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INCIDENCE AND ASSOCIATION OF POSSIBLE RISK FACTORS FOR SURGICAL SITE INFECTION IN CLASS I & CLASS II SURGICAL WOUNDS

General Surgery

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ABSTRACT

Introduction The most prevalent kind of hospital-acquired illness (HAI) is known as a surgical site infection (SSI). An SSI is a surgical site infection that begins at the incision made after an invasive procedure and then spreads to other areas of the body. At present, a surgical site infection (SSI) is defined as "An infection that manifests itself during the first thirty days after surgery if there is no implant left in place, or within the first twelve months after surgery if there is an implant left in place". **Aim And Objectives Aim** This study aims to find out the incidence and association of possible risk factors for surgical site infection in class I & class II surgical wounds.

Objectives-

Primary

1) To find out the incidence of surgical site infection in class I & II surgical wounds.
2) To find out the association of possible risk factors in surgical site infection.

Secondary

1) To suggest measures to reduce the incidence of SSI in class I & II surgical wounds in our hospital.

Materials and methods The study was conducted on a total of 289 patients from 1 December 2020 to 31 July 2022. Following details like type of surgery by wound class (classI/II), Elective/Emergency surgery, type of SSI, duration of surgery, antimicrobial prophylaxis used or not, drain used or not, duration of pre-operative period, total stay in hospital till discharge were noted. Surgical site was inspected after 48hrs of surgery and as and when required thereafter upto 30 days. Swabs were taken from the infected wounds and culture and sensitivity was done by the department of microbiology through standard methods.**Results** The incidence of SSI was 15.6%. The prevalence of SSI increased with age with higher prevalence among more than 60 years age group, more than 10 days in hospital , those undergoing emergency procedure. All risk factors and were significantly associated with the occurrence of SSI and Clean contaminated surgery.

KEYWORDS

INTRODUCTION

Surgical Site Infection (SSI) is a serious postoperative complication that affects around 5% of all surgical patients .[1] When an SSI develops, the clinical and economical costs of surgery considerably rises. Chlorhexidine-Alcohol is advised by the Centers for Disease Control and Prevention (CDC) to be used before to central venous and peripheral arterial catheterisation. Recent research has shown that while performing clean surgery, Chlorhexidine- Alcohol is more effective at avoiding surgical site infections than Povidone-Iodine.[2]

AIM AND OBJECTIVES

AIM

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MATERIAL AND METHODS

The study was conducted on a total of 289 patients from 1 December 2020 to 31 July 2022. It is an observational analytical study.

Inclusion Criteria

1. Patients undergoing all general surgical procedures with class I & class II surgical wounds with more than 18 yr of age.

Exclusion Criteria

1. Patients undergoing surgeries with contaminated/dirty surgical wounds.
2. Patients with bone implants.
3. Patients undergoing surgery for malignancy.
4. Patients on corticosteroids/immunosuppressants.
5. Patients undergoing urological and reconstructive procedures.

On the day of surgery following details were noted:

1. Type of surgery by wound class (classI/II)
2. Elective/Emergency surgery
3. Type of SSI
4. Duration of surgery
5. Antimicrobial prophylaxis used or not
6. Drain used or not
7. Duration of pre-operative period
8. Total stay in hospital till discharge

Surgical site was inspected after 48hrs of surgery and as and when required thereafter upto 30 days. Swabs were taken from the infected wounds and culture and sensitivity was done by the department of microbiology through standard methods.

Statistical Analysis

All data was entered into a Data collection Proforma Sheet and entered into MS Excel 2011. Statistical analysis was carried out using SPSS version 24.0 software with regression modules installed.

RESULTS

The incidence of SSI was 15.6%. The mean age of the study population was 42.45±16.14 years with majority belonging to 31-40 years (25.3%) with 62.7% males and 37.3% females. The mean Duration of Hospital stay was 10.88±3.86 (5-23) days. Elective procedure was done for 231 patients and emergency procedure for patients out of which 17.7% and 29.3% developed SSI respectively. The risk factors reported were Smoking, Anaemia, Diabetes, Obesity, Hypertension, Prolonged duration of surgery, Respiratory Disease and Old age were 19.4%, 9.3%, 10.7%, 6.2%, 7.3%, 4.2%,8.3% and 5.2% respectively. Drain was placed in 39 patient out of which 19 (48.7%) developed SSI. Out of total 289 cases Clean among 173 (59.9%), Clean contaminated among 116 (40.1%). SSI was found to have more prevalence in class II wounds. The prevalence of SSI increased with age with higher prevalence among more than 60 years age group, more than 10 days in hospital , those undergoing emergency procedure.

All risk factors and were significantly associated with the occurrence

of SSI and Clean contaminated surgery. 13 (28.9%) patients had E. coli as the most frequently reported pathogen. MRSA (15.6%), Klebsiella pneumoniae in 6 (13.3%) patients, Staphylococcus aureus in 5 (11.1%) patients, Enterobacter aerogenes in 3 (6.7%) patients, Pseudomonas aeruginosa in 4 (8.9%), Acinetobacter baumannii in 2 (4.4%) patients, and Candida albicans in 1 (1.8%) patients were among the other organisms identified.

DISCUSSION

Surgical Site Infection (SSI) is a serious postoperative complication that affects around 5% of all surgical patients. [1] When an SSI develops, the clinical and economical costs of surgery considerably rises. Age, poor nutrition, hypovolemia, poor tissue perfusion, obesity, diabetes, steroids, and other immunosuppressants are different risk factors.

Surgical wounds may heal with primary, delayed primary, or secondary intents, depending on the kind of treatment that was performed. The majority of wounds are treated using a technique called primary closure, in which the wound edges are apposed and then maintained in place mechanically. This allows the wounds to heal and become robust enough to bear force without further support (with adhesive strips, staples, or sutures). The fundamental objective of surgery is to hasten the body's natural healing process with as few adverse side effects as possible, including edema, serous discharge, infection, wound border separation, and scarring. The bacterial load is the most important risk factor, despite the fact that the effectiveness of surgical wound healing is affected by a variety of variables. [3,4]

Reduced host resistance may be brought on by surgical qualities, local wound characteristics, or systemic variables impacting the patient's healing response.

1. Age, poor nutrition, hypovolemia, poor tissue perfusion, obesity, diabetes, steroids, and other immunosuppressants are examples of systemic variables.
2. Dead spaces, improper skin preparation, such as shaving, leaving nonviable tissue in the wound, hematomas, foreign objects, such as drains and sutures, dead spaces, and preexisting infections are some of the hallmarks of wounds (local or distant).
3. Operative characteristics include: a prolonged hospital stay before surgery; the length of the surgical scrub; the duration of skin antisepsis; preoperative shaving; preoperative skin preparation; the length of the operation; intraoperative contamination, including infected theatre staff and instruments; the use of surgical drains; inadequate sterilization of instruments; a suture technique that causes tissue trauma; and poor hemostasis.

Surgical Site Infection Criteria

Surgical site infections are infections of tissues, organs, and locations exposed by the surgeon during surgery. Organ/space infections and infection of the incision line are the two types of SSI, with the latter being further broken down into groups for superficial and deep infection.[5]

Superficial SSI

Any surgical procedure covered by the National Health Care Safety Network (NHSN) has a date of occurrence for infection that is within 30 days without any implant or within 1 year if an implant is being used. It should solely impacts the skin and subcutaneous tissue surrounding the incision. The patient fits at least one of the following descriptions:

1. Purulent discharge from the incision's surface.
2. A shallow incision or subcutaneous tissue that contained organisms that were isolated aseptically and utilised for clinical diagnosis or treatment.
3. The patient exhibits at least one of the physical traits: warmth, erythema, localized swelling, pain, or soreness.
4. The diagnosis of a superficial surgical site infection must be made by the surgeon.

Deep SSI

The National Healthcare Safety Network (NHSN) operational procedure (30 days without any implant or within 1 year if an implant is being used) within the days of the infection's occurrence, and it includes deep soft tissues around the incision (fascial and muscle layers) and the patient has at least one of the following:

1. Purulent Discharge from the incision's deep opening.
2. Adeep incision that suddenly dehisces, is intentionally opened, or is aspirated by a surgeon and an organism is identified by a culture-based microbiologic testing method used for clinical diagnosis or treatment.
3. An infection discovered by a gross anatomical, histological, or imaging study, such as a deep incision abscess.

Organ/Space SSI

Date of event for infection occurs between 30 days and a year after the National Healthcare Safety Network (NHSN) surgical procedure, infection affects any part of the body that was opened or manipulated during the surgical procedure that is deeper than the fascial/muscular layers, and patient has at least one of the following:

1. Purulent outflow from an organ or space-specific drain (for example, closed suction drainage system, open drain, T-tube drain, CT guided drainage)
2. By using a culture-based microbiologic testing approach, organisms from fluid or tissue in the organ or space are identified for use in clinical diagnosis or therapy
3. The discovery of an abscess or other infection-related evidence involving the organ or space during a gross anatomical or histopathological examination, or infection-related imaging test evidence.

Surgical Wound Classification

Class I / Clean:

An uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or uninfected urinary tract is not entered. In addition, clean wounds are primarily closed and, if necessary, drained with closed drainage. Operative incisional wounds that follow no penetrating (blunt) trauma should be included in this category if they meet the criteria.[6]

Class II / Clean-Contaminated:

An operative wound in which the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions and without unusual contamination. Specifically, operations involving the biliary tract, appendix, vagina, and oropharynx are included in this category, provided no evidence of infection or major break in technique is encountered.[6]

Class III / Contaminated:

Open, fresh, accidental wounds. In addition, operations with major breaks in sterile technique (e.g., open cardiac massage) or gross spillage from the gastrointestinal tract and incisions in which acute, no purulent inflammation is encountered are included in this category.[6]

Class IV / Dirty:

Old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation.[6]

3). Preoperative elements

a. Preoperative hair removal:

Shaving the surgical site the night before surgery, as opposed to using depilatory drugs or not removing hair at all, is linked with a far increased risk of surgical site infection (SSI). One research found that the SSI incidence was 5.6% among patients who had a razor shave compared to the SSI rate of 0.6% among patients who had used a depilatory or who did not remove their hair at all. The risk of a surgical site infection (SSI) is higher after a shave because the razor creates tiny wounds in the skin that may become breeding grounds for bacteria..

b. Skin preparation:

Common antiseptics include iodophors (such povidone-iodine), alcohol-based compounds, and chlorhexidine gluconate. No well-controlled trials that focus on a single kind of surgery have compared the efficacies of these various preoperative skin antiseptics in reducing the risk of SSI. Alcohol is the most accessible, least priced, and fastest acting skin antiseptic. Alcohol solutions in water at concentrations between 70% and 92% are germicidal against bacteria, fungi, and viruses; however, certain spores may be resistant. There is a risk of fire if alcohol is used during surgery.

Scrubs made of water and products containing rubbing alcohol are the two most.prevalent types of cleaners used in the peri-operative context. The two most frequent aqueous washes are chlorhexidine gluconate and povidone-iodine, and they are used in a systematic cleaning process to avoid cross-contamination. Before putting on

surgical gloves, it is standard practice to massage the hands with alcohol and then let the alcohol evaporate.

c. Preoperative scrubing by surgical team

Commonly available antiseptics include rubbing alcohol, chlorhexidine, iodine/iodophors, parachloro-meta-xylenol, and triclosan. Alcohol is often considered the gold standard for preoperative hand preparation in several European countries. In the United States, povidone-iodine and chlorhexidine gluconate are the antiseptics of choice for most surgeons.Even though hand rubbing with a 75% aqueous alcohol solution only took 2.5 minutes as compared to 5 minutes of hand washing with 4% PI or 4% chlorhexidine gluconate, compliance with the necessary period of hand antisepsis was much greater. Utilizing an alcohol-based solution to massage hands after washing for one minute to remove dirt and debris was shown to be as beneficial as using traditional hand-scrubbing procedures in preventing SSIs, and in certain cases was less irritating and drying to the skin.

d. Antimicrobials prophylaxis:

Surgical antimicrobial prophylaxis (AMP) is the administration of a brief course of an antimicrobial drug soon before surgery begins . Tissue sterilization is not the goal of AMP; rather, it is utilized as an adjuvant to reduce the microbial load of intra-operative contamination to a level where host defenses are not overwhelmed. It is important to note that AMP does not cover measures taken to avoid SSI due to surgical contamination. Currently, intravenous infusion is the most used route of administration for AMP in clinical settings.

CONCLUSION

To avoid SSIs and keep wound contamination to a minimum, the duration of the procedure should be minimised. Reducing the length of time patients spend in the hospital before surgery is crucial in the fight against SSI. Patients of all ages, but particularly those at the extremes, need to be in excellent health before surgery may be performed. Antibiotic susceptibility testing and regular culture should be performed on surgical site samples as soon as possible if an infection is suspected. Hospital-specific antimicrobial prophylaxis protocols should be reviewed from time to time.

A large study enrolling patients from all possible surgical specialties is required to isolate a large number of isolates, including anaerobic bacteria, to establish the prevalence of SSIs caused by antimicrobial-resistant pathogens and identify the relevant gene responsible for antibiotics resistance. It is important to have a system of continuous monitoring and feedback for surgeons, whose practices may need to adapt in light of the results.

REFERENCES

1. Gottrup F. Prevention of surgical-wound infections. N Engl J Med 2000;342(3):202-4.
2. Darouiche RO, Wall MJ Jr, Itani KM, Otterson MF, Webb AL, Carrick MM et al. Chlorhexidine-alcohol versus povidone-iodine for surgical-site antisepsis. N Engl J Med. 2010;362(1):18–26.
3. Almuhanna MT, Alnadwi ME. Epidemiology, Bacteriology and Risk Factors of Surgical Wound Infections: A Systematic Review. The Egyptian Journal of Hospital Medicine. 2018;70(4):625-9.
4. Bowler PG, Duerden BI, Armstrong DG. Wound microbiology and associated approaches to wound management. Clin Microbiol Rev. 2001;14(2):244-69.
5. Seyrnour I, Schwartz, Sheres TS. Principle of surgery, 6th ed. 151.
6. Ortega G, Rhee DS, Papandria DJ, Yang J, Ibrahim AM, Shore AD, et al. An evaluation of surgical site infections by wound classification system using the ACS-NSQIP. J Surg Res. 2012;174:33-38.