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Surgical Site Infection Rates: A Comparative Study Between Elective and Emergency Surgeries in a Tertiary Care Centre in Eastern U. P.

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Abstract

Background: Surgical site infections (SSIs) are a significant cause of postoperative morbidity, prolonged hospital stay, and increased healthcare costs. The risk of SSIs varies between elective and emergency surgeries due to factors such as patient condition, sterility control, and procedural urgency.

Objective:

This study aims to compare SSI rates between elective and emergency surgeries and identify the contributing risk factors influencing infection rates.

Methods:

A prospective observational study was conducted on patients undergoing elective and emergency surgical procedures. Patients were followed postoperatively for the development of SSIs. Data on patient demographics, comorbidities, type of surgery, duration of procedure, intraoperative contamination, and postoperative wound care were analyzed.

Results: SSI rates were significantly higher in emergency surgeries (18%) compared to elective surgeries (6%). Factors contributing to increased SSI risk in emergency cases included poor preoperative optimization, increased contamination, longer surgical duration, and higher wound classification scores.

Conclusion: Emergency surgeries have a significantly higher incidence of SSIs than elective procedures due to lack of preoperative optimization, higher contamination risk, and compromised aseptic conditions. Implementing strict infection control measures and perioperative care protocols can help reduce the incidence of SSIs.

Keywords: Surgical site infection, elective surgery, emergency surgery, postoperative complications, wound infection, hospital-acquired infections.

Introduction

Surgical site infections (SSIs) are among the most common healthcare-associated infections, accounting

for a significant portion of postoperative morbidity and mortality. An SSI is defined as an infection occurring at the surgical site within 30 days of an operation (or up to one year in cases of prosthetic implantation). The incidence of SSIs depends on multiple factors, including the type of surgery, patient comorbidities, surgical technique, and perioperative care.

Elective surgeries are planned procedures performed under optimal conditions, allowing for thorough preoperative preparation, infection control measures, and patient optimization. In contrast, emergency surgeries are unplanned and often performed under suboptimal conditions, leading to higher risks of SSIs due to inadequate preoperative preparation, increased wound contamination, and urgent procedural execution.

This study aims to compare the rates of SSIs in elective and emergency surgeries, analyze the contributing risk factors, and suggest preventive strategies to minimize infection rates.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Patients undergoing elective and emergency surgeries.
- Patients aged 18 years and above.
- Patients with no pre-existing active infections at the time of surgery.
- Patients who provided informed consent for study participation.

Exclusion Criteria:

- Patients with preoperative infections unrelated to the surgical procedure.
- Immunocompromised patients (e.g., undergoing chemotherapy or with advanced HIV/AIDS).
- Patients undergoing minor surgical procedures not involving deep tissue dissection.
- Patients who failed to complete the postoperative follow-up period.

Materials and Methods

Study Design: This prospective observational study was conducted at a tertiary care hospital over a period of 12 months. Patients undergoing elective and emergency surgeries were enrolled and monitored for SSIs.

Data Collection: Patient data were collected using standardized forms, including:

1. **Demographics** – Age, sex, BMI, comorbid conditions.
2. **Surgical Variables** – Type of surgery, elective vs. emergency, duration of procedure, wound classification (clean, clean-contaminated, contaminated, dirty).
3. **Intraoperative Factors** – Aseptic precautions, intraoperative contamination, use of prophylactic antibiotics.
4. **Postoperative Follow-Up** – Wound inspection, SSI diagnosis based on CDC criteria (redness, swelling, discharge, fever).

Outcome Measures:

- Primary outcome: Incidence of SSIs in elective vs. emergency surgeries.
- Secondary outcomes: Risk factors associated with SSIs, length of hospital stay, need for antibiotic therapy, and requirement for surgical wound debridement.

Observations and Results

Patient Distribution and Surgery Types:

A total of 500 patients **were included in the study:**

- **Elective surgery group (n=250)**
- **Emergency surgery group (n=250)**

Surgical Site Infection Rates:

- **Elective surgery SSIs: 6% (15/250 patients)**
- **Emergency surgery SSIs: 18% (45/250 patients)**

Risk Factor Analysis for SSIs:

Risk Factor	Elective Surgery (%)	Emergency Surgery (%)
Diabetes Mellitus	12%	20%
Obesity (BMI >30)	15%	22%
Surgery duration >2 hours	10%	30%
Wound contamination (contaminated/dirty)	5%	35%
Prophylactic antibiotic use	90%	65%

SSI Classification (According to CDC Guidelines):

Type of SSI	Elective Surgery (n=15)	Emergency Surgery (n=45)
Superficial incisional SSI	8	22
Deep incisional SSI	4	15
Organ-space SSI	3	8

Discussion

1. Higher SSI Rates in Emergency Surgeries

The study demonstrates that SSIs are significantly more common in emergency surgeries (18%) compared to elective procedures (6%). This can be attributed to:

- **Limited preoperative preparation:** In elective surgeries, patients are optimized preoperatively (e.g., blood sugar control in diabetics, preoperative antibiotics), whereas emergency cases often lack this optimization.
- **Increased wound contamination:** Many emergency surgeries involve the gastrointestinal tract, trauma, or infected tissues, leading to a higher risk of wound contamination.
- **Longer surgical duration:** Prolonged procedures increase the risk of bacterial exposure and infection.

2. Impact of Comorbidities

Diabetes mellitus and obesity were significantly associated with higher SSI rates. Poor glycemic control impairs wound healing, while obesity increases tissue hypoxia and surgical stress.

3. Antibiotic Prophylaxis and Infection Control Measures

Prophylactic antibiotic use was significantly higher in elective surgeries (90%) than in emergency cases (65%), contributing to the lower infection rate in elective procedures. Emergency surgeries often experience delays in antibiotic administration, leading to increased infection risks.

4. Wound Classification and SSI Rates

Wound classification plays a crucial role in infection risk:

- **Clean wounds** (e.g., elective hernia repair) have the lowest infection rates.

- **Contaminated and dirty wounds** (e.g., emergency bowel resections, perforated appendicitis) have the highest SSI rates.

5. Postoperative Care and Length of Hospital Stay

Patients with SSIs required **longer hospital stays (mean 10 days in emergency surgeries vs. 5 days in elective surgeries)** due to the need for intravenous antibiotics, wound care, and, in some cases, reoperation.

Conclusion

This study highlights the significantly higher incidence of SSIs in emergency surgeries compared to elective procedures. The primary contributing factors include inadequate preoperative preparation, increased wound contamination, prolonged operative times, and suboptimal infection control measures.

Key Recommendations to Reduce SSIs:

1. **Strict adherence to aseptic techniques** during emergency surgeries.
2. **Timely administration of prophylactic antibiotics** in all surgical cases.
3. **Optimized perioperative patient care**, including glycemic control and weight management.
4. **Enhanced postoperative surveillance** for early detection and management of SSIs

By implementing these measures, hospitals can significantly reduce SSI rates and improve surgical outcomes.

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