

Incidence of Surgical Site Infection among Patients Undergoing Abdominal Surgery at Murtala Muhammad Specialist Hospital Kano, Nigeria

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ABSTRACT

Surgery plays an increasingly prominent role in healthcare and growing attention is being focused on the safety and quality of such care. Surgical site infections have been known to be the leading cause of Hospital Acquired Infection and contribute significantly high in modern surgery. Surgery related iatrogenic complications are avoidable and breakdown in standard practice usually results in surgical site infection especially in low income settings where resources are limited.

Keywords: *surgical site infection, incidence, surgical wounds, infection, surgery,*

INTRODUCTION

Surgical site infections (SSI) are have been known to be the leading cause of Hospital Acquired Infection and contribute significantly high in modern surgery [Anderson, Podgorny, Berríos-Torres, Bratzler, Dellinger, Greene, Nyquist, Saiman, Yokoe, Maragakis, Kaye 2014]. These infections could be classified based on the surface area involved [Ikeanyi, Chukwuka, Chukwuanukwu 2013]. Base line studies from United State showed that 780,000 out of 30 million surgical procedure performed annually results in surgical site infections and the average cumulative incidence rate of surgical site infection was 2.6 per 100 surgical procedures in a nationwide study conducted in the United States (Gaynes, Culvar, Horan, Edwards, Richards et.al., 2001). In the United

Kingdom the estimated direct cost from a patient who developed surgical site infection are between \$ 2265 and \$251; and surgical site infection incidence in France was 11% (Mawalla et al.,2011). In an Algerian study the cumulative incidence of surgical site infection decreased from 11.9% in 2001 to 2.5% in 2005 following infection control prevention (Atif, Bezzaoucha, Mesbah, Djellato, Boubechou et al., 2006). In a Tanzanian study 19.4% of patients developed surgical site infections after surgery, and in 36.4% of these patients the problems was identified during post-discharge follow up (Ericksen, Chugulu, Kondo and Lingass2003). In a Ugandan study, the overall cumulative incidence of surgical site infection was 10% among surgical patients in general and 9.4% among women who underwent caesarean section (Hodges

&Agaba 1997 cited in Nejad et al., 2011). In Ethiopian study the cumulative incidence of surgical site infection was 21% base on clinical criteria and 38% based on bacteriological criteria in patients who had undergone abdominal surgery (Nejad et al., 2011). In a study from Kenya the cumulative incidence of surgical site infection was 19% after caesarean section and 33% among women who had been in labour for more than 12 hours versus 15% among women whose labour had lasted fewer hours (Kamau, Kabare and Gichuhi 2005, cited in Dalhatu, et al., 2014). In Nigeria, the cumulative incidence was 23.6 per 100 operations (Ameh, Mshelbwala, Nasir, Lukong, Jabo et al., 2009). A report of surgical site infection incidence have been occurring and documented after hospital discharge (Sands, Vineyard, and Platt, 1996 cited by Deverick and Anderson, 2011). Ten studies (eight with a focus only on surgical site infection) and three conference abstracts reported an incidence of surgical site infections ranging from 2.5% to 30.9% following various types of surgical procedures (Atif, et al., 2006; Fehr, Hatz, Soka, Kibatala, Urassa et al., 2006; Erikson, Chugulu, Kondo and Lingaas, 2003). In Nigeria, the Cumulative incidence of surgical site infection was 23.6 per 100 operations (Ameh, et al., 2009). When reported, the incidence of surgical site infection by wound classification ranged from 6.5% to 20.2% in clean

wound, 10.1% to 23.8% in clean contaminated 100 units 13.3% to 51.9% in contaminated wounds and 44.1% to 83.3% in dirty wounds Erikson, Chugulu, Kondo and Lingaas, 2003; Ameh, et al., 2009). Superficial, deep and organ / space surgical site infection accounted for 38.2% to 73.6% 6.8% to 46% and 10.4% to 20.5% of all surgical site infections, respectively (Fehr, et al. 2006 cited in Dalhatu et al., 2014; Erikson, Chugulu, Kondo and Lingaas, 2003). In an Algerian study, the cumulative incidence of surgical site infection decreased from 11.9% in 2001 to 2.5% in 2005, following an infection control intervention i.e adherence to surgical safety guidelines and standard protocol of wound care (Atif, et al., 2006). In a survey conducted in Tanzanian, demonstrated that surgical site infection was identified in a surgical patient after discharge in 21% of patients, one third of whom were re-hospitalized because of such infection (Fehr, et al., 2006, cited in Dalhatu et al., 2014). In another Tanzanian study, 19.4% of patients developed surgical site infections after surgery, and in 36.4% of these patients the problem was identified during post-discharge follow-up (Erikson, Chugulu, Kondo and Lingaas, 2003). In a Ugandan study, the overall cumulative incidence of surgical site infection was 10% among surgical patients in general and 9.4% among women who underwent caesarean section (Nejad, et al., 2011). In a study

conducted in Ethiopia the cumulative incidence of surgical site infection was 21% based on clinical criteria and 38. % based on bacteriological criteria in patients who had undergone abdominal surgery (Nejad, et al., 2011). In a study from Kenya, the cumulative incidence of surgical site infection after caesarean section was 19% overall, and 33% among women who had been in labour for more than 12 hours versus 15% among women whose labour had lasted fewer hours (Kamau, Kabare & Gichuhi, 2005). Until the middle of the 19th century, when Ignaz, Semmelweis & Joseph Lister became the pioneers of infection control by introducing antiseptic surgery, most wounds became infected (European Centre for Disease Prevention and Control 2008). In cases of deep or extensive infection this resulted in a mortality rate of 70-80% (Oni, et al., 2006). Since then a number of significant developments, particularly in the field of microbiology, have made surgery safer (Allegranzi, et al., 2011). However, the overall incidence of healthcare associated infections remains high and represents a substantial burden of disease (Nejad, et al., 2011).

OBJECTIVE: This study aimed at exploring and documenting the incidence rate of surgical site infection among patients that underwent abdominal surgery at Murtala Muhammad Specialist Hospital Kano.

METHODOLOGY

This was a descriptive observational study involving all subjects who have undergone abdominal surgery in surgical wards within the period of study at Murtala Muhammad Specialist Hospital Kano. Murtala Muhammad Specialist Hospital Kano has a capacity of 688 beds and serves as a referral centre and training ground for the state with a projected population of three thousand surgical patient outflows annually. The hospital has twelve (12) wards each of which has a surgical unit. The hospital has eight (8) preoperative nurses and fourteen (14) anesthetist, twelve (12) General surgeons and eleven (11) Obstetric and Gynecological surgeons. The hospital has five operating theatres with different specialties including Obstetrics and Gynecology theatre, General Surgery theatre, Orthopedics theatre, Accident and Emergency theatre, Vesico-Viginal Fistula theatre and various surgeries are performed to include appendectomy, thyroidectomy, prostatectomy, herniotomy, caesarean section, hysterectomy, myomectomy, laparotomy, excisional biopsies among others. An informed consent form was signed before sample collection and purposive sampling method was used to select all subjects that have undergone major surgery during the study period. A total of 150 patients were used for the study and therefore all patients of all ages and genders undergoing major surgical procedures

with visible incision were serially recruited right from the time when surgical intervention was announced until the sample size was attained. Wound swabs samples were collected from post operative hospitalized surgical patients. Samples were only collected from patients before surgical

wound dressing. A swabs sample were collected using sterile swab sticks from each patient and transported immediately in the Medical Laboratory within 4 hour for analysis. All collections were done under strict aseptic conditions.

RESULTS

Table 1: Distribution of patients based on Socio-demographic characteristics

Variable N=150	Frequency	Percentage %
Gender		
Male	22	14.6
Female	128	85.3
Educational level		
Formal	104	69.3
Informal	46	30.6
Marital status		
Married	137	91.3
Single	13	8.6
Place of residence		
Urban	59	39.3
Semi urban	21	14
Rural	40	26.6
Total	150	100%

The table showed that most of the respondent 128 (85.3%) are female and majority 104 (69.3%) had formal education. Others are reflected on the table.

Table 2. Bacterial isolates recovered from post-operative wound infection at MMSH

Variable (n=12)	No. of infected (N=150)	No. of non infected
E.coli	4 (33.3%)	146 (97.3%)
Pseudomonas spp	3(25%)	147 (98%)
Klebsiella spp	2(16.6%)	148(98.6%)
Staphylococcus aureus	2(16.6%)	148 (98.6)
Proteus spp	1(8.3%)	149 (99.3%)

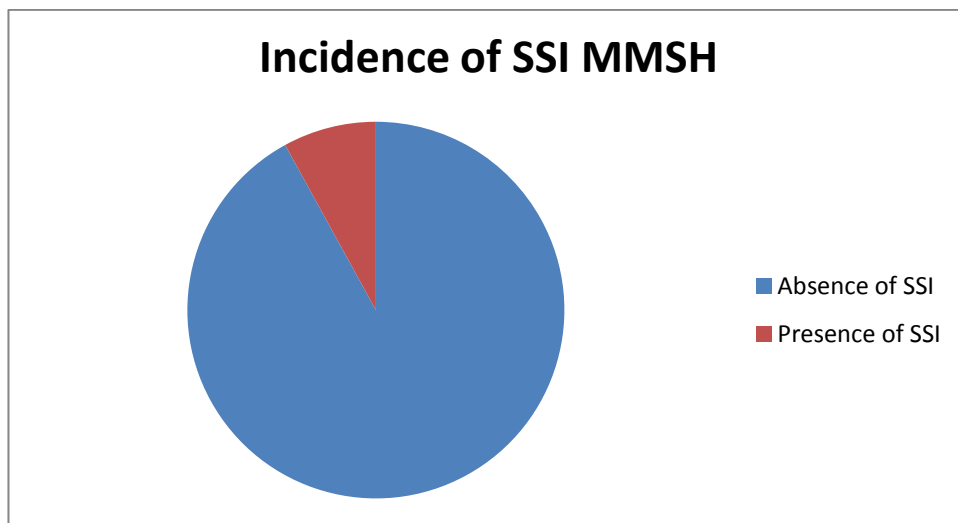
N= number of subjects, n= number of bacterial isolates

The table above showed that majority of the isolates 4 (33.3%) are E.coli,

followed by *Pseudomonas* spp 3(25%) in a decreasing frequency. Others were

reflected on the table above.

Incidence of Surgical Site Infection at MMSH



Key: MMSH- Murtala Muhammad Specialist Hospital
SSI- Surgical Site Infection

The proportion of patients with surgical site infection versus those without surgical site infection based on bacteriological criteria is given below.
 $12/150 \times 100 = 8\%$.

While the proportion of patients with surgical site infection versus those without surgical site infection based on clinical criteria is given below
 $2/150 \times 100 = 1.3\%$

DISCUSSION

The incidence rate of surgical site infection at Murtala Muhammad Specialist Hospital in this study was 8% based on bacteriological criteria and 1.3% based on clinical criteria. The

reason for this low incidence could be link to the fact that the study only employed in-patient during the period of index hospitalization before surgical dressing is done. The finding is similar to the report documented in Nigeria in which the incidence rate of 10.3% was reported Shuaibu et al., 2015. The findings of the study differ with another study documented at General Hospital Funtua North-Western Nigeria where an incidence rate of 22% was documented Dalhatu et al., 2014. The reasons for the differences in the incidence rate could be link to differences in hospital settings, geographical location and unhygienic

state of some hospital environment which naturally influence the growth of some bacterial species. The finding of present study also differs from the report around the world documented in Tanzania where an incidence rate of 24% to 19.4% was documented Mawalla et al., 2011.

The study concluded with moderate incidence rate of surgical site infection and gram-v bacteria being the most commonly pathogen implicated in surgical site infection.

METHODS

A prospective observational design was employed for the study. An instrument was adapted based on Centre for Disease Prevention and Control to determine the clinical manifestation of surgical site infection. Swabs of the clinically infected wounds detected in a population of 150 consecutively studied patients were taken, and samples were cultured on Blood and MacConkey agar media and incubated aerobically and anaerobically for 48 hours. Isolation and identification of the organism was done by standard microbiological methods.

RESULTS

The results showed that most of the patients were female 128(85.3%) and had formal education. The incidence of surgical site infection is 12 (8%) based on bacteriological criteria and 1.3 % based on clinical criteria and gram negative bacteria was the most

commonly pathogens implicated in surgical site infection among the studied patients.

CONCLUSION

The study revealed appreciably moderate incidence rate of surgical site infection and gram -negative bacteria are the major agents of abdominal surgical site infections and therefore, recommend that surveillance activities with frequent feedback to hospital management is essential to curb the surgical complication and improve patient safety.

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