

A study to determine the effect of using clippers in reducing surgical site infections among the post operative abdominal surgery patients in a selected private hospital in Kolkata.

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Introduction -

A surgical site infection is an infection that occurs after surgery in the part of the body where the surgery took place. Surgical site infections can sometimes be superficial infections involving the skin only. Other surgical site infections are more serious and can involve tissues under the skin, organs, or implanted material. CDC provides guidelines and tools to the healthcare community to help end surgical site infections and resources to help the public understand these infections and take measures to safeguard their own health when possible.

Approximately 27 million surgical procedures are performed in the United States each year, with up to 5% resulting in surgical site infections (SSI). Trends in the incidence of SSI are monitored by the National Nosocomial Infections Surveillance (NNIS) system of the Centres for Disease Control and Prevention (CDC). According to NNIS data, SSIs are the third most frequently reported nosocomial infection and are associated with substantial morbidity that can endanger a patient's life, increase the number of days in the hospital, and increase healthcare costs. This chapter describes the types of SSI, lists risk factors, and explains prevention strategies.

Surgical site infections may be caused by endogenous or exogenous microorganisms. Most SSIs are caused by endogenous microorganisms present on the patient's skin when the surgical incision is made. Gram-positive bacteria such as *Staphylococcus aureus* are the most common causative skin-dwelling microorganisms. Surgical site infections may also be caused by organisms within the patient's body that are exposed during surgery. Causative pathogens depend on surgical site; for example, the risk of developing SSI from enteric gram-negative microorganisms increases with surgery on the gastrointestinal tract. Exogenous sources of microorganisms include surgical instruments, operating room surfaces, the air, and personnel.

Removal of hair from the intended site of surgical incision has traditionally been part of the routine preoperative preparation of patients undergoing surgery. Hair removal may be necessary to facilitate adequate exposure to the site and preoperative skin marking. Furthermore, suturing and the application of wound dressings can be complicated by the presence of hair. Apart from these practical issues, hair has been associated with a lack of cleanliness and the potential to cause surgical site infection (SSI). However, there is also the belief that hair removal inversely increases the risk of SSI by causing microscopic trauma of the skin. To minimize the potential of skin trauma, the use of clippers instead of razors has been proposed for preoperative hair removal. Clippers cut the hair close to the skin without actually touching it, whereas razors involve a sharp blade drawn directly over the skin. A third method for hair removal is the application of depilatory creams containing chemicals. The drawbacks are the necessity to leave the cream in place for approximately 15-20 minutes for the hair to be dissolved and the potential for allergic reactions. A Cochrane review, published in 2009 and updated in 2011, concluded that there was no statistically significant effect on SSI rates of hair removal¹. However, a significant harm was seen when hair removal with razors was compared with clipping.

Need of the study –

The preparation of people for surgery has traditionally included the routine removal of body hair from the intended surgical wound site. Hair is removed as its presence can interfere with the exposure of the incision and subsequent wound, the suturing of the incision and the application of adhesive drapes and wound dressings (Hallstrom 1993; Miller 2001). Hair is also perceived to be

associated with a lack of cleanliness and the removal of hair is thought to reduce the risk of surgical site infections (SSIs) (Kumar 2002). However, there are studies which claim that pre-operative hair removal is deleterious, perhaps by causing SSIs, and should not be carried out (Alexander 1983; Court Brown 1981; Horgan 1997). Three methods of hair removal are currently used; shaving, clipping and chemical depilation.

Shaving is the commonest and cheapest method of hair removal. This method uses a sharp blade, held within the head of a razor, which is drawn over the patient's skin to cut hair close to the surface of the skin.

Clippers use fine teeth to cut hair close to the patient's skin, leaving short stubble of usually around one millimetre in length. The heads of clippers can be disposed of or disinfected between patients to minimise the risks of cross infection.

Despite remarkable advances in the use of surgical techniques and prophylactic antibiotics and environmental/ergonomic improvements in the operating room, surgical site infections (SSIs) remain a significant cause of patient morbidity and mortality and are the third-most common source of hospital-acquired infection. Of concern is that SSIs occur in up to 30% of all surgical procedures, and yet most are preventable. The economic impacts on the health care system are substantial, including increased hospital length of stay and escalating hospital costs, rising from twofold to fivefold.

A systematic review of preoperative shaving was published in 2002 (Kjonnixsen 2002). The search for this review was up until 1999 and included both randomised and observational studies. Evidence for not removing hair was found in observational studies only. Strong evidence was found in support of clipping in preference to shaving. Observational studies supported depilation rather than shaving. Moderate evidence, based on observational studies and a randomised study (though this is not statistically significant) finds that the timing of hair removal should be as close to surgery as possible. The recommendations of the Norwegian Centre for Health Technology Assessment (SMM2000) are based on the findings of this review.

Purposes-

To minimize the potential of surgical site infection rate.

Objectives -

- To find SSI rates among the post operative abdominal surgery patients using razor for shaving (control group) preoperatively.
- To find SSI rates among the post operative abdominal surgery patients using Clippers for shaving preoperatively.
- To compare the effectiveness of Clippers by finding the SSI rates in both the cases.

Operational definition -

Surgical Site Infection: - A surgical site infection (SSI) is an infection that occurs after surgery in the part of the body where the surgery took place.

Clippers- A hair clipper (often individually known by the apparent plural hair clippers in a similar way to scissors) is a specialised implement used to cut human head hair. They work on the same principle as scissors, but are distinct from scissors themselves and razors.

Razor -A sharp-edged cutting instrument used especially for shaving or cutting hair, especially from the face or legs.

Effectiveness – It is the power to bring the changes in the rate of SSI.

Hypothesis -

H1- There is significant reduction in post operative surgical site infection rate after using clippers than the post operative surgical site infection rate after using razors.

H2- There is significant difference in rate of surgical site infections between experimental group and control group.

Review of Literature -

The present study is almost to the similar study that 'Preoperative hair removal to reduce surgical site infection' by Cochrane Systematic Review - Intervention Version published: 19 July 2006, in which Alexander 1983 used sealed envelopes and Ko 1992 stated that the assessors were blinded to the group allocation status. 2.8% (46/1627) of people who were shaved prior to surgery developed an SSI compared with 1.4% (21/1566) of people who were clipped prior to surgery. The trials involved similar types of surgery and were pooled using a fixed effects model ($I^2 = 0\%$) giving an RR = 2.02 (95% CI 1.21 to 3.36) (Analysis 3.1). This difference was statistically significant and shows that people are more likely to develop an SSI when they are shaved than when they are clipped prior to surgery.

In another study 'Pre-operative hair removal with trimmers and razors and its impact on surgical site infections in elective inguinal hernia repair' by John S. Kurien, Sansho E. U, Adarsh I, Nath, Sandeep A. Varghese, in which Out of the total 160 patients who were studied, 29 (18.1%) of them had post-operative infection within 30 days, in the form of erythema, induration, discharge and gaping. Most of the symptoms of surgical site infections were during the initial 3 days (69%), with the most common symptom being erythema (18.1%) followed by induration (12.5%). Gaping (0.6%) and discharge from wound (3%) were very minimal. Those individuals who had undergone preoperative hair removal with trimmers (11.2%) had a lower incidence of surgical site infection when compared to those with razors (20%). The difference was statistically significant, with a p value of 0.024 by Chi-Square tests. The difference in erythema (p- 0.024) and induration (p-0.017) between the two groups was also found to be statistically significant. Other factors, namely type of surgery, age of the individual and sex did not have a statistically significant difference.

Research Methodology -

Research Approach – Experimental research approach

Research Design – Post test only control group design

Sample Size - 60 (30 for razor, 30 for clipper)

Setting - Private Hospital, Kolkata

Population - Patient undergoing abdominal surgery, age group between 20 to 50 years.

Sampling technique – Non Probability purposive sampling.

Variables:

Clippers: Independent Variable.

Surgical site Infection: Dependent variable

Delimitation -

- The study was delimited to only abdominal surgery patients
- The study was confined to a selected private hospital, Kolkata.
- Subjects are taken during data collection.

Inclusion Criteria -

- Patients who underwent abdominal surgery.
- Patients who underwent abdominal surgery belong to age group 20 to 50 years.

Exclusion Criteria -

- Patients who went to other than abdominal surgeries.
- Patients who were not willing to participate.

Content validity-

Tool (demographic data, Surgical safety checklist by WHO, Criteria of identifying SSI as per CDC guidelines) was validated by 5 experts and the percentage of agreement for demographic data and appropriateness of different checklist was 100%.

Reliability -

The reliability of the tools was established by Inter-rater reliability method. The reliability coefficient was found 0.69 which was indicated to be reliable and showed more than 80% agreement between the two.

Ethical Consideration - Permission was taken from ethical committee of the hospital

Data collection tools -

Sec-I Interview schedule related to demographic data related to Age, Sex, Income, Educational status, Types of Surgery.

Sec-II Surgical safety checklist by WHO

Sec- III Criteria of identifying SSI as per CDC guidelines

Patients with SSI were identified as per the following CDC criteria.

- Infection occurring in the first post-operative week
- Involving skin and subcutaneous tissue at surgical site and patient is with any one of the following:
 - a. Purulent discharge.
 - b. Organisms isolated from fluid/tissues of superficial incision.
 - c. At least one sign of inflammation (indurations, erythema, local rise of temperature, excess pain in the incision site.).
 - d. Wound deliberately opened by the surgeon for drainage.
 - e. Surgeon declares that the wound is infected due to overt signs of inflammation or discharge from suture line.

Data collection procedure -

- After obtaining informed consent to be a part of the study, data were collected as per a predesigned questionnaire for all the patients who underwent abdominal hysterectomy, explorative laparotomy, appendectomy, cholecystectomy, herniorrhaphy, hernioplasty. Lower uterine caesarean section
- Risk factors, like patient characteristics (age, any co morbidity, indications of surgery and procedure characteristics (prophylactic antibiotics, postoperative antibiotics, date of surgery, type of anesthesia, type of wound, duration of surgery in minutes, glucose monitoring, monitoring vitals and all other necessary pre op investigations) were analyzed to predict SSIs.
- Except using clippers, others all pre operative measures were same for both experimental and control group.

Data Analysis-

Data was analyzed by using Frequency distribution, percentage, and Chi square test

Demo graphic data analysis:**No of Sample according to their sex –**

Majority samples are Female 38 (63.3%) and male samples are 22 (36.7%).

No of samples according to their age-

Majority samples 32(53.3) are belongs to age group of 31 to 40 years. 12 (20%) samples are from the age group of 20 to 30 years. 16 (26.7%) are from the age group of 41 to 50 years.

No of samples according to their Education-

Majority samples are graduate 42 (70%).

No of samples according to their Income-

Majority samples 36 (60%) are belongs to (Rs 40,000 to Rs 50,000) income group

Category of patients according to their surgery-

Total patients – 60, samples were taken from abdominal surgery. Appendectomy 8 (13.4%), LUCS 9 (15%), Cholecystectomy 13 (21.7%), Hysterectomy 17(28.4%), Hernioraphy 4(6.68%), Hernioplasty 3(5%), Laparotomy 6(10%).

Data analysis about Surgical Site Infection

Calculation of SSI –

No of Surgical site infections

SSI rate by type of operation = ----- x 100

Total no of operations

SSI rate is a percentage and is calculated as the number of SSIs divided by the total number of patients.

Two cases of SSI were found from the study population of 60 patients. The diagnosis of SSIs occurred between the 5th and 12th postoperative days. Both the samples were under the category of shaving with Razor group. Post-operative infection seen in the form of erythema, induration, discharge and gaping in the wound.

Incidence of SSIs in cases of abdominal surgeries. Total cases of abdominal surgeries 60. SSIs among all cases 2. Total incidence 3.3% Incidence of SSIs according to type of surgery

No of incidence-

- 1 (12.5% reported from Appendectomy)
- 1 (50.8% reported from Laparotomy) from the Razor shaving group.

Bacteria found in SSI –

- Laparotomy - Acinetobacter spp
- Appendectomy – Escherichia coli
- Those individuals who had undergone preoperative hair removal with clippers had no incidence of surgical site infection when compared to those with razors (3.3%).
- The difference was statistically significant, with a p value of 0.024 by Chi-Square tests.

Discussion -

Numerous randomized, controlled trials have examined the practice of preoperative hair removal and its relation to operative site infection. Hair has often been perceived to be associated with a lack of cleanliness, and its removal linked to infection prophylaxis. Various modalities of hair removal include shaving, clipping, and depilatory creams.

Routine preoperative shaving was not shown to decrease the risk of SSI in laparotomies, and has been implicated in higher rates of infection. Studies have shown that shaving the skin as compared with clipping results in a statistically significant increase in the rate of SSI. Shaving results in microscopic cuts and abrasions, thus acting as a disruption of the skin's barrier defence against microorganism colonization. Clippers, when used correctly, should not cut into the patient's skin, potentially.

Clippers use fine teeth to cut hair close to the patient's skin, leaving short stubble that is usually around one millimetre in length. The heads of trimmers can be disposed of between patients to minimise the risks of cross infection

Limitations

- Sample size was relatively small, so its findings could not be effectively generalized.
- The assessment for SSI was for limited time.

Implication -

Nursing Administrations - Nursing Administrator can make a policy to make mandatory of using clippers in pre operative patient's shaving

Nursing Practice - Nurses are always challenged on contribute to society as professionals. They are expected to take professional responsibilities for continuously providing direct care, protecting individual lives and supporting activities of daily living. For making them updated, need help of new instruments

Nursing Education – Nurse Educator should emphasize the concept of more involvement of staff training, regarding use of clippers.

Nursing Research - More emphasis should be laid on research in this area of SSI practicing for different hospitals to disseminate the research based evidence for nursing practice.

Recommendation -

- A similar study can be replicated with a larger number of samples for making generalization of the study.
- A similar study can be performed with other surgeries.
- The study can be performed to assess the nurse's attitude towards reduction of SSI.
- The study can be done to identify the factors that contribute the SSI.

Conclusion – In this study there is evidence of definite reduction in surgical site infection rates when clippers are used for pre-operative hair removal than razors in abdominal surgery. Preoperative hair removal with clippers had a statistically significant lower incidence of erythema and indurations at the wound site when compared to use of razors. Other factors namely type of surgery, age of the patient and sex of the patient were not statistically significant. Therefore, preoperative hair removal with the help of clippers should be recommended since this method significantly reduces the number of surgical site infections.

To minimize the potential of skin trauma, the use of clippers instead of razors has been proposed for preoperative hair removal. Clippers cut the hair close to the skin without actually touching it, whereas razors involve a sharp blade drawn directly over the skin.

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