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Original Research Article

Surgical Site Infection in 160 Post Operative Patients in a Government Hospital: A Prospective Observational Study

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ABSTRACT

Context: Surgical site infection continues to be a major cause of morbidity and mortality among post operative cases worldwide.
Aims: This study was conducted to find out incidence of surgical site infection (SSI) and associated factors in post operative patients.
Settings and Design: The present study was institution based prospective observational study.
Materials and Methods: This study was conducted at a tertiary care hospital over a period of two month in the department of surgery. Subjects were patients operated in the hospital in 2 months of our study period and followed till tenth postoperative day for SSI. Predesigned, pretested, semi-structured questionnaire and predefined local examination findings were used for data collection. Data analyzed by using various statistical methods like percentage, proportions, graphs, tables and suitable statistical software.
Results: The incidence rate of surgical site infections found in the present study was 18.12%. A very high incidence of SSIs has been found in Muslims with a rate of 43.75%, which is statistically significant with p value of 0.0138. Open surgery have 20.90% prevalence of SSIs which is very high as compared to laparoscopic surgery (3.85%).
Conclusions: Surgical site infection is one of the important complications of surgery. SSI rate is found to be less in this study in comparison to the previous ones. Record keeping and a monitoring system for SSI is necessary to suggest preventive and control measures which can lower the infection.

***Key-words*:** Surgical site infection, Incidence, Government hospital, Religion, Site of surgery, Laparoscopic surgery.

INTRODUCTION

SSIs are among the most common hospital acquired infections comprising 14-16 percent of inpatient infection. [1] Such infection lengthens the bed stay for an average of seven days. This leads to physical and mental trauma to patients and results in avoidable financial burden on patients and health systems. Potential sources of infection are the patient (especially contamination by alimentary tract bacteria), hospital environment, food, other patients, staff and infected surgical instrument, dressings, and even drugs and injections.

SSI is identified with redness, inflammation, heat, pain, a temperature of 38°C, and septic drainage from the surgical site during 30 days following operation. [2] In a study, the rate of wound infection for 15 to 24-year old patients was only 10 % but increased significantly for

those over 65 years of age. Same study showed, in patients who showered with ordinary soap preoperatively, the infection rate was reduced to 2.3%. Only 3% of operations lasting 30 minutes or less led to infection, while for operations lasting more than 6 hours, this rate increased to18%. Among other factors that delay wound healing or increase the infection rate are cigarette smoking, which increases the postoperative infection rate 5-fold, and the use of steroids, which delays wound healing and increase the infection rate by 9 %. Shaving during surgeries reduces the chances of SSi**.** [3] Sterile gloves contribute to preventing SSI**.** [4] Aseptic surgical techniques are claimed to decrease the infection rate, though not to zero**.** [5] However, the administration of prophylactic antibiotics 30 to 60 minutes before surgery decreases the incidence of SSI**.** [2,5-11] Other contributing factors are the type of surgery and secondary infections.

Surgical site infections remain a major cause of hospital-acquired infections irrespective of improvements being done in operating room practices, instrument sterilization methods, better surgical technique and the best efforts of infection prevention strategies. Rates are still increasing globally even in hospitals with most modern facilities and standard protocols of preoperative preparation and antibiotic prophylaxis. SSIs also contribute to increased costs owing to longer hospital stays, readmissions and additional use of antibiotics that can lead to antibiotic-resistant bacteria. Patients who experience SSIs are up to 60% more likely to spend time in the intensive care unit, five times more likely to be readmitted to hospital and twice as likely to die compared with patients without an SSI**.** [12] Hence, there is a need of information to identify opportunities for quality improvement as well as guiding the selection of interventions that may be required to improve compliance with guideline recommendations and thereby reducing SSI rates.

The objective of this study is to assess incidence of SSI and factors associated so that preventive guidelines could be made to avoid morbidity and additional financial burden, associated with the SSIs.

MATERIALS AND METHODS

This prospective observational study was conducted at a tertiary care teaching hospital over a period of two month, on the patients operated consecutively, in the department of general surgery. Screening for the inclusion and exclusion criterion was done and eligible patients were included into the study after taking their written informed consent. Patients who were screened but not enrolled in the study (including patients unable to give informed consent due to any reason) will be documented in the screening log, recording the reason for exclusion.

Inclusion criteria

- Age equal or greater than 18 years.
- Informed consent.
- Patients undergoing elective surgery for any reason.

Exclusion criteria

- Participation in another intervention-trial with interference of outcome of this study.
- Impaired mental state or language problems.
- Patients undergoing emergency surgery.

Study design:

The stages for data collection and information completion were: identification of patients, preoperative interview, postoperative interview, record completion and alternate day examinations for 7-10 days following the operation, and pre-discharge examination. The present study was institution based prospective observational study with qualitative and quantitative component. A study proforma

was pretested before the actual study undertaken.

Study area: The study was carried out in general Surgery department, of a tertiary care teaching hospital in north-central India.

Study subjects: Subjects were selected from patients operated electively in the hospital in 2 months of our study period after obtaining consent and are followed till 7 -10 days after surgery and for SSI.

Consent: After explaining the nature, procedure, purpose and other relevant details of the study, written informed consent will be obtained from the patients. They will be assured that confidentiality will be strictly maintained regarding their personal information. Those subjects will be finally included in the study who will furnish the written informed consent for participation in the study. Participants will be given the choice to withdraw at any time from the study.

Instruments used for assessment:

a) Description of proforma Predesigned, pretested, semi-structured questionnaire and predefined local examination findings will be used for data Collection.

b) Selection of respondent: Based on the exclusion and inclusion criterion of the study.

c) Ethical consideration: Ethical approval regarding the study will be obtained from human research ethical committee of the hospital prior to the start of study.

Statistical analysis*:* After collection data analyzed using various required statistical methods like percentage, proportions, graphs and tables and by using suitable statistical software to apply chi square test.

RESULTS

A total of 29/160(18.125%) cases with SSI were found. A very high incidence of SSIs has been found in muslims with a rate of 43.75%, which is statistically significant with p value of 0.0138. (Table 1)

Table 1.Socio-demographic characteristics and surgical wound infection

Socio-demographic Characteristics	Total patients	Surgical site infection	Non surgical Site infection	Chi sq. Value	p value
Age					
18-29 yrs	38	8(21.05%)	30(78.95%)		
30-49 yrs	62	9(14.52%)	53(85.48%)	59.0	0.0
50 & above	60	12(20%)	48(80%)		
Sex					
Male	91	21(23.07%)	70(79.93%)	3.49	0.062
Female	69	8(11.59%)	61(88.41%)		
Residence					
Rural	71	15(21.13%)	56(78.87%)	0.775	0.379
Urban	89	14(15.73%)	75(84.27%)		
Religion					
Hindu	144	22(15.78%)	122(84.72%)	6.065	0.0138
Muslim	16	7(43.75%)	9(56.25%)		

The number of cases with SSI were 2(25%) in head and neck operations, 18(16.22%) in abdominal, 1(10%) in chest, 10(47.62%) in perineum, 2(15.39%) in operations on extremities**.** (Table 2)

Table 2. Showing relation of SSIs with surgery done at different sites of body

Site of operation	Total	SSI	NON SSI
Head & Neck	8	2	6
Chest	10	1	9
Abdomen	111	18	93
Perineum	21	10	11
Extremities	13	2	11

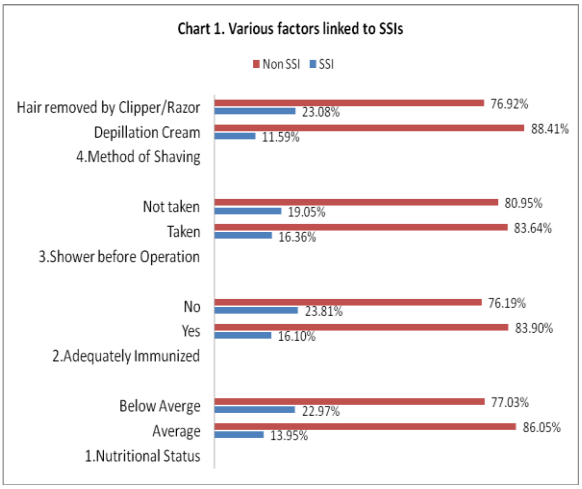
Open surgery have 20.90% prevalence of SSIs which is very high as compared to laparoscopic surgery (3.85%). (Table 3)

Highest rate of SSI was seen on 5th day of operation i.e. 2nd post operative dressings (41%). Out of 91 male patients, 21(23.07%) males have SSIs while 8(11.59%) out of 69 females have SSIs. Hair removed by clipper/razor has high chances of infection that is 23.08% in

comparison to 11.59% in hair removed by depilation cream. (Chart 1)

Table 3. Intraoperative observations and surgical wound infection

Intra operative Observation	Total patients	Surgical site infection	Non surgical site infection	Chi sq. value	p value
Type of operative wound					
Clean	114	19(16.67%)	95(83.33%)		
Clean contaminated	45	10(22.22%)	35(77.78%)	0.894	0.64
Contaminated	1	0	1(100%)		
Operation duration					
<1 hour	45	7(15.56%)	38(84.44%)		
1-2 hours	77	11(14.29%)	66(85.71%)	3.96	0.138
>2 hours	38	11(28.95%)	27(71.05%)		
Method of operation					
Open	134	28(20.90%)	106(79.10%)	4.27	0.039
Laparoscopic	26	1(3.85%)	25(96.15%)		
Type of suture					
Polyfilament	36	7(19.44%)	29(80.56%)	0.357	0.982
Monofilament	124	23(18.55%)	101(81.45%)		



Other factors that may be considered as risk factors for development of SSI are age, sex, smoking and alcoholism, malignancy and other coexisting disease, obesity **(Table 4)**, timing and method of shaving, shower prior to surgery, duration of operation, body site of surgery, timing and type of antibiotic administration etc.

Table 4. Showing BMI relation with SSIs

BMI	Total patients	SSI	SSI Rate(%)	Chi sq. value	p value
<18.5	50	12	24	1.70	0.428
18.5-24.99	104	16	15.39		
>25	6	1	16.67		

DISCUSSION

The present study was carried out in 160 patients who underwent various surgeries. The incidence rate of surgical site infections found in the present study was 18.12%. The incidence rate in our study was remarkably lower than those reported in previous studies [17] but higher than the incidence rates in patients from developed countries. [18-20] Few studies done in the past have shown surgical site infection rates in India to be between 4 to 30%. [13,21-23] The higher surgical site infection rate in Indian hospitals may be due to the poor set up of our hospitals and also due to the lack of attention towards the basic infection control measures.

The highest rate (21.05%) was recorded at 18-29 year age group followed by 50 year & above age group with a rate of 20%. It can be due to multiple factors like a low healing rate, malnutrition, mal-absorption, increased catabolic processes and a low immunity in elderly group of patients. [24] The rate of SSI was significantly higher in male patients (23.07%) than in females (11.59%). This could be explained by multiple risk factors in male such as cigarette smoking, alcohol consumption and HIV. Incidence of SSIs among smokers in this particular study was found to be 20%. Reason being that Cigarette smoking have an impact on wound healing through impairment of tissue oxygenation and local hypoxia via vasoconstriction. [15]

A statistically significant difference is found in the incidences of SSIs among Hindus and Muslims.

A very high rate of SSI (66.67%) has been found in patients suffering from malignancies in this study. Other co-existing diseases like hypertension, tuberculosis, and diabetes mellitus are also

the risk factors for SSIs. This may be due to their low immunity as mentioned in other studies also. [25] This study reveals that our rural population is at high risk for SSIs as compared to the urban population. Reason behind this scenario may be the high rate of illiteracy and lack of awareness about hygein and various diseases among the rural population.

SSI rate is more in dirty wounds as compared to clean contaminated and clean wounds as observed by many authors. [14,16] In our study, SSI rate is more in clean contaminated wounds than in clean wounds. Underlying reason remains obscure. In agreement with other studies, [26] the present study found that a length of operation of more than 2 hours leads to higher risk for SSI (28.95%). Increasing the length of procedure theoretically increases the susceptibility of the wound by increasing bacterial exposure and the extent of tissue trauma (more extensive surgical procedure) and decreasing the tissue level of the prophylactic antibiotic. In case of open surgeries, a very high rate of SSI (20.90%) has been observed as compared to laparoscopic surgeries (3.85%), p value 0.039. It has been demonstrated by previous studies that laparoscopic surgery results in fewer overall complications, shorter hospital stays, and shorter recovery time. In addition, they may have less impact on immune function than the open technique. [27]

Removal of hair by means of shaving has 23.08% SSI prevalence. It is supported by various studies that have shown that shaving the skin results in a significant increase in the rate of SSI. [28-30] Shaving results in microscopic cuts and abrasions, thus acting as a disruption of the skin's barrier defense against microorganism colonization. This study reflects that showering before operation reduces the risks for SSIs. This was well supported by other studies which also favour the effectiveness of pre-surgical showering for the reduction of skin flora and SSIs. [31,32] Non-immunized patients were found to be more prone to SSIs due to weak immune system.

The administration of antibiotics longer than 2 hours prior to surgery or in post-operative care was confirmed to be associated with a higher rate of SSI. Contrary to this, SSI rate of 24% has been seen when antibiotics given 30 minutes before incision in operation theatre as compared to 17.04% in case of antibiotics given in ward on the day of surgery in this study. Ideally, the antibiotics should be administered within 30 minutes and certainly within two hours of the time of incision. [33]

SSIs occured more in surgeries done over perineal site than any other body part which is found to be statistically significant with a p value of 0.019.

CONCLUSIONS

Surgical site infection is one of the important complications of surgery. SSI rate is found to be less in this study in comparison to the previous ones. Religion (hindu or muslim), site of surgery (Head and neck, chest, abdominal, perineum or extremities), method of surgery (open or laparoscopic) are the factors which are found to have a statistically significant association to SSIs. A monitoring system for surgical wound infections is necessary to suggest preventive and control measures which can result in a lowering of the infection.

REFERENCES

1. Agarwal P K et al. Epidemiology of Pseudomonas aeruginosa, post Operative wound sepsis. India J. Pathol Microbial 1985; 28:137-196
2. Schwartz SI Conspires G, Spencer FC, Dally GN, Fischer J, Galloway AC: Principles of Surgery; 7th edition, NY: McGraw-Hill Companies; 1999:83
3. Kumar k, Thomas J, Chan C Cosmesis in Neurosurgery: Is the bald head necessary to avoid infection. Annals of Academy of Medicine 2002; 31:150-4

4. Thomas M, Hollins M. Epidemic of Post Operative wound Infection Associated with Ungloved abdominal palpation. Lancet.1974; 20: 247-278.
5. Burkitt Jf. Identification of the sources of staphylococci contaminating the surgical wound during operation. Ann Surg. 1963;158:898–904.
6. Habte-Gabr E, Gedebau M, Kronvall G. Hospital-acquired infections among surgical patients in Tikur Anbessa Hospital, Addis Ababa, Ethiopia. Am J Infect Control. 1988:7–13.
7. Lecuona M, Torres Lana A, Delgado-Rodriguez M, Llorc J, Sierra A. Risk factors for surgical site infections diagnosed after hospital discharge. J Hosp Infect. 1988;39:71–4. doi: 10.1016/S0195-6701(98)90246-8.
8. Nystrom PO, Jonstam A, Hojer H, Ling L. Incision infection after colorectal surgery in obese patients. Acta chir scand. 1987;153:225–7.
9. Nichols RL. Preventing surgical site infections: A Surgeon's Perspective. Emerg Infect Dis.2001;7:220–4.
10. Majidpoor A, Jabarzadeh S. Hospital acquired infections, how to control. In: Hatami, editor. Emerging, Re-emerging infectious diseases and Employee Health. Vol. 1. Tehran: Ministry of health and medical education, Center for disease management; 2004. pp. 263–321.
11. Gante JE. Manual of Antibiotics and Infectious Disease Treatment and Prevention. 9. L.W.W; 2002. pp. 630–730.
12. Kirkland KB, Briggs JP, Trivette SL et al. The impact of surgical site infections in the 1990s. Infect Control Hosp Epidemiol. 1999;20:725-30.
13. Anvikar A.R, Desmukh A. B, Karyakarte R.P, Damble A.S, Patvardan N S, Malik A.k et al. A one year prospective study of 3280 surgical wounds. Indian J Med Microbiol 1999; 17 (3) :129-132.
14. P.L Nandi, S Souara. Rajan, KC Mak, SC Chan, YP So. Surgical wound infection. HKMJ 1999; 5 (1) :82-6
15. Jone SK, Tripleff RG: The relationship of cigarette smoking to impaired intra-oral wound healing: a review evidence and implication for patient care. *J oral Maxillo Surg* 1992, 50:237-40.
16. Patel Sachin et al. Surgical Site Infections: Incidence and Risk Factors In A Tertiary Care Hospital, Western India. National Journal of Community Medicine Vol 3 Issue 2 April-June 2012; 193-6.
17. Ameh EA, Mshelbwala PM, Nasir AA, Lukong CS, Jabo BA, Anumah MA, et al. Surgical site infection in children: prospective analysis of the burden and risk factors in a sub-Saharan African setting. Surg Infect (Larchmt). 2009;10:105–9.
18. Lecuire F, Gontier D, Carrere J, Giordano N, Rubini J, Basso M. Ten-year surveillance of nosocomial surgical site infections in an orthopedic surgery department. Rev Chir Orthop Reparatrice Appar Mot. 2003;89:479–86.
19. Gastmeier P, Sohr D, Brandt C, Eckmanns T, Behnke M, Rüden H. Reduction of orthopaedic wound infections in 21 hospitals. Arch Orthop Trauma Surg. 2005;125:526–30.
20. Whitehouse JD, Friedman ND, Kirkland KB, Richardson WJ, Sexton DJ. The impact of surgical-site infections following orthopedic surgery at a community hospital and a university hospital: adverse quality of life, excess length of stay, and extra cost. Infect Control Hosp Epidemiol. 2002;23:183–9.
21. Agarwal SL (1972). Study of postoperative wound infection. Indian J. Surg. 34: 314-20.
22. Rao AS, Harsha M (1975). Postoperative wound infections. J Indian Med. Assoc. 64 :90-3.
23. Kowli SS, Nayak MH, Mehta AP, Bhalerao RA (1985). Hospital infection. Indian J. Surg. 48: 475-86.
24. Narasinga Rao Bandaru et al. A Prospective Study on the Postoperative Wound Infections. Journal of Clinical and Diagnostic Research. 2012 September (Suppl), Vol-6(7): 1266-71.
25. Delamaire M, Maugendre D, Moreno M, Le Goff MC, Allannic H, Genetet B: Impaired leucocyte functions in

diabetic patients. *Diabet Med* 1997, 14:29-34.
26. Kaiser AB, Herrington JL, Jacobs JK: Cefoxitin versus erythromycin, neomycin and cefazolin in colorectal operation. Importance of duration of surgical procedure. *Ann Surg* 1983, 198: 525-530.
27. Redmond HP, Watson RW, Houghton T, et al. Immune function in patients undergoing open vs laparoscopic cholecystectomy. Arch Surg. 1994; 129: 1240–1246.
28. Alexander JW, Fischer JE, Boyajian M, et al. The influence of hair-removal methods on wound infections. Arch Surg. 1983;118:347–352.
29. Balthazar ER, Colt JD, Nichols RL. Preoperative hair removal: a random prospective study of shaving versus clipping. South Med J. 1982;75:799–801.
30. Ko W, Lazenby WD, Zelano JA, et al. Effects of shaving methods and intraoperative irrigation on suppurative mediastinitis after bypass operations. Ann Thorac Surg. 1992;53:301–305.
31. Webster J, Osborne S. Preoperative bathing or showering with skin antiseptics to prevent surgical site infection. *Cochrane Database Syst Rev* 2010;(1):CD004985.
32. Jakobsson J, Perlkvist A, Wann-Hansson C. Searching for evidence regarding using preoperative disinfection showers to prevent surgical site infections: a systematic review. *Worldviews Evid Based Nurs* 2011;8(3):143–152.
33. Satyanarayana V. et al. Study of Surgical Site Infections in Abdominal Surgeries. Journal of Clinical and Diagnostic Research; 2011, October, Vol-5(5): 935-9.

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