

# A one year cross sectional study on Surgical Site Infections (SSI), associated risk factors and antimicrobial sensitivity patterns in a government tertiary care teaching hospital, Egmore Chennai

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## Abstract

**Background:** Surgical Site Infections (SSI) is one of the most commonly reported nosocomial infection which has an adverse impact on the hospital as well as on the patient.

## Objectives:

1. To study the prevalence of Surgical Site Infections.
2. To identify the risk factors associated with the development of SSIs.
3. To identify the etiological pathogens and their antimicrobial susceptibility

**Methodology:** We conducted a one year cross sectional study on SSI in

I.O.G. 152 post-lscs cases who developed SSI were included in the study. Factors like age, duration of surgery, co-morbidities, type of skin suture, pathogen and their antimicrobial sensitivity associated with SSI and their outcomes were studied. Swabs were collected from the infected surgical wounds and processed by the conventional microbiological methods. Antimicrobial susceptibility was done by Kirby-Bauer disc diffusion method and interpretation done by CLSI guidelines 2020.

**Results:** Among the 6650 cases of LSCS done in our hospital in the year 2021, 152 cases developed surgical site infection. Of which 67% of the population comprise of the age group 18-30 yrs, anemia, diabetes, hypertension were the predominant risk factors associated with SSI. About 37% of the cases needed wound resuturing remaining 63% of the cases were medically managed. The common pathogen encountered with SSI were *E. coli*, Klebsiella and MRSA. Around 82% of the organism were sensitive to Amikacin and 48% of them were sensitive to Gentamycin, about 43% of the pathogen were resistant to Ampicillin.

**Conclusions:** The overall prevalence of SSI in our hospital was 2.28% in the year 2021. Early diagnosis and prompt treatment of risk factors like anemia, diabetes and hypertension may prevent SSI and improve outcomes in infected cases. Decrease in the duration of surgery, decreases the incidence of SSI. Empirical use of antibiotics based on the common organism encountered and their sensitivity patterns improves the outcome of SSI. Periodic surveillance of SSI and measures to prevent it to be done on regular basis.

**Keywords:** SSI, incidence, risk factors, outcome, pathogen

## Introduction

Surgical site infections (SSI) are the third most commonly reported nosocomial infection and they account for approximately a quarter of all nosocomial infections. It has an adverse impact on the hospital as well as on the patient. It is responsible for increasing length of stay of patient which results in social and economic loss to the patients and family. Host factors, wound factors and surgery related factors are implicated in the causation of SSI. Total quality management in hospitals is gaining emphasis these days.

Control of postoperative complications is an essential component of total quality management.

## Objectives

1. To study the prevalence of Surgical Site Infections.
2. To identify the risk factors associated with the development of SSIs.
3. To identify the etiological pathogens and their antimicrobial susceptibility

## Methodology

**Type of study:** A period cross sectional – observational study

**Study area:** Institute of Obstetrics and Gynaecology – a government tertiary care teaching hospital Egmore Chennai Tamilnadu

**Study period:** January 2021 – December 2021 (one year)

## Study population

All patients undergoing caesarean section in institute of obstetrics and gynaecology were taken for the study. Certain risk factors like duration of surgery, any underlying or predisposing conditions, type of skin suture used were noted. Swabs were obtained from the postoperative infected wounds and processed by the conventional microbiological methods. Antimicrobial susceptibility testing was done and reported by the microbiology department.

## Inclusion criteria

- All post lscs patients with the following complaints
- Serous discharge with clinical evidence of sepsis
  - Wound gaping
  - Frank pus
  - Purulent with foul smelling discharge
  - Induration with discharge
  - Burst abdomen

## Exclusion criteria

Patients who underwent LSCS in other institutes and patients with serous discharge alone without clinical evidence of sepsis

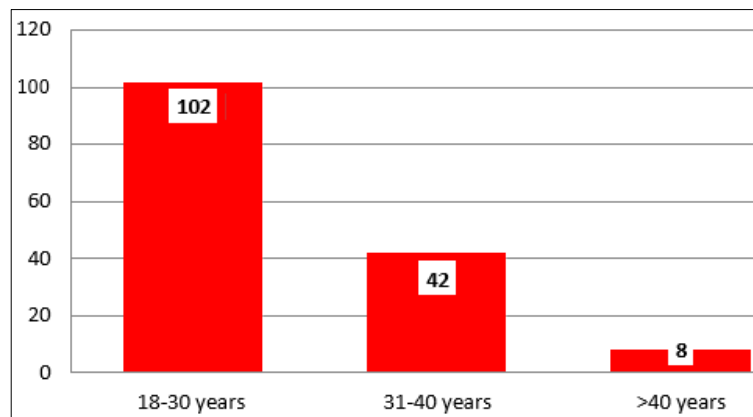
- Study methods tools used for data collection:
- Patient observation and patient interview
  - Casesheets
  - Passive surveillance register
  - Wound resuturing register
  - wound infection register in family welfare op department for follow up cases

## Procedure

All post LSCS patients admitted in the LSCS ward of institute of obstetrics and Gynaecology were included in the study after obtained informed consent. Patient details, risk factors like type of surgical wound, elective or emergency surgery, antibiotic prophylaxis, duration of surgery, any underlying or predisposing conditions were noted by the junior resident at the time of receiving patients in the LSCS ward. Post op wound of all post LSCS patients were inspected daily for surgical site infection by the junior resident in charge of respective wards. As per standard operating protocol dressing was usually removed on the third postoperative day. If any post-operative wound shows signs and symptoms of surgical site infection in accordance with the inclusion criteria of our study, the junior resident in charge sends written requisition to microbiology lab to issue pus culture and sensitivity swab. Under strict aseptic precautions the junior resident and sent to the microbiology lab for processing. The specimen was inoculated in mc conkey agar, blood agar and nutrient agar observed for growth of organisms Antimicrobial susceptibility testing was done by Kirby-Bauer disc diffusion method in muller hilton agar and interpretation was done according to CLSI guidelines 2020. The culture reports are collected after 3 days.

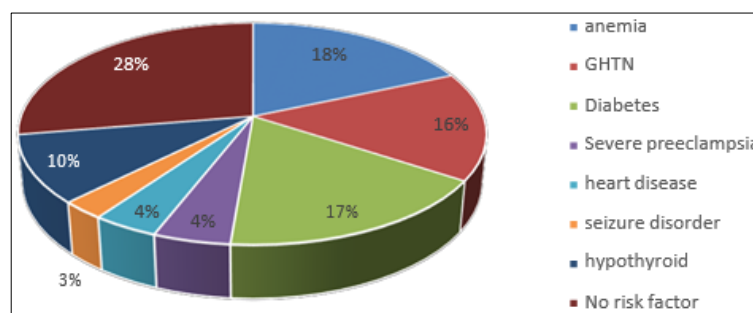
## Observation and results

A total of 6650 patients underwent cesarean section in our institute of obstetrics and gynecology over a period of one year from jan 2021 to dec 2021, Of which 152 patients developed surgical site infection who were taken for the study



**Fig 1:** Age distribution

Of the total, 67% of the study population belonged to age group of 18-30 years of the reproductive age group.

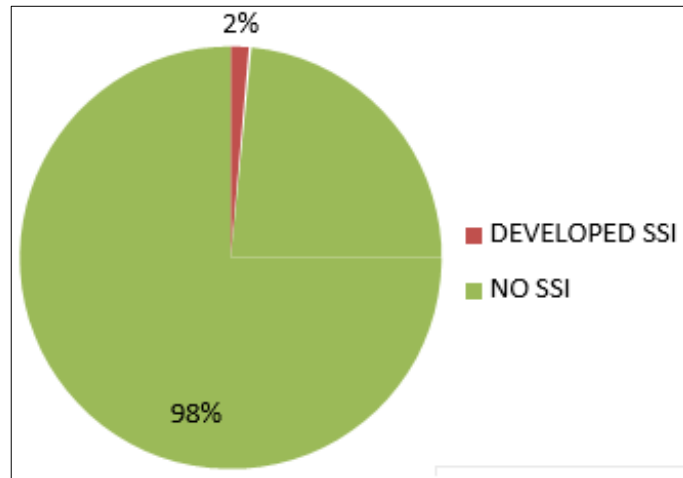


**Fig 2:** Risk factors associated with SSI

In the study population of 152 patients, 72% of the study population had some risk factors associated with surgical site infection. Of which anemia, diabetes and gestational

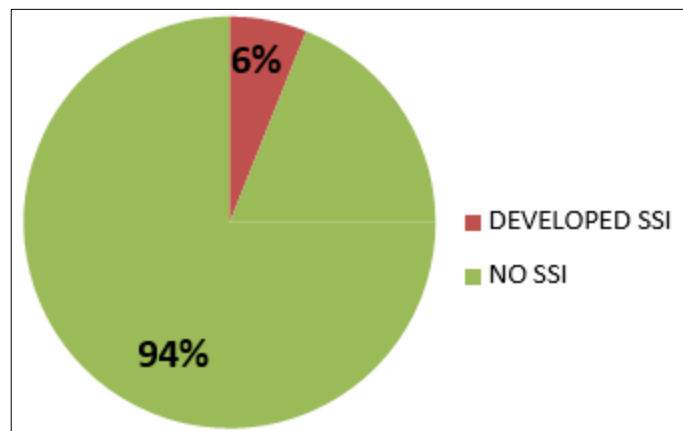
hypertension were the predominating risk factors contributing to 18%, 17%, 16% respectively. 42 patients had no associated risk factors

**Duration of surgery**



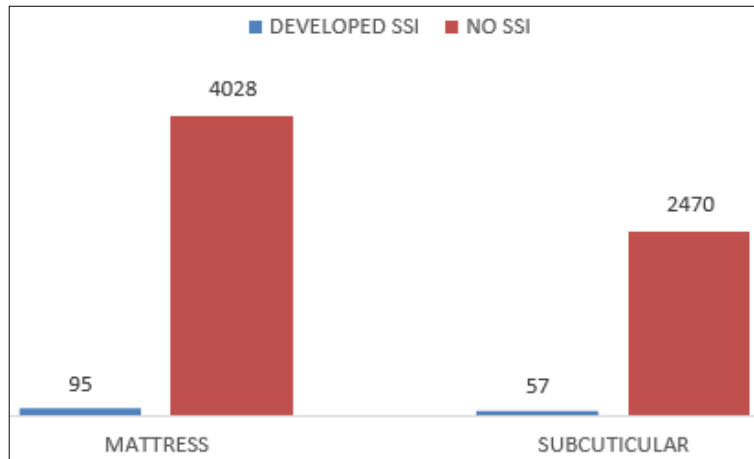
**Fig 3:** Less than 45 mins

Coming on to the surgical factors associated with SSI, Of the total 6650 LSCS done in 2021, 5612 cases were done within a duration of less than 45 mins of which 89 cases developed SSI accounting for 2%. The duration of surgery for the remaining 1038 cases exceeded 45 mins, of which 63 cases developed SSI amounting to 6%.



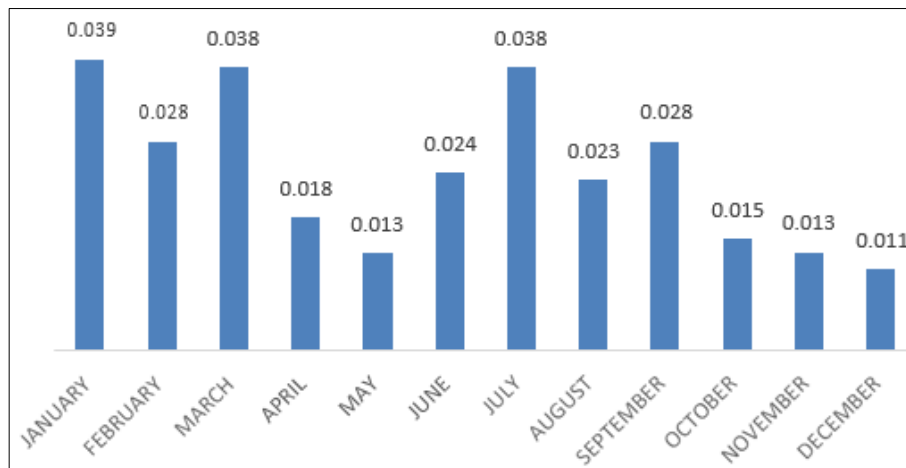
**Fig 4:** More than 45 mins

Based on the type of skin suture used, of the 4123 cases in which mattress skin suturing done, 95 developed SSI. Whereas, of the 2527 cases in which subcuticular skin suturing done 57 developed SSI amounting to 2.3% and 2.2% respectively.



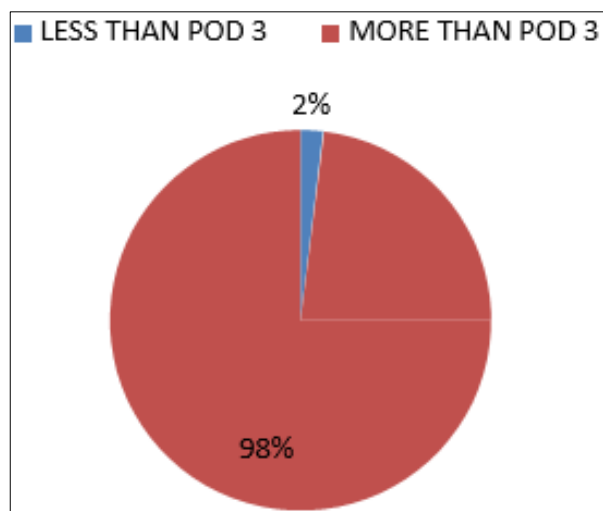
**Fig 5:** Type of skin suture used

The prevalence of surgical site infection in our hospital ranges from 3.9% (highest) in January 2021 to 1.1% (lowest) in December 2020. The peak of surgical site infections were in January 2020, March 2020 and July 2020 contributing to 3.9%, 3.8% and 3.8% respectively.



**Fig 6:** Prevalence of SSI

In the study population of 152 post LSCS patients, 3 patients developed SSI within the 3rd postoperative day accounting to 2% and the remaining 149 patients developed SSI at or after the third postoperative day.



**Fig 7:** Day of development of SSI

Of the total 152 cases of surgical site infection encountered in our hospital, approximately 36.8% of the cases needed wound resuturing. On the other hand 63% of the cases were medically managed with antibiotics i.e 96 cases were medically managed, wound resuturing were done in 56 cases.

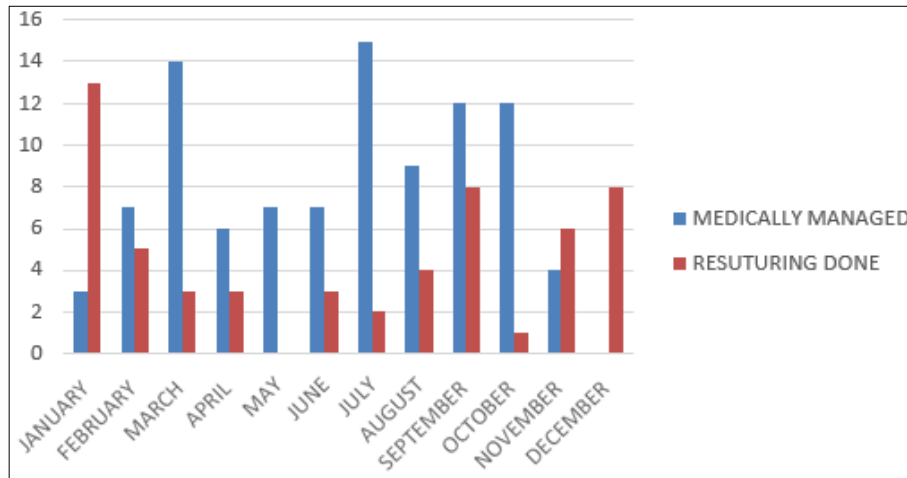


Fig 8: Outcomes of SSI

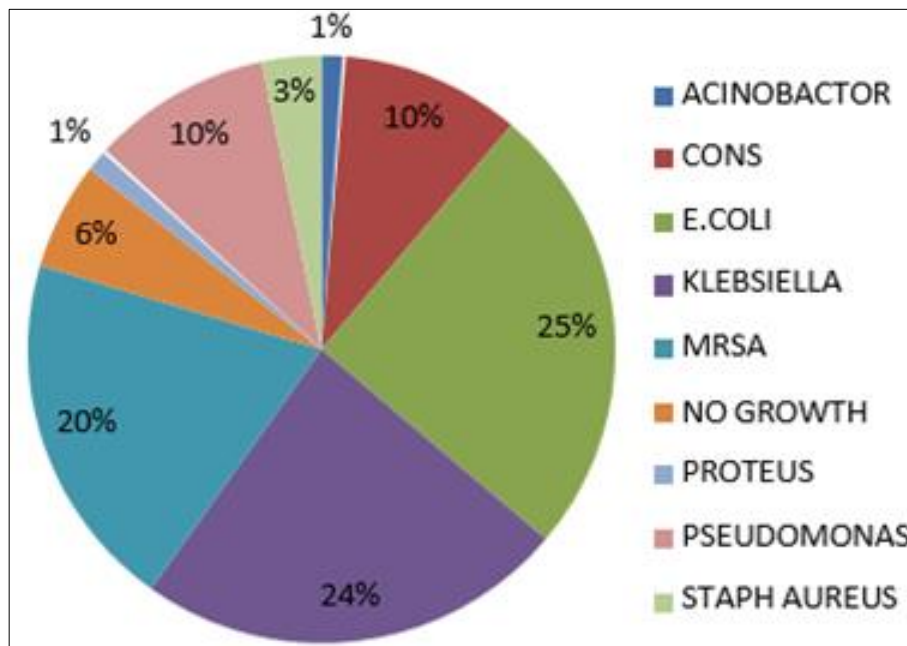


Fig 9: Pathogens associated with SSI

In our study population, culture report of 94% of the cases revealed growth of various micro-organisms, However culture report of 9 cases revealed no growth. The predominating pathogens in our study population were *E. coli*, klebsiella and MRSA contributing 25%, 24% and 20% respectively.

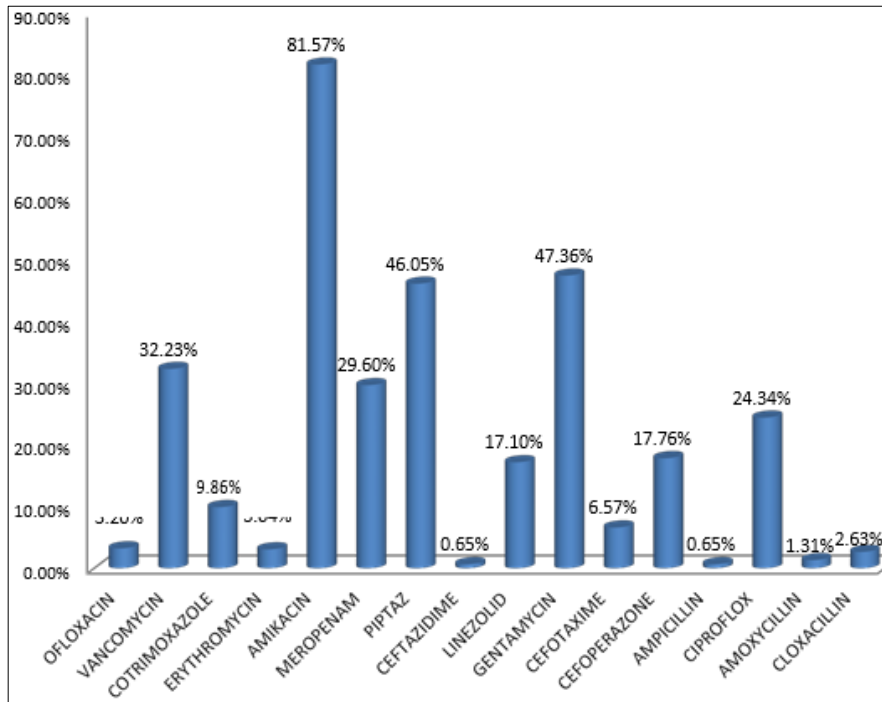


Fig 10

In our study population, about 82% of the pathogen associated with SSI were sensitive to amikacin and about 48% of the organism were sensitive to gentamycin, whereas less than 1% of the organisms were sensitive to ampicillin and ceftazidime.

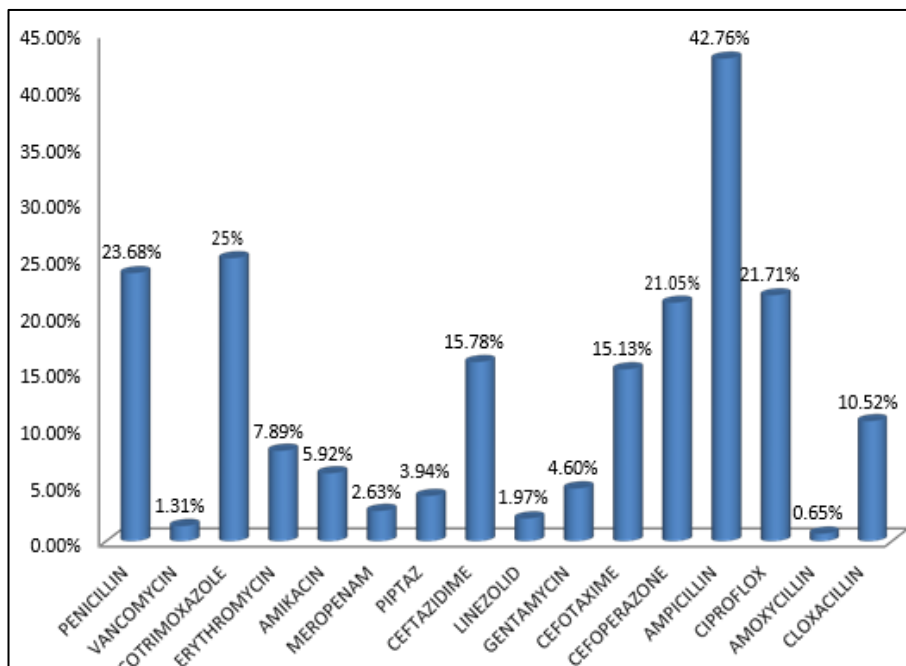


Fig 11

About 43% of the pathogens isolated from our study population were resistant to ampicillin, around 20-25% of the pathogens encountered in our study was resistant to penicillin, cotrimoxazole, cefoperazone and ciprofloxacin.

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