

# Rates of Surgical Site Infections in Clean Surgery at Tertiary Care Teaching Hospital

Surgical Site  
Infections in  
Clean Surgery

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## ABSTRACT

**Objective:** To quantify the rates of Surgical Site Infections (SSI) in clean Surgery.

**Study Design:** Prospective / cross sectional study.

**Place and Duration of Study:** This study was conducted at the Tertiary People's Medical University Hospital, Nawabshah from 1<sup>st</sup> March 2015 to 31<sup>st</sup> March 2016.

**Materials and Methods:** This study was conducted on 218 cases who meet the inclusion criteria and consented in written for study. The demographic data of the patients with diagnosis, name of operation, category of operation and post-operative infections of subjected cases were recorded on pre-designed pro-forma by the treating surgeons. The percentages and means were used to describe the variables.

**Results:** A total of 218 cases were eligible for analysis. The SSI was found in 5 males and in 10 females respectively with total of 15 (6.88%) among all subjects. Rates of SSI were more common in subjects having ages > 40 years. Among these surgeries, the rates of SSI were higher (10%) in ventral hernia repairs and then were inguinal hernia surgery stood as second with rates of 6.52%. Among various types of SSI, superficial incisional infections were on top with rates of 5.04% in this study.

**Conclusion:** The study concluded, that the rates of surgical site infections as 6.88% in patients underwent for clean surgery.

**Key Words:** Surgical site infections, wounds, clean surgery.

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## INTRODUCTION

Postoperative surgical site infections remain a major source of illness and a less frequent cause of death in the surgery patients.<sup>1</sup>

Surgical site infection (SSI) is increasingly recognized as a measure of the quality of patient care by both healthcare providers and the public.<sup>2</sup> SSIs are the second most common cause of hospital acquired infections.<sup>3</sup>

The incidence of infections varies from surgeon to surgeon, from hospital to hospital, from one surgical procedure to other, and – most importantly- from one patient to other.<sup>4</sup>

The Centers for Disease Control and Prevention (CDC) changed the term wound infection resulting after surgical procedures to surgical site infection in 1992. These infections are classified into incisional and organs or space manipulated during an operation; incisional infections are further divided into superficial

(skin and subcutaneous tissue) and deep (deep soft tissue – muscle and fascia).<sup>5</sup>

The pathogens isolated from infections differ, primarily depending on the types of surgical procedure. In clean surgical procedures, the gastrointestinal, gynecologic, and respiratory tracts are not entered, while staphylococcus aureus comes either from the exogenous environment or the patient's skin flora and remains the usual cause of infection.<sup>6</sup>

The post – operative SSI infections depends upon the preoperative variables include scrubbing time, skin antiseptics, surgical aseptic technique, duration of procedure, presence of an implant or drain and duration of the preoperative hospitalization.<sup>7</sup>

Medical literature explicates that SSI increases the length of hospital stay, admission to the intensive care unit, incidence of readmission and risk of mortality.<sup>8</sup>

Hence, this study was designed with an object to quantify the rates of SSI in clean Surgery.

## MATERIALS AND METHODS

This study was conducted in the Tertiary Care Surgical Unit one of 1500 bed tertiary care People's Medical University Hospital, Nawabshah from 1<sup>st</sup> March 2015 to 31<sup>st</sup> March 2016.

The study included 218 cases who meet the inclusion criteria and consented in written for study.

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**Inclusion Criteria:**

- All clean surgical cases as defined by ACS-NSQIP without infection or inflammation, and without entry into respiratory, gastro intestinal, genital or urinary tract during operation.
- Subjects ages with from 18 to 60 years.
- Operated electively.

**Exclusion criteria:**

- Patients with high risk for infections (Diabetics, malnourished, on Immune Suppressants)
- Surgical procedures in emergency.
- Procedure involving mesh repair.
- Patients having pre-operative infections disease.
- Patients (s) refused to participate in study.
- Patients (s) that did not complete the follow-up period.

**Data Collection:** The demographic data of the patients with diagnosis, name of operation, category of operation and post-operative infections of subjected cases were recorded on pre-designed proforma by the treating surgeons. Wound considered infected (SSI/ Surgical site infection) as per criteria of the centers for Disease control and Prevention-CDC Atlanta 1999 The operational definition of SSI according to ACS-NSQIP includes.

- a. Superficial incisional (limited to skin or sub-cutaneous tissue of surgical incision,
- b. Deep incisional (has spread to deep soft tissues, as in fascial and muscle layers) and
- c. Organ / space infections (deeper infection that involves any part of anatomy that was opened or manipulated during the operation).

An operation was defined as any procedure involving skin incision undertaken in an operating theatre under any type of anaesthesia. The skins of all the study subjects were scrubbed with Povidin-iodine before open surgery. Every study subject received prophylactic 3<sup>rd</sup> generation cephalosporin (1gm) intra venously ½ hour before surgery.

Surgical site infections were detected by two methods: Bedside and post-discharge surveillance. Bedside surveillance involved the patients during hospital admission and started from the day after surgery until the patient was discharged from the hospital. Post-discharge follow-up was conducted for a period of one month after discharge.

**Data Analysis:** The data was entered in the statistical package for the social sciences (SPSS) Soft word version 20 for analysis. The percentages and means were used to describe the variables.

## RESULTS

A total of 218 cases were eligible for analysis. All analyzed patients in context to rates of SSI are displayed in different categorical variable in table No.1.

In this study, the male to female ratio was 2.5:1. Males were 156 and females were 62.

The SSI was found in 5 males and in 10 females respectively with total of 15 (6.88%) among all subjects. Rates of SSI were more common in subjects having ages > 40 years. Among these surgeries, the rates of SSI were higher (10%) in ventral hernia repairs and then were inguinal hernia surgery stood as second with rates of 6.52%. Among various types of SSI, superficial incisional infections were on top with rates of 5.04% in this study.

While, the median during of hospital stay was (mean  $4 \pm 0.08$  days).

**Table No.1: Patients in context to rates of SSI in different categorical variable**

Characteristics		SSI Total	Rates
Gender	Males	10/156	6.41%
	Females	5/62	8.06%
Ages (years)	< 40	8/152	5.26%
	>40	7/66	10.60%
Nature of Surgery	Inguinal Hernia	6/92	6.52%
	Ventral Hernia	3/30	10%
	Benign soft tissue surgeries	2/35	5.71%
	Breast Benign / malignant surgeries	2/31	6.66%
	Lymphadec tomies	1/10	10%
	Thyroid Surgeries	1/20	5%
	SSI	15/218	6.88%
	Superficial Incisional	11/218	5.04%
	Deep Incisional	03/218	1.37%
	Organ Space SSI	01/218	0.45%
	Hospital stay (median)	$4 \pm 0.08$ days	

## DISCUSSION

Despite the guide lines form the Centre's for Disease Control and Prevention (CDC) for preventions of SSIs, it still remains the significant burden on health care system.<sup>9</sup> A part from clean-contaminated surgery, the rates of SSIs generally remain to be more than 3% in clean surgical procedures.<sup>8</sup> But, the SSIs rates are more in hospitals of third world countries, as is seen about

6.8% in this study and this is in agreement with rates observed by Abu – Hanifa<sup>10</sup> and Leilani et al.<sup>11</sup>

In the cases of this study, male subjects (71.55%) were operated in majority. This may be because of the patriarchal society. Out of total study subjected sample; 66(30.27%) were above 40 years with SSIs rates of 10.60%, this higher rate may be due to decreased immunity, as also has been described earlier in 1990 by Isadore C et al<sup>7</sup> and then by Kay KS et al<sup>12</sup> and Neumayer et al<sup>13</sup>. But this result is not statistically significant.

In this study, the second higher rates of SSIs (10%) were observed in open Meshless Ventral herma repairs. This may partially be explained by the fact that majority of the patients in these repairs were obese and this reflects in similarity to several studies, which showed increased risk of post-operative infections among obese patients.<sup>14</sup> Further studies showed that the rates of SSIs are even higher in emergency operations<sup>14,15</sup> but emergency cases were not included in this study. SSIs after clean operations may result by the micro-organism from skin flora or exogenous sources; like, infected or colorized health care workers, instruments or operating room environment as have been described in many studies.<sup>16</sup> This might need infection control team in every tertiary care hospital, which is very much lacking at our part of world. Hence the increased rates of SSIs among patients operated on for clean surgery may be because of sub-standard infection controlling measures for dis infecting the skin of patient and health care worker and sterilization of surgical instruments. However, improper handling of tissue may be another possible contributory reason with increasing risk of SSIs in patient underwent for clean procedures, and same is also observed by Petrosillo et al in his study.<sup>17</sup>

## CONCLUSION

The study concluded that the rates of surgical site infections as 6.88% in patients underwent for clean surgery; which are higher than many other countries. These rates can be decreased with simple awareness of infection control measures..

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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