



## MICROBES CAUSING SURGICAL SITE INFECTIONS AND THEIR ANTIBIOTIC SENSITIVITY PATTERN IN A TERTIARY CARE HOSPITAL

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### ABSTRACT

Surgical site infection continues to be a significant problem due to emergence of resistant microbes for the currently available antibiotics [1][2].

To study the incidence of surgical site infection and antibiotic sensitivity pattern of microbes associated with surgical site infection

This retrospective , observational was conducted at saveetha medical college , chennai . Data was obtained from the cases undergone surgery during the year January 2013 to December 2013 and antibiotic sensitivity reports were obtained from the central lab of our hospital and analysed

Study shows the incidence of surgical site infection on our hospital is about 14.1% and staphylococcus aureus is the major pathogen associated post operative wound infections . Amikacin showed good sensitivity towards the gram positive and gram negative isolates and Enterococcal spp .showing considerable resistance towards various antibiotics including vancomycin .

In this study , overall incidence of wound infection is well within the occurrence mentioned in similar studies , however incidence of dirty , contaminated wounds are more which necessitates revision of antibiotic policy for covering such infected wounds .

**KEYWORDS:** Antibiotic sensitivity , surgical site infections , post operative wound care



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## INTRODUCTION

### BACKGROUND OF THE STUDY

Post operative wound infections , also known as surgical site infections (SSI's) are the infections that occur anytime from 0 to 30 after the surgical procedure or up to 1 year after a procedure that has involved the implantation of a foreign material like mesh , prosthesis etc[1] . Surgical site infections are classified as clean , clean-contaminated , contaminated , and dirty wound in which SSI's incidence is about 3% , 11 % , 18 % and 27 % respectively[1][3]. There are three major factors that are associated with formation of post operative wound infections , these major determinants are related to either microbial agents such as contamination , prevalence of virulence bacteria or wound related factors such as complex , long duration surgeries or patient related such as older age , having diseases like diabetes , immunosuppression etc . Among microbes , coagulase negative staphylococcus aureus , E.coli , pseudomonas aeruginosa , klebsiella , enterococcus are the more common microbial agents implicated in surgical site infections<sup>1</sup> . Along with the various steps that are helpful to prevent wound infections like meticulous surgical procedure , good nutrition , correct asepsis , antibiotic prophylaxis is inevitable particularly for clean-contaminated and contaminated , dirty wound . Judicious use of antibiotics is essential to prevent wound infections and also to prevent emergence of resistance among microbes. Choice of antibiotics is also influenced by the prevalence of sensitive and resistant microbes of that area . In general antibiotic coverage includes agents that are effective against gram positive organisms such as cefazolin , azithromycin and for gram negative organisms such as combination of parenteral third generation cephalosporins , aminoglycoside antibiotics and metronidazole for anaerobes. Treatment of already established wound infection is managed by wound drain and antibiotic therapy , ideally based on antibiotic sensitivity pattern of isolated microbes . Despite many studies and approaches have been made to

rationalize the use of antibiotics used for various surgical procedures , still there is definite unmet need of analysis for rational use of antibiotics used for various surgical procedures . Judicial use of antibiotics helps to prevent and treat wound infection and also essential to prevent the emergence of resistance in microorganisms . It is also recommended by drug technical advisory board (DTAB) of India , that every hospital must frame their antibiotic policy for their surgical procedures so as to prevent irrational use of antibiotics and hence to prevent emergence of antibiotic resistance among microbes . Hence this study was done , which will help us to correlate the prevalence of wound infection and their microbial causation with national and global scenario

### MATERIALS AND METHODS

This study was conducted at Saveetha Medical College and Hospital , as retrospective , observational study , data was obtained from the cases undergone various type of surgeries between January 2013 and December 2013 . Data was collected from 617 surgeries done within the above mentioned duration . For every case , preoperative , perioperative and postoperative details were analysed . Every data that are relevant for the study like demographic data of the study population , indication for surgery , type of surgery , antibiotics given preoperatively and post operatively , associated co morbid condition of the patient were considered . Samples were collected from the patients who complaints discharge, pain, swelling, foul smelling, delayed and non healing wound . The samples were collected using a sterile swab , which avoids contamination of the specimen with commensals from the skin, and immediately sent to our laboratory . For all the infected wound case sheets that have been found , results of *in vitro* antibiotic susceptibility testing performed by disc diffusion method on Mueller Hinton agar was analysed

## RESULTS

### INCIDENCE OF WOUND INFECTION

Out of 617 surgeries , 92 (14.1%) cases of surgical site infections were treated .Number post operative wound infection with various

type of surgeries are 5 (4.1%) cases among clean , 38(10.6%) cases from clean-contaminated , 27(27%) from contaminated , 22 (52 %) from dirty surgical wounds . Incidence of wound infection is shown in table 1

**Table 1**  
**Showing incidence of surgical wounds and microbes isolated.**

| Type of surgery    | Number (n) | Number of wound infection(n) | Isolated microbes(n)   |
|--------------------|------------|------------------------------|--|
| Clean              | 121        | 5                            | Coagulase negative staphylococcus(3)<br>S.aureus (2)   |
| Clean contaminated | 356        | 38                           | S.aureus (10)<br>Coagulase negative Staphylococcus(9)<br>e.coli (9)<br>Pseudomonas(8)<br>enteobacter (2)         |
| Contaminated       | 98         | 27                           | S.aureus (9)<br>Enterococcus(5)<br>E.coli(4)<br>Klebsiella(4)<br>Proteus (3)<br>Alpha hemolytic streptococci (2) |
| Dirty              | 42         | 22                           | S.aureus (9)<br>Enterococcus (7)<br>Pseudomonas(3)<br>Proteus(2)<br>Entrobacter(1)                               |

### MICROBES ISOLATED AND THEIR ANTIBIOTIC SENSIVITY PATTERN

Out of 92 samples , Staphylococcus aureus was the most common microbe isolated (42%) .Other microorganisms are coagulase neagative staphylococcus (13%) , E.coli (15.2%0, Entrococcus(13%) , Proteus (5.4) , Pseudomonas (11.1) , Klebsiella (4.3%) , Enterobacter (3.2%) , Alpha hemolytic streotococci (2.17%).

Number of samples and their antibiotic sensitivity pattern is shown in table 2

Table -2 Showing microbes isolated from surgical wounds and their antibiotic sensitivity pattern

| Microbes isolated from all the samples (n) | Sensitive antibiotics ( in the the order of higher to low sensitivity ) |
|--|---|
| S.aureus (39)                              | vancomycin , amikacin ,imipenem , rifampicin                            |
| Coagulase negative stahphylococcus(12)     | vancomycin , imipenem , rifampicin , ciprofloxacin                      |
| Enterococcus(12)                           | Vancomycin , teicoplanin , linezolid                                    |
| Pseudomonas(11)                            | Amikacin , tobramycin , meropenem , ceftazidime cefuroxime              |
| Proteus spp(5)                             | Meropenem , ceftazidime , cefuroxime                                    |
| E.coli(14)                                 | Amikacin , ceftazidime , cefazolin                                      |
| Klebsiella(4)                              | Ceftazidime , cefotaxime , amikacin ,                                   |
| Enterobacter(3)                            | Meropenem , cefipime  |
| Alpha hemolytic streptococci(2)            | Cefazolin , vancomycin , ciprofloxacin                                  |

## DISCUSSION

In this study which was designed to study the incidence and pattern of post operative wound

and antibiotic sensitivity pattern of organisms causing it shows that the Incidence of surgical

site infections is well within the number mentioned in literature and few other similar studies<sup>2,3,4</sup>, but incidence associated with clean contaminated and dirty wound are slightly high in our study and this needs revision of antibiotics used to treat such wound. *Staphylococcus aureus* was the most common organism causing surgical site infection and this was sensitive to antibiotics like vancomycin, amikacin etc, we did not encounter vancomycin resistant strains from these samples [6]. Among gram negative organism *E. coli*, *Pseudomonas* are the more common agents implicated and they are sensitive to amikacin, and third generation cephalosporins like ceftadime, and monolactams. Almost all the gram negative isolates are largely resistant, though few are showing moderate sensitivity to commonly used gentamicin. These gram negative organisms sensitivity has to be maintained by careful administration of antibiotics and it must be borne in mind even carbapenems resistant strains have emerged (so called super bug agent), which if proliferates would be disaster in health care. *Enterococcus* though showed sensitivity to glycopeptides, 5 isolates are resistant to vancomycin but still susceptible to teicoplanin and linezolid. Reasons for surgical

wound infection is multi factorial, however the use of antibiotics is inevitable in most of the circumstances. Adequate dose of antibiotics for adequate duration at appropriate timing is one the most important factor determining the prevention and treatment of wound infection. Injudicious use of antibiotics, deviating the normally required dose and duration causes significant resistance among microbes

## CONCLUSION

Drug utilization study of antibiotics used to prevent and treat wound infections is helpful to optimize the treatment and to promote rational use of antibiotics. This study highlights need of standard antibiotic policy for prevention and treatment of wound infection at every level of health care and antibiotic policy in accordance with the standard treatment guidelines has to be framed.

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