural residence was significantly associated with delayed presentation, with 70.9% of rural participants presenting after 24 hours compared with 30.3% presenting early. After adjustment for other factors, rural residence remained independently associated with delayed presentation (AOR 1.82, 95% CI 1.18–2.81; p=0.007). This finding is consistent with national evidence demonstrating disparities in access to surgical care between rural and urban populations in Pakistan. A national household survey estimated access to essential surgical procedures at 74.8% overall, while access was considerably lower in rural populations and in Khyber Pakhtunkhwa compared with urban areas and some other regions.[12] The geographical distribution of surgical services, transportation difficulties and the need to travel to tertiary hospitals may therefore contribute to delays among rural patients.

Low household income was another important factor. In this study, 68.5% of participants from the low-income group presented late, compared with a smaller proportion among higher-income participants. Low income remained independently associated with delayed presentation (AOR 1.67, 95% CI 1.09–2.56; p=0.019). This finding is consistent with research from Pakistan showing that financial considerations influence access to essential surgical care. Samad et al. reported financial constraints as an important reason for delay in accessing surgery, while a national study of surgical patients in Pakistan also demonstrated substantial financial and geographical barriers to surgical care.[13],[14] Financial limitations may influence transportation, consultation at multiple facilities, diagnostic investigations and the decision to seek care at a tertiary hospital.

Educational and awareness-related factors also demonstrated an important relationship with delayed presentation. In the present study, 78.8% of participants with low educational status presented late, and lack of awareness regarding the seriousness of symptoms was reported in 43.2% of participants. Lack of awareness remained strongly associated with delayed presentation after multivariable adjustment (AOR 2.84, 95% CI 1.82–4.43; p<0.001). This finding is comparable with previous Pakistani evidence in which lack of knowledge about disease implications and treatment options contributed to delays in accessing surgical care.[13] A broader scoping review of 78 studies from LMICs similarly identified inadequate awareness of symptoms as an important contributor to delayed care-seeking.[15]

A particularly important finding was the association between waiting for symptoms to improve and delayed presentation. In the current study, 77.0% of participants who reported waiting for symptoms to improve presented after 24 hours, and this factor remained independently associated with delayed presentation (AOR 2.69, 95% CI 1.70–4.25; p<0.001). This finding is consistent with the Pakistani emergency-care study in which the belief that symptoms would resolve spontaneously was the most common reason for prolonged decision-making.[10] Evidence from other LMICs also

indicates that patients may initially observe symptoms at home before deciding that professional medical attention is necessary.[15] Such behavior may be particularly consequential in gastrointestinal emergencies because symptoms can initially appear nonspecific before rapidly progressing to a more severe condition.

Self-medication and use of home or traditional remedies were also significantly associated with delayed presentation. Self-medication was reported among 37.0% of participants and was associated with more frequent delayed presentation; after adjustment, self-medication remained an independent factor (AOR 2.11, 95% CI 1.35–3.30; p=0.001). Home or traditional remedies showed a similar pattern. These findings are supported by the LMIC scoping review, which identified self-medication and alternative medication as important contributors to delay in accessing appendectomy.[15] Importantly, a study conducted specifically in Peshawar reported self-medication, home remedies and misdiagnosis among commonly identified reasons for late presentation of acute appendicitis.[16] The consistency between the local literature and the present findings suggests that non-hospital treatment before definitive surgical assessment deserves attention in emergency surgical pathways.

Fear of surgery was also associated with delayed presentation in the present study, with 73.9% of patients reporting this factor presenting late. Fear may lead patients or families to postpone hospital attendance even when symptoms are becoming more severe. The international evidence similarly identifies refusal or reluctance to undergo treatment because of fear as a contributor to delay in LMIC settings.[15] This suggests that public education should not focus solely on recognizing symptoms but should also address misconceptions about emergency surgery and the consequences of postponing assessment.

Transportation represented another important patient-access factor. In the current study, 71.0% of participants reporting transportation difficulties presented late, and rural residence was independently associated with delay. Previous Pakistani emergency-care research identified transportation mode and traffic congestion as significant contributors to increased transit time.[10] National Pakistani data further demonstrate substantial geographical variation in access to surgical care, particularly between rural and urban populations.[12] Thus, transportation should be considered part of the emergency surgical pathway rather than merely an external socioeconomic issue.

The study also identified substantial health-care-related delays. Patients who had previously visited another health facility, experienced delayed diagnosis, received initial conservative treatment, or required referral from another facility had higher rates of delayed presentation. These findings are particularly relevant because they demonstrate that delayed presentation may not always represent a failure of the patient to seek care. Some patients may actively seek medical attention but fail to reach definitive surgical treatment promptly because of referral pathways, diagnostic difficulties or inappropriate initial management.

The association between delayed diagnosis and delayed presentation is consistent with previous Pakistani studies of acute appendicitis. Asad et al. reported that missed diagnoses by physicians and non-doctors, conservative management and self-medication were important contributors to complicated presentations.[17] Similarly, another Pakistani study involving patients with delayed acute appendicitis reported incorrect diagnosis by emergency physicians, treatment by non-medical practitioners and financial limitations among important contributors to diagnostic delay.[18] Although these studies focused specifically on appendicitis, their findings are relevant to the broader emergency gastrointestinal pathway because diagnostic uncertainty and inappropriate initial management can postpone definitive surgical assessment.

Multiple health-facility visits demonstrated one of the strongest associations in the current study. Among patients with multiple health-facility visits, 81.8% experienced delayed presentation, and the factor remained independently associated with delay

(AOR 2.56, 95% CI 1.45–4.52; p=0.001). This finding is compatible with the concept of the Three Delays Model, which distinguishes delays in deciding to seek care, reaching an appropriate facility and receiving appropriate treatment after reaching a health facility.[19] The Pakistani literature demonstrates that patients may initially seek care close to home before eventually reaching a facility capable of providing definitive surgical treatment.[14] Such movement between facilities can increase both the time to diagnosis and the time to definitive treatment.

Delayed surgical consultation showed the strongest association in the multivariable analysis, with an AOR of 3.08 (95% CI 1.65–5.75; p<0.001). This finding highlights the importance of timely involvement of surgical teams once a potentially operative gastrointestinal emergency has been identified. Evidence from emergency laparotomy literature indicates that delays can occur at multiple points after hospital arrival, including diagnostic imaging, decision-making, staffing and theatre availability.[9] The ERAS Society recommendations similarly emphasize early diagnosis, rapid assessment and timely source control in patients requiring emergency laparotomy.[20]

The findings concerning health-care-related delays are also consistent with broader evidence on emergency surgical systems in LMICs. A systematic review of perioperative care pathways in low- and lower-middle-income countries identified limitations in emergency surgical pathways and highlighted the importance of improving the organization of care.[21] In Pakistan, studies of access to surgery have likewise demonstrated that patients may face delays related to transportation, availability of appropriate facilities and referral between different levels of care.[14] Therefore, reducing delayed presentation requires interventions at both the community and health-system levels.

The clinical importance of these delays is supported by evidence showing that prolonged time before emergency abdominal surgery is associated with progression of disease and poorer outcomes. The systematic review by Mason et al. found that increased time to theatre was associated with mortality and identified diagnosis, imaging, decision-making, staffing and theatre availability as important points where delay occurs.[9] In Pakistan, Khan et al. reported that patients presenting after 48 hours had greater rates of perforation, gangrene, contaminated or dirty wounds and postoperative morbidity.[11] Although the present study primarily examined factors associated with presentation delay rather than postoperative outcomes, these findings demonstrate why identifying and addressing such delays is clinically relevant.

The current results also demonstrate that delayed presentation is multidimensional rather than attributable to a single factor. Rural residence, low income, inadequate awareness, waiting for spontaneous improvement, self-medication, transportation difficulties, multiple health-facility visits, delayed diagnosis and delayed surgical consultation all contributed to the observed pattern. This corresponds closely with the LMIC evidence synthesized by Louw et al., which showed that delays can arise during seeking care, reaching an appropriate facility and receiving appropriate treatment.[15] The interaction between these factors is particularly relevant in Peshawar, where Hayatabad Medical Complex serves as a tertiary referral centre and therefore receives patients who may have already passed through several stages of the health-care system.

From a practical perspective, the findings indicate several areas for improvement. At the community level, education regarding warning symptoms of acute gastrointestinal disease and the importance of early medical assessment may reduce delays caused by waiting for spontaneous improvement, self-medication and home remedies. At the primary and secondary health-care levels, improved recognition of surgical emergencies, standardized referral criteria and early communication with surgical teams may reduce diagnostic and referral delays. At the tertiary-care level, rapid emergency triage, timely surgical consultation and streamlined diagnostic pathways may help reduce delays after arrival. These approaches are consistent with

international emergency laparotomy recommendations emphasizing rapid diagnosis, early source control and coordinated perioperative pathways.[20]

Strengths and limitations

An important strength of this study is that it considers both patient-related and health-care-related factors within the same study population rather than attributing delayed presentation solely to patient behavior. The study was also conducted at a major tertiary-care hospital in Peshawar, providing locally relevant information about emergency gastrointestinal surgical patients. However, the cross-sectional design limits the ability to establish causal relationships between the identified factors and delayed presentation. Data regarding symptom onset and previous health-care visits were partly dependent on patient or attendant recall and may therefore be affected by recall bias. Furthermore, because the study was conducted at a single tertiary-care hospital, the findings may not be directly generalizable to all hospitals or populations in Khyber Pakhtunkhwa. The use of a 24-hour threshold also means that patients with different degrees of delay are grouped together, despite potentially important clinical differences between moderate and very prolonged delays.

Conclusion

The study demonstrates that delayed presentation is common among patients undergoing emergency gastrointestinal surgery at Hayatabad Medical Complex, Peshawar. Patient-related factors, particularly rural residence, low income, inadequate awareness, waiting for symptoms to improve and self-medication, were significantly associated with delayed presentation. Health-care-related factors, including multiple facility visits, delayed diagnosis and delayed surgical consultation, were also important. The findings indicate that reducing delays requires a coordinated approach involving community awareness, improved early recognition of surgical emergencies, effective referral pathways and timely access to specialist surgical care.

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