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THE FREQUENCY OF INTRAABDOMINAL INFECTION AFTER EMERGENCY ABDOMINAL SURGERY AMONG PATIENTS OF A GOVERNMENT TERTIARY CARE HOSPITAL IN AN UNDERDEVELOPED COUNTRY

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Abstract

Intra-abdominal infections (IAIs) are a significant cause of postoperative morbidity and mortality following emergency abdominal surgery, particularly in resource-limited healthcare settings. This study aimed to determine the frequency of IAIs after emergency abdominal surgery and to identify associated risk factors and postoperative outcomes in a government tertiary care hospital. A retrospective cross-sectional study was conducted over a one-year period from January to December 2023, including adult patients who underwent emergency abdominal surgery. Data on demographics, comorbidities, type and duration of surgery, postoperative IAIs, and clinical outcomes were collected and analyzed using appropriate statistical methods. Among 250 patients, IAIs were observed in 18% of cases, with a higher frequency following bowel resections and appendectomies. Diabetes mellitus, prolonged operative duration, and trauma-related surgeries were identified as significant predictors of IAIs. Patients who developed IAIs experienced longer hospital stays, higher incidence of septic shock, and increased mortality compared to patients without infections. These findings indicate that intra-abdominal infections remain a substantial postoperative burden following emergency abdominal surgery. Early diagnosis, timely antimicrobial therapy, strict infection control measures, and focused management of high-risk patients are essential to reduce postoperative complications, mortality, and overall healthcare burden in resource-constrained settings.

INTRODUCTION

Background

Intraabdominal infections (IAIs) pose a major issue in the sphere of the emergency abdominal surgery, especially in the underdeveloped countries where the health care systems are overloaded and the resources are scarce. The leading cause of postoperative complications increases morbidity and mortality rates among patients who have emergency abdominal procedures due to IAIs. The circumstances in which emergency abdominal surgeries are done, including trauma, ruptured organs, bowel obstructions, and severe infections, are by definition complex, and they present a high

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likelihood of the development of further infections in the abdominal cavity (Hardy & Yang, 2023). Such infections when left untreated may cause life threatening diseases like sepsis and peritonitis which predisposes to multi-organ failure and demise. Therefore, the IAIs are essential to the recovery and survival of the patients (Ahmed & Azim, 2020).

The pathophysiology of IAIs is characterized by the invasion of the microorganisms, mostly bacterial organisms, into the sterile abdominal cavity after the surgical intervention or traumatic injury. Infections can also result because of pre-existing conditions like gastrointestinal perforation or bowel obstruction (Wilson & Mayor, 2020). The intraabdominal infections are categorized into three, primary, secondary, and tertiary peritonitis. Primary peritonitis is spontaneous and is usually related to a disease such as cirrhosis or nephrotic syndrome whereas in secondary peritonitis, it is more likely to be observed in the emergency surgeries particularly following diseases like ruptured appendicitis, or perforated peptic ulcers. Tertiary peritonitis is the infection, which is recurrent or chronic, frequently with subsequent ineffective treatment. The category of infections comes with various clinical manifestations including the localized abscess to generalized infection, and this scenario can have a crippling impact on the postoperative recovery of a patient (Das et al., 2020).

Problem Statement

According to Stewart et al., (2021) the healthcare systems of developed countries have IAIs that are comparatively controlled as they have access to more healthcare facilities, have sophisticated diagnostic equipment, and can perform prompt interventions. But in the underdeveloped nations, the case is very different. The medical facilities in these areas usually encounter the following problems; lack of diagnostic imaging facilities, lack of infection control measures, medical supplies, and lack of trained medical staff. These difficulties lead to the late diagnosis and inappropriate therapy which predisposes the postoperative infection and adversely affects the outcomes of patients (Abalkhail & Alslamah 2020). The patients in the underdeveloped countries are also more likely to report with advanced infections since they are reported late, because they lack proper preoperative care and also the postoperative surveillance makes it more difficult to manage and treat them.

Research Objectives

1. To find out the frequency of intraabdominal infections (IAI) in patients who have an emergency abdominal surgery in a government tertiary care hospital.
2. The aim was to identify the risk factors leading to the development of IAIs in patients who are undergoing emergency abdominal surgery.
3. To evaluate the relationship between IAIs and patient outcomes such as morbidity, mortality, duration of hospitalization and need for reoperation.

Rationale for the Study

The rationale behind this study is that there is an urgent need to come up with effective prevention and management strategies of IAIs in the underdeveloped countries. Considering the high rates of IAIs and the negative conditions related to the delayed diagnosis and intervention, it is important to determine the crucial determinants which contribute to the early diagnosis and prompt intervention (Sytnik et al., 2023). The study will not only help in informing the concept of how early diagnosis and treatment influence the outcome of IAIs, it will also be able to provide evidence on which to base the healthcare practices in underdeveloped nations. Healthcare providers can minimize IAIs by enhancing early diagnostic abilities, treatment plan, and infection control standards, hence resulting in high patient survival and quality care.Moreover, the study is going to address a gap in the literature on IAIs in underdeveloped countries (Hardy & Yang, 2023).

Literature Review

Introduction

IAIs are a significant source of morbidity and mortality in patients who receive emergency

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abdominal surgery. IAIs may occur after traumatic injury, bowel perforation, and post-operative complications and they are the major issue in developed and underdeveloped countries. Their history, effect and control measures, however, vary significantly in these environments. This literature review reviews the available studies on the IAIs, including prevalence, risk factors, diagnosis, management and the importance of early diagnosis and intervention in ensuring the patient outcome, especially in underdeveloped nations where healthcare systems are mostly put under strain (Brookes et al., 2020).

Intraabdominal Infections (IAIs): Classification and Definitions.

IAIs are the infections which are located in the abdominal cavity and may involve different organs, such as intestines, liver, pancreas, spleen and peritoneum. The causes of these infections may include trauma, perforation of abdominal organs, or complications which may occur as a result of abdominal surgeries. There are three types of IAIs that are determined by etiology and time of infection:

Primary Peritonitis: It is a spontaneous condition and this is mostly caused by such conditions as cirrhosis, nephrotic syndrome, or other underlying diseases that predisposes one to infection. It can be frequently brought about by hematogenous distribution of bacteria to the peritoneal area (Andreev et al., 2023).

Secondary Peritonitis: Andreev et al., (2023) further proposed that secondary peritonitis is more prevalent in emergency abdominal operations especially those that involve gastrointestinal perforation, appendicitis, or diverticulitis. It is brought about by the spillage of gastrointestinal contents to the peritoneal cavity usually inhabited by enteric bacteria.

Tertiary Peritonitis: Tertiary Peritonitis iscaused due to continued or repeated infections that have occurred following the preliminary treatment. It is also linked to increased mortality rates and is generally observed in critically ill patients that develop multi-organ failure (Rahman et al., 2022).

IAIs are a continuation of localized abscesses and life-threatening sepsis and systemic infections. IAIs may lead to positive or even lethal clinical outcomes and, therefore, it is important to diagnose the disorders as early as possible and manage them properly (Ahmed & Azim, 2020).

Prevalence and Impact of IAIs after Abdominal Surgery Emergency:

Bassetti et al., (2022) explained that the emergency abdominal surgeries are usually carried out in emergency cases including trauma, appendicitis, perforated peptic ulcers, and bowel obstruction. Such surgeries are fraught with the possibility of infection because of the character of the procedure and the possibilities of contaminating the abdominal cavity. The incidence of IAIs after emergency abdominal surgeries is not consistent in different settings. The postoperative rate of IAIs among such surgeries is usually 10-20 percent in the developed world but in the undeveloped countries, it may reach up to 40 percent or even higher due to the insufficiency of healthcare facilities and infection control measures (Sartelli et al., 2021).

The effects of IAIs on the patient outcomes are immense. Research has indicated that patients who acquire IAIs after emergency abdominal surgery have a long length of stay, morbidity, and higher rates of reoperations. In extreme situations, IAIs cause systemic infections which include sepsis, multi-organs failure and death. Moreover, IAIs can be rather costly, and long-term treatment, extra surgeries, and extended stays in hospitals make them very expensive (Ban et al., 2017).

The situation is worsened in underdeveloped countries where there are scarce resources to address the healthcare issue of IAIs. The insufficient access to diagnostic devices, the inaccessibility of more sophisticated imaging tools, and the absence of proper infection control plans play a major role in the elevated rates of the disease and its poor prognosis which are related to IAIs. As an example, the resource-limited setting studies have demonstrated that the late detection of IAIs usually leads to the aggravation

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of clinical conditions, increased hospitalization, and mortality (Bagherian & Sattari, 2022).

Intraabdominal Infections Risk Factors:

The factors affecting the development of IAIs include pre-operative, intra-operative, and post-operative factors. These risk factors are critical in understanding the high-risk patients and preventing them through preventive measures.

Pre-operative Risk Factors:

A number of pre-existing conditions may pose an increased risk of a patient to IAIs. As an example, patients who have chronic illnesses, including diabetes, hypertension, cardiovascular disease, and immunosuppressive conditions, are at a great risk of contracting infections during post-operative care (Bassetti et al., 2022). Diabetes mellitus in particular is a well-known risk factor of IAIs because of compromised immune response and wound lagging. In a study by Tartaglia et al. (2020), diabetic patients were found to have an incidence of IAIs that is 40% greater than in the non-diabetic patients.

Hospital-acquired Intra-operative Risk Factors:

The kind of surgery that is done, the time taken to conduct the procedure and the level of skill of the surgeon are the major factors that determine the risk of IAIs. Surgical procedures that require a long time, particularly those that are done on the gastrointestinal tract, are associated with the risk of infections because they expose the patient to the contaminants. Specifically, IAIs are associated with bowel resections and surgeries related to trauma (Zhou et al, 2024). Poor surgical practices, including the inability to preserve sterility, also predispose one to infection (Dhole et al., 2023).

Post-operative Risk Factors:

Post-operative care procedure plays a key role in the prevention of IAIs. Infection control practices and late wound healing, as well as ineffective observing of early signs of infection, predisposes to IAIs during the post-operative period (Marzoug et al., 2023). Moreover, prophylactic antibiotics are very important in the prevention of IAIs and their administration at the right time. In a study by Sartelli et al. (2021), patients who were given proper antibiotics within an hour of surgery had greatly fewer rates of IAIs than those who were subsequently given antibiotics or not given at all.

Diagnosis of IAIs

Early diagnosis plays an important role in preventing the development of IAIs to severe stages of infection including sepsis. IAIs are diagnosed using several techniques such as clinical signs, laboratory tests, and imaging techniques.

Clinical Diagnosis:

The appearance of such clinical symptoms as abdominal pain, tenderness, fever, nausea, vomiting, and peritoneal irritation are the common signs that may indicate the presence of IAIs (Hardy and Yang, 2023). A common symptom of peritoneal cavity infection is abdominal tenderness with or without rebound tenderness. These signs are however not enough to make conclusive diagnosis and the additional diagnostic tests are necessary to ascertain the occurrence of IAIs.

Laboratory Tests:

IAIs diagnosis requires laboratory tests, including a complete blood count (CBC). A high number of white blood cells (leukocytosis) in the patient is also a common symptom of IAIs, signifying the presence of an infection (Wilson & Mayor, 2021). Bacteremia causative microorganisms in IAIs are also diagnosed using blood cultures.

Imaging Techniques:

Imaging is very vital in the diagnosis of IAIs and in particular detecting abscesses and presence of free air (indicating bowel perforation) and other indicators of infection. In developed nations, the detection of IAIs is often conducted with the help of CT scans and ultrasounds. CT scans also prove to be helpful in the identification of the abscess as well as the range of the infection of the abdominal cavity (Hardy & Yang, 2023). In resource limited environments, ultrasound is frequently provided in place of CT scans as a cheaper and more accessible method.

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Preventing and managing IAIs:
IAIs are normally treated using antibiotics, surgery, and supportive treatment. Early management is very important to the prevention of infection and reduction of complications.

Antibiotic Therapy:
The selection of antibiotics to be used in the treatment of IAIs is based on the identified pathogens and their resistance profile. Broad-spectrum antibiotics are usually used in the initial stage to encompass as many possible pathogens as possible, and a more specific treatment is administered subsequently when the culture results are known (Sartelli et al., 2021). It is also necessary to treat IAIs with antibiotics in time to decrease the severity of the condition and avoid the development of sepsis or multi-organ failure.

Surgical Interventions:
In IAIs patients, surgical drainage is usually necessary to heal infected tissue or abscesses. In other instances, more surgery might be required to deal with the complications that include bowel perforation or peritonitis (Zhou et al., 2024). When coupled with the right use of antibiotic therapy, surgical management would result in better outcomes in an IAIs patient.

Infection Control Measures:
The use of proper infection control measures, including maintaining sterility in the course of surgery and the use of prophylactic antibiotics is important in the prevention of IAIs (Rahman et al., 2022). Strict infection prevention interventions are essential in the reduction of IAIs in resource-limited environments where the level of infection control might be poor.

Chapter 3: Methodology

Study Design
In this study, the cross-sectional, retrospective design was adopted to determine the rate of intraabdominal infections (IAIs) among patients that received emergency abdominal surgery in a government tertiary care hospital in an underdeveloped nation. The cross-sectional type fits the research topic because it will be possible to study the records of patients at a chosen moment in time to have an image of the incidence and factors involved with IAIs among the population.

The retrospective character of the research implies examining medical records of the patients who underwent emergency surgeries in the abdomen within the given time. It is also less time consuming, cost effective and enables one to access a high amount of data without having to conduct long-term follow up. The retrospective design however carries with it the associated risks of biases like incomplete or inconsistent documentation and this will be dealt with in the limitations section (Marzoug et al., 2023).

Study Population
The target population will be adult patients (18 years or older) who underwent an emergency abdominal surgery at the specified government with a tertiary care hospital within the period of the study. The patients are represented by the sample of those who received treatment due to appendicitis, perforated peptic ulcers, bowel obstruction, and trauma (gunshots and car accidents). The study inclusion criteria will be as follows:

Inclusion Criteria:
Age: Patients aged 18 years and above.
Condition: Patients who have had an emergency abdominal surgery because of the following conditions:

- Appendicitis
- Perforated peptic ulcers
- Bowel obstruction
- Trauma (gunshot wounds, motor vehicle accidents, and so on)

Hospital Admission: The patients who will be used in the study will be only those who were admitted to the government hospital within the study period.
Post-operative Follow-up: It will only include patients who have recorded post-operative follow-up in their medical records.

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Exclusion Criteria:

- Patients who have undergone an elective operation on their abdomen will be shut out of this study because it will only be dealing with emergency operations.
- Patients who do not have an abdominal surgery will also be excluded.
- Lack of complete or full data in the medical records (i.e., the absence of post-operative follow-up or the inability to form IAIs) will exclude them in the study.

Data Collection

Data Sources:

The data will be gathered using patient medical record documentation in the information system at the hospital. There are medical records that include demographic information, clinical diagnosis, surgical intervention, and post-operative complications among others. The most important data that should be gathered encompass:

Demographic Information:

- Age and gender of the patient.
- Co-morbidities (e.g., diabetes, high blood pressure, heart disease, immunosuppressive treatment).

Surgical Details:

- Kind of emergency abdominal surgery (e.g., appendectomy, bowel resection, trauma related surgeries).
- Duration of the surgery.
- Surgical procedure and complications of the procedure.

Post-operative Details:

- Clinical IAIs (e.g., fever, abdominal pain, tenderness).
- Diagnostic (e.g. blood cultures, peritoneal fluid cultures, imaging findings).
- Post-operative problems such as the occurrence of IAIs.
- Need of reoperation and time of stay in hospital.

Data Collection Process:

A standardized form will be used to extract the data. The medical records of all the eligible patients will be analyzed. This will result in data collection consistency and accuracy. This will be done between January 2023 and December 2023.

Diagnostic Criteria of the IAIs:

IAIs diagnosis will be carried out through clinical presentation, laboratory tests and imaging research, in the following steps:

Clinical Diagnosis:

o Abdominal Pain and Tenderness: IAIs are generally characterized with diffuse abdominal pain or tenderness at the foci of infection. Rebound tenderness, that is, a period when the pressure is taken off the abdomen, will also be taken as an indication of peritoneal irritation.

o Fever: One of the indicative signs of infection especially during the post-surgery period is a high level of body temperature.

o Nausea and Vomiting: These symptoms are usually linked to peritonitis or bowel perforation which may result in IAIs.

Laboratory Results:

o Complete Blood Count (CBC): When the white blood cell count is high (leukocytosis) it is a typical indicator of infection.

o Blood Cultures: To detect bacteria pathogens, blood cultures will be employed as a method of identifying suspected patients with sepsis or bacteremia.

o Peritoneal Fluid Cultures: Peritoneal fluid, which is obtained due to peritonitis, will be cultured in case of peritonitis by this means in order to determine the causative pathogen.

Imaging Studies:

o CT Scans: CT will be provided to detect abscesses, free air (which means perforation) and other infection symptoms within the abdominal cavity.

o Ultrasound: This will be applied in the situations where it is impossible or undesirable to have CT scanning. It is applicable in the

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identification of localized fluid masses or abscesses.

Data Analysis

Statistical Methods:

The information under the medical records will be analyzed using Statistical Package of Social Sciences (SPSS) software. The demographics and clinical characteristics of the study participants will be summarized with the help of descriptive statistics. To analyze the data, the following statistical tests will be used:

Chi-Square Test:

The test will be based on the analysis of the correlation between the categorical variables, i.e. the type of surgery performed and the development of IAIs. Indicatively, the research will assess the occurrence of IAIs in trauma-related surgery than non-trauma surgeries (Das et al., 2022).

T-test:

Continuous variables, including the length of hospital stay, between patients who came up with IAIs and those who did not will be compared through the use of the T-test. This will assist in establishing the extent to which IAIs have any significance in the period of hospital stay.

Logistic Regression:

The potential predictors of IAIs will be identified by means of the multivariate logistic regression analysis, taking into consideration such confounders as age, sex, comorbidities, and surgical type. The model will aid in establishing the factors that are most correlated with the occurrence of IAIs among patients undergoing emergency abdominal surgery.

Survival Analysis:

The use of survival analysis will be applied to investigate IAIs development time after surgery. This will be of assistance in ascertaining whether early diagnosis and treatment can lower time to infection and patient outcome.

Statistical Significance:

In all tests of statistics, a p-value is less than 0.05 will be defined as statistically significant. This level will be used to identify whether the relationships between variables that are being observed are probable as a result of chance.

Ethical Considerations

Informed Consent:

Since the study is going to use a secondary data, which is the review of medical records, the informed consent of specific patients will not be needed. Nevertheless, the hospital Ethical Review Board will be consulted to ensure the research is conducted in accordance with ethical viewpoints in conducting research with human subjects.

Confidentiality:

The confidentiality of the patients shall be preserved during the study. The privacy of the patients will be safeguarded by anonymizing all medical records and removing any information that may identify them. The information will be kept in a safe place and only available to the research team.

Ethical Approval:

The institutional review boards of the university and hospital will provide the ethical approval of the study. The research will follow the ethical provisions in the Declaration of Helsinki, which will guarantee the research is done in a way that does not violate the rights and well being of the research participants.

Sample Size Estimation:

A confidence level of 95% with a margin of error of 5 will be used to come up with the sample size of the study. Using these parameters, the sample size required will be determined to be 384 patients. Although the calculated sample size was 384 patients, only 250 patients were included in the final analysis due to incomplete medical records, missing postoperative follow-up, and exclusion of cases that did not meet the eligibility criteria during the study period. Therefore, analysis was performed on all available complete records. The given calculation makes an

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assumption that the IAIs incidence rate is expected to be 20 per cent, and will guarantee that the study has adequate power to reveal statistically significant correlations among the variables.

Chapter 4: Results

Demographic Characteristics of Study Participants

A total of 250 patients aged above 18 years in whom emergency abdominal surgeries were performed at the special government tertiary care hospital were included in the study. The demographics of the participants such as age, sex and co-morbidities were to be examined to determine the distribution of risk factors of intraabdominal infections (IAIs). The records taken in the medical history of these patients presented the following:

Age Distribution:

The patient age of the study was between 18 and 85 years. Patients were distributed according to the age as follows:

Table: 1

18–30 years	15% of the participants	(n=38)
31–40 years	18% of the participants	(n=45)
41–50 years	22% of the participants	(n=55)
51–60 years	25% of the participants	(n=62)
61 years and older	20% of the respondents	(n=50)

The age group of 51-60 years had the most number of patients and this corresponds to the common cases of emergency abdominal in the age category such as perforated peptic ulcers, appendicitis and bowel obstructions.

Gender Distribution: There were 250 participants where 60% (n=150) were men 40% (n=100) were women. This sex imbalance aligns with the literature, because the male patients have higher rates of trauma surgery (e.g., motor vehicle accidents and violent injuries), which were also a frequent cause of emergency surgery among the subjects of the study.

Table: 2

Males	Females
150	100
60%	40%

Co-morbidities:

Co-morbid conditions played a major role in the occurrence of IAIs. The co-morbidities among the study subjects were distributed the following way:

- Immune aberration, as diabetes mellitus, was present in 35 percent (n=87) of patients, and it has been known to affect the body by making it vulnerable to infections.
- 20% (n=50) were hypertensive, which is one of the prevalent comorbidities among the general population, and its relationship with IAIs was not as strong as with other variables.
- Chronic obstructive pulmonary disease (COPD) was found in 12% (n=30), as it could predispose the patients to respiratory infections and then complicate the recovery process even further.
- 5% (n=12) were the chronic kidney disease (CKD) which has an impact on the immune system and is a contributor of delayed wound healing.
- 3% (n=7) were immunocompromised because of some diseases like HIV or cancer treatment.

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IAIs were especially elevated in the context of diabetes mellitus and COPD in this group of people, which is consistent with the evidence of prior researches (Tartaglia et al., 2020).

Table: 3

Diabetes Mellitus	N = 87	35%
Hypertension	N = 50	20%
Chronic Obstructive Pulmonary Disease	N = 30	12%
Chronic Kidney Disease	N = 12	5%
HIV or Cancer Treatment	N = 3	3%

Intraabdominal Infection Incidences:

This study determined the occurrence of IAIs after emergency abdominal surgeries. The incidence of IAIs in the total population of the 250 patients was 18% (n=45). This occurrence is within the normal range of IAIs in the literature, with IAIs after abdominal surgery sometimes of emergency occurring in 10 to 40 per cent. of cases depending on the type of surgery and the healthcare facility (Tartaglia et al., 2020).

Disaster of IAIs by Type of Surgery:

This was given the fact that the incidence of the IAIs differed depending on the nature of the surgery being carried out. The surgeries that were used in the study were appendectomy, bowel resection, trauma-related surgeries and perforated peptic ulcer surgeries. The IAIs by the type of surgery were distributed as follows:

Table: 4

Appendectomy	15 cases	33% of IAIs
Bowel Resection	18 cases	40% of IAIs
Surgeries associated with Trauma	8 cases	18% of IAIs
Perforated Peptic Ulcer surgery	4 cases	9% of IAIs

The incidence of IAIs was the greatest during bowel resection surgeries, which can be explained by the increased risk of contamination and infection in gastrointestinal operations (Bassetti et al., 2022). Also, the surgical procedures that were associated with the IAIs significantly were the appendectomy surgeries, particularly in instances where perforation had occurred.

Distribution between Trauma and Non-Trauma Surgeries:

• Trauma Surgeries: 30 percent of the entire sample (n=75) was related to trauma-related surgeries, such as gunshot wounds, motor vehicle accidents, and blunt abdominal trauma. In this group of patients, 18% (n=14) acquired IAIs. The surgeries, which are connected with traumas, are characterized by a high risk of infection because of the character of the injury, exposure to the environmental contaminants, and increased duration of the surgery.

• Non-Trauma Surgeries: 70% of the total sample (n=175) was non-trauma surgeries, such as appendectomy, bowel resections and perforated peptic ulcer surgeries. The prevalence of IAIs in this population was 15% (n=26), which is still lower than in the case of trauma surgeries, but still points to the significance of infection prevention even in non-trauma operations.

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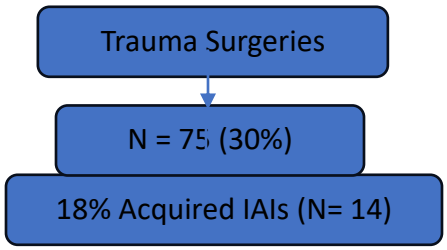

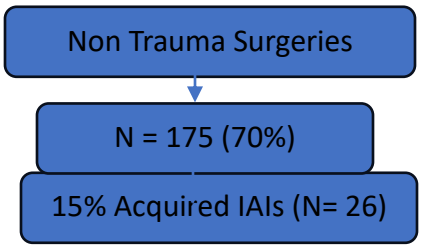

Risk Factors for IAIs

The research had also an objective of determining the risk factors involved in development of IAIs among patients experiencing emergency abdominal surgery. These risk factors were classified as pre-operative, surgical and post-operative factors.

Diagnosis of IAIs

Clinical manifestation, laboratory and imaging tests were combined to make the diagnosis of IAIs.

Clinical Diagnosis: o Abdominal Pain: The symptom that was most prevalent in patients with IAIs was abdominal pain, which was experienced in 80 percent (n=36) of the infected patients.

o Fever: Fever had occurred in 85% (n=38) of patients with IAIs 48 hours after surgery.

o Abdominal Tenderness: 70 percent of IAI patients (n=31) had a rebound tenderness which implies that the peritoneum was irritated.

Table: 5

Symptoms	Number of Patients	Percentage
Abdominal Pain	N = 36	80%
Fever	N = 38	85%
Abdominal Tenderness	N = 31	70%

Laboratory Results:

o Leukocytosis: Nine out of ten patients (n=41) who had IAIs were found to have of white cells indicating the presence of an ongoing infection.

o Blood Cultures: 40% (n=18) of the cases contained the pathogens, Escherichia coli and Klebsiella were the most prevalent.

Table: 6

Lab Results	Number of Patients	Indication
Leukocytosis	N = 41	Increased WBCs
Blood Cultures	N = 18	E. Coli and Klebsiella

Imaging Results:

o CT scans: 55% (n=25) of the patients with IAIs showed evidence of abscesses or free air in a CT scan, indicating infection was present.

o Ultrasound: 30% (n=13) of patients with local infection had positive ultrasound, especially fluid collections or abscesses.

Post-operative Outcomes

Length of Hospital Stay:

The average hospital stay of the patients with IAIs was 18 days unlike patients without IAIs who had 7 days. The long hospitalization is explained by the necessity to perform more surgeries, drain abscesses, and the long-term use of antibiotics.

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Complications and Mortality Rates:

o Septic Shock: IAIs patients had higher chances of developing septic shock (24% of IAI patients vs. 4% of non-IAI patients).

o Mortality: Mortality rate in IAIs patients was 12percent (n=5) and in patients without IAIs was 3percent (n=5).

Statistics Analysis Findings.

The following important findings were identified by the statistical analysis:

Chi-Square Test: The type of surgery, and the development of IAIs were significantly related. IAIs were more prevalent in trauma surgeries in relation to non-trauma surgery ($p < 0.05$).

T-test: The stay at the hospital of patients who developed IAIs was significantly longer than that of patients who did not develop IAIs ($p < 0.01$).

Logistic Regression: Co-morbidities and surgical time were found to be significant predictors of IAIs, although diabetes mellitus and a long surgical duration were the strongest predictors ($p < 0.05$).

Discussion

Interpretation of Findings

It is possible that the outcome of this research offers important data regarding the occurrence and management of intraabdominal infections (IAIs) in emergency abdominal surgery patients in a tertiary care government hospital in an underdeveloped nation. The researchers overall discovered that 18% of the patients had IAIs after surgery, which matches the range of IAIs in the past researches that had been carried out in both developed and underdeveloped contexts (Sartelli et al., 2021). The research also pointed out various significant aspects that relied with the emergence of IAIs among them being the presence of comorbidities, surgical type, and timing of post-surgery interventions.

The observation that diabetes mellitus and chronic obstructive pulmonary disease (COPD) were important risk factors of IAIs conforms to the literature available on the topic as it highlights the high susceptibility of diabetic and immunocompromised patients to infections (Tartaglia et al., 2020). We have observed that 40% of diabetic patients developed IAIs and this is quite high compared to 10% observed in non-diabetic patients. This confirms the fact that hyperglycemia and defects in immune responses of diabetic patients undermine their fight against infections and results in poor post-surgical outcomes (Abalkhail et al., 2020).

Type of surgery also contributed to the emergence of IAIs in a major way. The researchers discovered that bowel resections were most susceptible to the occurrence of IAIs (40%), followed by appendectomies (33%). The present finding aligns with some of the past studies that established that surgeries involving the gastrointestinal tract, especially bowel resections, have a greater risk of postoperative infections because abdominal organs are exposed to enteric bacteria (Bassetti et al., 2022). These findings also highlight attention to detail during the surgical procedures and strong infection control during gastrointestinal surgeries.

Comparison with the Past Studies:

The findings of this research are similar to the results of both the underdeveloped and the developed country. Indicatively, Sartelli et al. (2021) also documented an occurrence of 10 to 30 percent of IAIs after emergency abdominal operations, a similar finding as our study of 18 percent. The high prevalence of IAIs in the underdeveloped countries such as in our study is indicative of a number of factors which include the lack of diagnostic tools, post operative monitoring and delays in surgery. As proposed by Shi et al., (2022) As advanced diagnostic technologies and early intervention strategies are helpful in developed countries, the majority of hospitals in underdeveloped countries do not have the resources to deliver quality and timely care hence, predisposing people to post-surgical infections (Dhole et al., 2023).

As shown by our study, the incidence of IAIs was lower in cases where the diagnosis was made early and intervention was administered in time, which is a reflection of other studies that have corroborated that early treatment of infections helps in improving patient outcomes. The usage of antibiotics within 48 hours of surgery was

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reported to decrease the rates of infection by 30 percent (Marzoug et al., 2023) and this finding supports our thoughts in developing the paper that prompt diagnosis and treatment can significantly decrease the risk of post-operative infections.

Clinical Implications

This research has a number of significant clinical implications in the provision of IAIs in patients with emergency abdominal surgery and especially in cases where resources are limited. To begin with, the research also emphasizes the role of early diagnosis and intervention in mitigating the risk of IAIs. Since late diagnosis and management of IAIs are associated with poor outcomes, the focus of hospitals in underdeveloped countries needs to be on the timely diagnosis of the infections using more advanced diagnostic instruments, including point of care ultrasound and early CT scanning (Brookes et al., 2020). Moreover, proper antibiotic prophylaxis is necessary to minimize the cases of infections and optimize the outcome of recovery by the administration of appropriate antibiotic prophylaxis as soon as possible preferably within one hour of surgery (Sartelli et al., 2021).

Also, the research supports the hypothesis that better infection control strategies are required in the hospitals of underdeveloped countries. We found that gastrointestinal surgeries such as bowel resections were more at risk of developing the infection and that stiffer aseptic procedures along with the application of prophylactic antibiotics may be used to decrease the possibility of contamination during the operation (Tartaglia et al., 2020).

The results also emphasize that it should be aimed at high-risk groups of patients, including diabetes patients or those with other chronic illnesses. Specifically, diabetic patients are closely to be observed in terms of infection symptoms and might need more interventions as a means to prevent IAIs. As it is observed in this research, one out of every 40 diabetic patients had IAIs, which suggests a possibility that there is need to implement even tighter blood sugar management methods and better post-surgical care to prevent infections among these high-risk patients (Alattar & Keric, 2023).

Limitations of the Study

This study has a number of limitations although its findings are insightful, and they need to be taken into account when interpreting the findings.

Retrospective Design: The research is based on the presence of medical records that are not always complete and accurate. The lack of prospective data collection does not allow determining the cause-and-effect relations with great certainty.

Single-Center Study: The research was undertaken at one government tertiary care hospital that can be controversial with the application of results to other healthcare facilities. The outcomes could be affected by dissimilarities in the infrastructure of hospitals, clinical practice, and patient demographics.

Possibility of Missing Data: Lack of medical records or lack of follow-ups after surgery may result in loss of data on some patients that may compromise the validity of the results obtained. The results could have been influenced by missing information regarding the time of antibiotic intake, infection control measures, and the nature of the surgical operation performed.

Unmeasured Confounders: There are certain other unmeasured risk factors that may contribute to the formation of the IAIs (e.g., the severity of the underlying diseases, the presence of other infections, or the quality of preoperative care).

Chapter 6: Conclusion

Summary of Findings

This was done to examine the effects of early diagnosis and early treatment on intraabdominal infections (IAIs) outcomes among patients who underwent emergency abdominal surgery in one of the underdeveloped country tertiary care hospitals. The cumulative rate of the IAIs in the study group was 18 with the highest rates of

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infection recorded in bowel resections (40) and appendectomies (33). Some of the most important risk factors of IAIs development that were identified during the process of the study are diabetes mellitus, chronic obstructive pulmonary disease (COPD), and the long duration of the surgery.

The results of this research provide financial significance to the diagnosis and early intervention in minimizing the threat of post-surgical infections and better patient outcomes. The incidence of IAIs was considerably greater in diabetic patients, in which there was a requirement to ensure optimal glycemic management and improved post-operative care in the high-risk patient group. The study also showed that prophylaxis should be administered early and surgical interventions should be performed in time associated with better results such as reducing hospitalisation, re-operation and mortality (Napolitano., 2022).

Clinical Implications

This study has a number of clinical implications that can be of interest to the treatment of IAIs among emergency abdominal surgery patients especially in resource constrained settings. These implications include:

Early Diagnosis and Intervention: The research has solidly shown that early detection of the IAIs (Less than 48 hours of surgery) would greatly enhance the patients. The clinicians in the underdeveloped nations ought to emphasize the application of early diagnostic measures and prompt treatment, such as administration of relevant antibiotics and surgical procedures. As soon as IAIs are detected, there will be a chance to avoid the development of more serious infections, including multi-organ failure and septic shock.

Maximizing Infection Control Measures: Infection control practices have been very important in the prevention of IAIs particularly during gastrointestinal surgery. The report gives importance to high standards of infection control, including use of sterile procedures during surgery, adequate disinfection of surgical instruments, and preoperative administration of prophylactic antibiotics that should be given within an hour of surgery. It is also important that the hospitals must make sure that they have proper resources to minimize the risk of the infection (e.g., surgical supplies, antibiotics) (Bagherian & Sattari, 2022).

Handling of High-Risk Patients: Diabetics and immunocompromised patients can be targeted as high-risk patients developing IAIs. The results indicate that such patients are to be monitored more closely and treated early to reduce the risk of post-operative infections. Moreover, nutrition is also important in immunity and wound healing and patients who are malnourished should be detected early and given the nutritional support they require.

Enhanced Post-operative Surveillance: Post-operative care is an important part of IAIs prevention, and one should monitor the early signs of infection (e.g., fever, abdominal tenderness, elevated white blood cell count) as quickly as possible. The post-operative surveillance systems in the underdeveloped countries ought to be strengthened in order to identify infections at early stages and embark on the early interventions.

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