**Scholars Journal of Applied Medical Sciences**
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: www.saspublishers.com

OPEN ACCESS

Surgery

# "Organism Patterns of Surgical Site Infection in the Department of Surgery, Chittagong Medical College Hospital (CMCH), Chattagram, Bangladesh"

Dr. Mohammed Eyakub Hossain[1*], Dr. Md. Humayun Reza[2]

[1]Assistant Professor, Dept. of Surgery, Rangamati Medical College (RmMC), Rangamati, Bangladesh
[2]Assistant Professor, Dept. of Orthopaedic, Shaheed M. Monsur Ali Medical College, Sirajganj, Bangladesh

**DOI:** 10.36347/sjams.2019.v07i12.003 | **Received:** 20.11.2019 | **Accepted:** 27.11.2019 | **Published:** 09.12.2019

***Corresponding author:** Dr. Mohammed Yakub Hossain

**Abstract** | **Original Research Article**

***Background:*** Surgical site infection is a serious complication of surgery. Present observational study is aimed to describe common organism patter in surgical site infection in a tertiary care hospital. ***Methods:*** A total of 120 patients underwent routine abdominal surgery and who had a preoperative preparation with ASA score I and II were recruited into this study. The study was conducted at the Department of Surgery, during a period of one and half years in Chittagong Medical College Hospital from December 2012 to May 2014. Post-operative infection rate was calculated. ***Results:*** In this study mean age was 49.5 ± 16.4 years where maximum patients were between 41-60 years age group. Male were predominant (161) and male to female ratio was 2.09: 1. Different types of operation done where among the 120 patients, most common operation was colorectal (43.3%), after that was gastric (30%), biliary was 18.3% and others was 8.3%. Regarding duration of operation among it was found that majority of the operations were completed in 1-3 hours. Post-operative wound infection revealed in the form of erythema, discharge of pus and wound dehiscence which was found in 6(5%) cases. Different organisms were analyzed in 25 preoperative culture positive cases where 20(80%) had Staphylococcus but postoperative it was 4 cases rest were infected with E coli and pseudomonas. ***Conclusion:*** Surgical site infection is not common now days and if present staphylococcus is common and sterile surgery is needed to prevent surgical site infection.

**Keywords:** Organism, Surgical site infection, Irrigation, Surgery, Operation.



## INTRODUCTION

Surgical-site infection (SSI) is the most common hospital acquired infection after surgery [1]. In different countries [2, 3] surgical site infections are the third most common hospital-acquired infection overall (14 %), and the most common in Finland (29.0%)[4]. They result in increased duration of postoperative hospital stay, increased mortality [5] and higher costs. Reducing the surgical site infection (SSI) rate is thus a major priority for infection control teams. Surgeon's practices differ with regard to intraoperative lavage, and particularly the solutions used (antiseptic or saline). In 2005, Whiteside and colleagues [6] found that 97.0% of general surgeons used intraoperative peritoneal lavage in patients with peritonitis; saline was the most frequently used fluid and povidone–iodine (PVI) the most frequent antiseptic. Another survey of orthopaedic surgeons in 2008 revealed that 87.0% used saline lavage alone, or with bacitracin, for open fracture management, 6.0% used an iodine-based antiseptic and 2.0% chlorhexidine; the majority of surgeons believed that iodine was more effective than saline [7]. Several guidelines for the prevention of SSI have already been published [8]. These mainly focused on preoperative preparation (skin disinfection, hair removal, antibiotic prophylaxis). Recently, the National Institute for Health and Clinical Excellence (NICE) has published guidelines on SSI prevention, including the intraoperative phase [9]. There are different organism cause surgical site infections postoperatively so this study is aimed to find the pattern of organisms among the infected surgical site.

## OBJECTIVES

**a) General objective**

- To assessment of the Organism patterns of surgical site infection in Department Surgery CMCH.

- To describe common organism patter in surgical site infection in a tertiary care hospital.

**b) Specific Objectives**

- To compare the Organism patterns of surgical site infection in Department Surgery CMCH.

## METHODOLOGY AND MATERIALS

It was an observational type of study conducted in the Department of Surgery, Chittagong Medical College & Hospital, and Chittagong from December 2012 to May 2014. Patients underwent routine abdominal operation were the study subjects. All the patients were given an explanation of the study and informed written consent was taken from each patient as per instruction of ethical committee and the trial was approved by the local ethical committee. Patients undergoing abdominal surgery a) gastric surgery, b) hepatobiliary surgery, c) small & large gut and colorectal surgery, d) inguinal hernia surgery as routine cases and adult patient and patient in ASA score I & II, exclusion criteria were patients having emergency surgery, patients with burn wounds, those patients with a known allergy to iodine, patient with ASA score III and above, pediatric patients and comorbidity like heart failure, renal failure and COPD. Patients undergoing different abdominal surgery, who had a routine preoperative preparation, were allowed to enter the trial. All samples were evaluated clinically by detail history and physical examination. Surgery was done by the competent surgeons of the department of surgery of CMCH with optimum anaesthetic care available per operatively. Same type of analgesic, anti-emetic, antibiotic and anaesthetic agents was used for all patients. Post-operative period of each patient were monitored closely to record the outcome in terms of -- Wound infection, duration of hospital stay, culture report Antibiotics were used as per hospital protocol decided by the attending surgeon. Skin preparation before operation was carried out with Povidone Iodine and chlorhexidine. For doing culture and sensitivity wound swab was collected from the wound edges as a baseline observation. The wound closure was completed using no 2/0 vicryl for the muscle and fascial layers and proline for the skin, and when drains used they were brought out through a separate stab incision. All wounds were assessed after 3rd day and 7th days and again at 30th day to see any discharge, wound gap or any other signs of wound infection. Arrangements were made for patients who left hospital within this period to return to the ward for assessment of wound by mobile communication. If discharge appeared at any time it was swabbed and cultured. The wound was classified as i) major infection with copious purulent discharge, ii) minor infection with scanty discharge of pus and iii) non-infected. Bacteriological culture (blood agar media: Oxoid UK, Mac Conkey's Agar Media: Oxoid UK, Mueller Hinton Agar Media, Oxoid UK, Triple Sugar Iron Agar Media, Oxoid UK, Simone Citrate Agar Media, Oxoid UK were performed routinely for aerobic organisms in the Department of Microbiology Chittagong Medical College.

## RESULTS

A total of 120 patients were selected for the study. Table me showing the age grouping of the patients where they are ranged from 21-70 years. Maximum patients were between 41-60 years' age group followed by 31-40 years' age group. Table II showing gender distribution of 120 cases in the study group where 101 patients were male and 19 patients were female. Male to female ratio was 5.31: 1. Table III showing different types of operation done where among the 120 patients, most common operation was colorectal (43.3%), after that was gastric (30%), biliary was 18.3% and others was 8.3%. Table IV showing duration of operation among both groups where it was found that majority of the operations was completed in 1-3 hours. Table V showing post-operative wound infection in the form of erythema, discharge of pus and wound dehiscence which were found in 6(5%) cases. Table VI showing different organisms where in 25 preoperative culture positive cases 20(80%) had Staphylococcus but post-operative it was 4 cases rest were infected with E coli and pseudomonas.

**Table-I: Age distribution of patients in whole series. (n=120)**

| Age (years) | n | % |
|---|---|---|
| 21-30 | 8 | 6.7% |
| 31-40 | 24 | 20% |
| 41-50 | 32 | 26.6% |
| 51-60 | 40 | 33.4% |
| 61-70 | 16 | 13.4% |

**Table-II: Sex distribution of the patients. (n=120)**

| Sex | n | % |
|---|---|---|
| Male | 101 | 84.1% |
| Female | 19 | 15.90% |

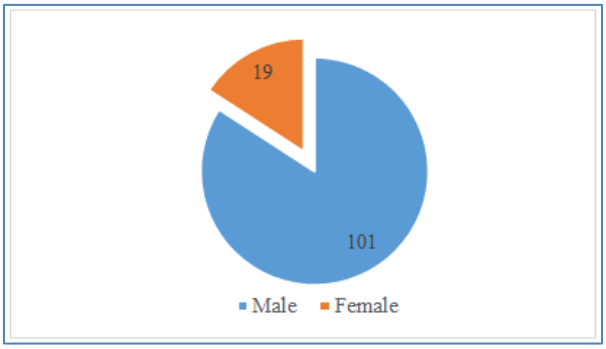


**Fig-I: Sex distribution of the patients. (n=120)**

**Table-III: Types of Operation. (n=120)**

| Operation type | n | % |
|---|---|---|
| Gastric | 36 | 30% |
| Biliary | 2218.3% | |
| Colorectal | 52 | 43.3% |
| Others* | 10 | 8.33% |

*included inguinal hernia, colostomy closure

**Table-IV: Duration of operation. (n=120)**

| Time(min) | n | % |
|---|---|---|
| <30 mins | 10 | 8.3% |
| 30-60 mins | 12 | 10% |
| 1—2 hours | 60 | 50% |
| 2-3 hours | 28 | 23.3% |
| >3 hours | 1 0 | 8.3% |

**Table-V: Post-operative wound infection (n=120)**

| Pattern of wound infection | Number (%) |
|---|---|
| Erythema | 1(0.8%) |
| Discharge of pus from wound | 4(3.2%) |
| Wound dehiscence | 1(0.8%) |
| No wound Infection | 114(95%) |

(Chi-square= 2.08, p= 0.15; where p>0.05)

**Table-VI: Organism pattern in pre and postoperative wound swab. (n=120)**

| Organisms | Preoperative-culture result(N=25) | Post-operative culture result(n=6) |
|---|---|---|
| Staphylococcus | 20(80%) | 4(66.6%) |
| E coli | 2(8%) | 1(16.6%) |
| Pseudomonas | 1(4%) | 1(16.6%) |
| No organism identified | 2(8%) | 0 |

## DISCUSSION

A total of 120 patients who were undergone different surgery were evaluated to find the organism pattern of surgical site infections. Sociodemographic profile was analyzed in the present study where majority of patients were between 41-60 years' age group followed by 31-40 years' age group. Regarding gender distribution of 120 cases in the study group 101 patients were male and 19 patients were female. Male to female ratio was 5.31: 1. Probably male patients come more at CMCH that is why this type of gender distribution was found. Table III showing different types of operation done where among the 120 patients, most common operation was colorectal (43.3%), after that was gastric (30%), biliary was 18.3% and others was 8.3%. Yearly disease profile of CMCH also goes in favor of the present study where colorectal operation was more next to which is biliary surgery [10]. In the present study post-operative wound infection was found in 6(5%) in group.

This finding is comparable with other studies done abroad. In a prospective comparative study, Barr[11] examined patients undergoing gastrointestinal surgery, of whom a group received 2-minute lavage with Betadine solution and another did not, 2 of 35 (5.7%) developed wound infection who received povidone but in the group that did not receive povidone lavage, 23 of 60 (38.3%) developed wound infection ($p < 0.001$). In relation with the present study another RCT was found done by Sidebar and Mason [12] on laparotomy patients were wound was classified as contaminated or dirty. The treatment group ($n = 80$) received irrigation of the peritoneal cavity for 60 seconds before closure of the abdomen with 1 L of 1% povidone-iodine. The control group ($n = 88$) received irrigation for 60 seconds with saline. Infection was defined as abscess formation. In the treatment group, 1 of 80 patients (1.3%) developed an abscess, whereas in the control group 9 of 88 patients (10.2%) developed an abscess ($p < 0.05$). In a RCT, de Jong and colleagues [13] examined all patients ≥ 5 years of age undergoing intra-abdominal and inguinal hernia operations where patients were classified as clean, clean-contaminated, contaminated or dirty. Among the different organisms 4 patients found to be infected with Staphylococcus rest were infected with E coli and pseudomonas. A similar finding was found in a study done by Johnson and colleagues [14] with 56 patients undergoing abdomino-perineal excision of the rectum for carcinoma. They classified the wound as contaminated or non-contaminated and infection was defined as purulent wound discharge or wound discharge with bacteria cultured. The treatment group had significantly fewer wound infections than the control group ($p < 0.01$) even when wound contamination occurred during surgery ($p < 0.05$). In addition, primary wound healing was significantly better in the treatment group than in the control group ($p < 0.02$) even when contamination occurred during surgery ($p < 0.005$). In the present study also it was found that patients with saline irrigation were more prone to wound infection with pyogenic and Gram negative bacteria.

## LIMITATIONS OF THE STUDY

Prevention of infection by prophylactic antibiotic may be a confounding factor. Due to time limitations long term follow up and study with large sample including all types of patients could not be done.

## CONCLUSION AND RECOMMENDATIONS

Though SSI after surgery is declining and the mortality is low, numerous risk factors have been identified which contribute to the infection rate. The administration of prophylactic antibiotics, weight reduction regimes, shortening of the operating time, identifying promptly treating high-risk groups, will help in further reducing the incidence of SSIs, and aggressive treatment is recommended. There is a need to reinforce rational antimicrobial use to limit emergence and spread of resistant and or continuing surveillance of bacterial antimicrobial sensitivity tests at local level to guide empirical drug choice. The practice of aseptic technique during and after surgery rather than overreliance on antibiotics is necessary to reduce emergence and spread of resistant pathogens.

## REFERENCES


1. Hedrick TL, Anastacio MM, Sawyer RG. Prevention of surgical site infections. *Expert Rev Anti Infect Ther*. 2006; 4: 223–233.
2. Fournel I, Tiv M, Soulias M, Hua C, Astruec K, Glele A. Meta-analysis of intraoperative povidone-iodine application to prevent surgical–site infection. British Journal of Surgery. 2010; 97:1603-1613
3. Smyth ET, McIlvenny G, Enstone JE, Emmerson AM, Humphreys H, Fitzpatrick F, Davies E, Newcombe RG, Spencer RC, Hospital Infection Society Prevalence Survey Steering Group. Four country healthcare associated infection prevalence survey 2006: overview of the results. Journal of Hospital Infection. 2008 Jul 1;69(3):230-48.
4. Lyytikäinen O, Kanerva M, Agthe N, Möttönen T, Ruutu P, Finnish Prevalence Survey Study Group. Healthcare-associated infections in Finnish acute care hospitals: a national prevalence survey, 2005. Journal of Hospital Infection. 2008 Jul 1;69(3):288-94.
5. Astagneau P, Rioux C, Golliot F, Brucker G. for the INCISO Network Study Group. Morbidity and mortality associated with surgical site infections: results from the. 1997; 1999:267-74.
6. Whiteside OJ, Tytherleigh MG, Thrush S, Farouk R, Galland RB. Intra-operative peritoneal lavage--who does it and why?. Annals of the Royal College of Surgeons of England. 2005 Jul;87(4):255.
7. Petrisor B, Jeray K, Schemitsch E, Hanson B, Sprague S, Sanders D, Bhandari M. Fluid lavage in patients with open fracture wounds (FLOW): an international survey of 984 surgeons. BMC musculoskeletal disorders. 2008 Dec;9(1):7.
8. National Institute for Health and Clinical Excellence (NICE). *Surgical Site Infection. Prevention and Treatment of Surgical Site Infection. NICE Clinical Guideline 74.* NICE: London, 2008.
9. Berry AR, Watt B, Goldacre MJ, Thomson JW, McNair TJ. A comparison of the use of povidone-iodine and chlorhexidine in the prophylaxis of postoperative wound infection. Journal of Hospital Infection. 1982 Mar 1;3(1):55-63.
10. Ali A. Review of Management of Biliary ascariasis. JCMCTA. 2003; 14(2): 29-38.
11. Barr LL. Prevention of wound infection by 2-minute lavage with Betadine solution. The Journal of the American Osteopathic Association. 1978 Feb;77(6):442-4.
12. Sindelar WF, Mason GR. Intraperitoneal irrigation with povidone-iodine solution for the prevention of intra-abdominal abscesses in the bacterially contaminated abdomen. Surgery, gynecology & obstetrics. 1979 Mar;148(3):409-11.
13. Vierhout RJ. Povidone-iodine irrigation of the subcutaneous tissue to prevent surgical wound infections. Surgery, gynecology & obstetrics. 1982 Aug;155(2):221-4.
14. Johnson JN, Croton RS, McGlinchey JJ, McLoughlin GA. The effect of povidone-iodine irrigation on perineal wound healing following proctectomy for carcinoma. Journal of Hospital Infection. 1985 Mar 1;6:81-6.