



PREVALENCE, KNOWLEDGE, AND PREVENTIVE PRACTICES OF SURGICAL SITE INFECTION AMONG NURSES IN SELECTED HOSPITALS IN OWO, ONDO STATE, NIGERIA

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ABSTRACT: *Surgical site infection (SSI) is a burden to the patient and family as it extends the number of days spent in the ward post-surgery. This study assessed the perception of factors associated with surgical site infection among nurses in selected hospitals in Ondo State, Nigeria. A cross-sectional design was utilized for the study. A simple random sampling technique was used to select 100 respondents for the study. Data was collected using a self-constructed questionnaire. Data obtained were analyzed with descriptive and inferential statistics using SPSS version 22. Results were summarized using frequency tables and charts. Results showed that the prevalence of surgical site infection among postoperative patients was 47%, with approximately 20% mortality rate. Also, the study showed that 88% of the respondents have high knowledge of SSI. Preventive practices adopted against SSI among respondents were: skin preparation using alcohol (76%), hand washing before wound care (92%), aseptic technique (80%), assessment of surgical site (89%), antibiotics usage (89%) and use of surgical mask (98%); overall, 97% of the respondents showed good level of preventive practice. The study showed a significant relationship between knowledge and preventive practice of SSI among respondents ($X^2 = 20.20$, $df=4$, $p < 0.05$). Also, there was a significant relationship between the duration of surgery and SSI among postoperative patients ($X^2 = 18.21$, $df=3$, $p < 0.05$). The study concludes that SSI is well known among the respondents. However, the identified factors seem to contribute to the increase in SSI among the patients the respondents cared for.*

KEYWORDS: Perception, knowledge, surgical site infection, preventive practices, and nurses.



BACKGROUND

Surgical site infections (SSIs) account for most hospital-acquired infections, i.e., about 20% of documented infections each year and costing approximately \$34,000 per episode (Nicole, 2016). SSIs are responsible for increased readmission rates, length of stay in hospital, reoperation, patient morbidity and mortality, and increased overall healthcare costs (Kuplicki & Lebedinskaya, 2016). Surgical site infection (SSI) has been described as an infection that develops within 30 days post-operation or within one year if an implant was inserted and the infection was related to the surgical procedure (Kitembo & Chugulu, 2013). SSIs contribute to morbidity and mortality among postoperative patients and continue to represent about a fifth of all healthcare-associated infections (Kitembo & Chugulu, 2013). Although at least 5% of patients develop SSI after surgery (Giri et al., 2013), SSIs seem to cause little concern and have been under-reported by the media. Despite advancements in operating room protocols, instrument sterilization methods, improved surgical technique, and infection prevention strategies, surgical site infections remained a major etiology of hospital-acquired infections, and prevalence is globally increasing even in hospitals with most modern-day facilities and standard protocols of pre-operative procedures and antibiotic prophylaxis (Victor et al., 2013).

Furthermore, among developing countries where resources are scarce, even basic operations, such as appendectomies and cesarean sections, were associated with increased infection rates and mortality (Victor et al., 2013). In developed countries, the prevalence of SSI has been reported to be between 5% to 15% among hospitalized patients in regular wards and up to 50% or more among patients in intensive care units (ICUs). Patients who develop SSI require significantly more medical and nursing care. If an SSI develops, a patient is 60% more likely to spend more time in the ICU post-surgery than an uninfected surgical patient, and the emergence of an SSI increases the length of stay in hospital by a median of two weeks (Kitembo & Chugulu, 2013). The risk of SSIs even continues after discharge. SSIs develop in almost 2 percent of patients after discharge from the hospital and these patients are two to five times as likely to be readmitted to the hospital (Kitembo & Chugulu, 2013). In 2012, major emergency operations contributed more than 43% of the total surgical operations in MRRH (Theatre Records, 2012). Most of these patients were at risk of developing SSIs postoperatively because of their health status preoperatively, surgical aseptic technique, and underlying comorbidities, among others (MRRH, 2012).

Nurses play a paramount role in surgery and often come in contact with patients; hence, their role in preventing surgical infection cannot be over-emphasized. Also, considering nurses as the highest workforce in the clinical setting, applying the sound theoretical knowledge they possess, in conjunction with their attitude and adequate practice of medical and surgical asepsis, one would expect that the prevalence of surgical site infection would reduce. However, anecdotal evidence points to the fact that the prevalence of surgical site infection seems to be on the increase; hence, this study was designed to explore nurses' perception on those factors responsible for surgical site infection among postoperative patients in selected hospitals in Ondo State.



The objectives of the study were:

- To determine the prevalence of surgical site infection among postoperative patients in selected Hospitals in Owo LGA, Ondo State.
- Assess the level of knowledge on causes of surgical site infection among nurses in selected hospitals in Owo LGA, Ondo State.
- Ascertain the level of preventive practices against surgical site infection adopted by nurses in selected hospitals in Owo LGA, Ondo State.
- Identify the factors associated with surgical site infection among nurses in selected hospitals in Owo LGA, Ondo State.

METHODOLOGY

A cross-sectional design was adopted. This research design provides a quick efficient and accurate means of assessing information about the population of interest. The study was conducted at the Federal Medical Centre and General Hospital, Owo. Federal Medical Center is a public tertiary health care hospital in Owo, Ondo State. The population for this study included the nurses working in surgical, gynaecology, post-natal and orthopaedic wards in Federal Medical Center Owo and General Hospital Owo, Ondo State, Nigeria. Taro Yamane's formula was used to select 100 participants for the sample size for this study. A list of nurses in the study area was obtained from the head of nursing service in the selected hospital. The respondents were selected by simple random sampling using their various ward rosters as the sample frames. A self-structured questionnaire was developed and used in this study. The questionnaire was sectioned into six parts. Part A: Respondent's Characteristics; this part contained biographic data such as age, sex, religion, marital status, educational level, professional cadre, speciality, level at work, working experience in surgical ward, and length of services. Part B: This part examined the prevalence of surgical site infection among surgical patients in selected Hospitals in Owo LGA, Ondo State, as reported by the nurses caring for the patients. Part C: This part examined the level of knowledge on causes of surgical site infection among nurses in selected hospitals in Owo LGA, Ondo State, Nigeria. Part D: This part examined the level of preventive practice against surgical sites among nurses in selected hospitals in Owo LGA. Part E: This part examined the perception of nurses on the factors associated with surgical site infection among postoperative patients in selected hospitals in Owo LGA, Ondo state. Part F: This part examined factors associated with surgical site infection among nurses in selected hospitals in Owo LGA, Ondo State.

Face and content validity of the instrument was ensured. For reliability, a pre-test study was conducted by administering the questionnaire to 10 nurses selected in a similar setting. It was re-tested after a week using the same respondents. Permission to collect data was obtained from the authorities of the selected hospitals. The researcher met and explained the purpose of the study to the nurse in charge of the surgical wards. The respondents were met in their various wards. Randomly selected nurses were requested to participate in the study, and they participated voluntarily. The questionnaires were distributed among the respondents after having been duly informed. Data collection took four weeks. Data collected were analyzed using descriptive and inferential statistics with the aid of SPSS version 21. Results were



presented using a frequency table and percentage. Mean score analysis was used for descriptive analysis, while the nonparametric statistical test (Chi-square) was used to test the formulated hypothesis. An ethical approval certificate was obtained from the ethical committee at the Federal Medical Centre and General Hospital, Owo. An informed consent form was filled out by intending participants that gave their consent. Participation of the respondents was strictly voluntary. Participants were treated with respect and courtesy, and anonymity was ensured.

RESULTS

Socio-demographic Characteristics

Table 1 shows socio-demographic characteristics among the respondents (n=100)

	Frequency (n)	Percentage (%)
Age		
25-35	31	31.0
36-55	34	34.0
Above 55	35	35.0
Gender		
Male	19	19.0
Female	79	79.0
Marital status		
Married	68	68.0
Single	27	27.0
Separated	5	5.0
Ethnicity		
Yoruba	69	69.0
Igbo	26	26.0
Hausa	5	5.0
Religion		
Christianity	66	66.0
Islam	34	34.0
Educational background		
RN	28	28.0
RM	22	22.0
B.SC	36	36.0
Others	14	14.0
Speciality		
Pediatric nurse	21	21.0
Surgical nurse	29	29.0
Wound care nurse	26	26.0
A & E nurse	17	17.0
General nurse	7	7.0
Work experience		
1-5	28	28.0



6-10	34	34.0
11-15	38	38.0
Cadre		
NOII	28	28.0
NOI	22	22.0
SNO	27	27.0
ACNO	17	17.0
CNO	6	6.0
Ward		
Surgical	22	22.0
Orthopedic	18	18.0
A & E	15	15.0
General ward	6	6.0
Pediatric ward	15	15.0
Medical ward	24	24.0

Table 2 shows the prevalence of surgical site infection

Variables	Frequency	Percentage
Is there an increase in the occurrence of surgical site infection among your patients		
Yes	47	47.0
No	30	30.0
Has there been any mortality among the patients with surgical site infection		
Yes	20	20.0
No	60	60.0
In your practice, when do you observe that a patient develops surgical site infection after surgery?		
48hrs post-surgery	13	13.0
73hrs post-surgery	17	17.0
96hrs post-surgery	29	29.0
5days post-surgery	41	41.0
Do you think surgeries requiring longer hours are associated with surgical site infections?		
Yes	67	67.0
No	33	33.0
Within the last 6months in your unit, how many surgical site infections were recorded		
1-10	12	12.0
11-20	6	6.0
More than 20	2	2.0

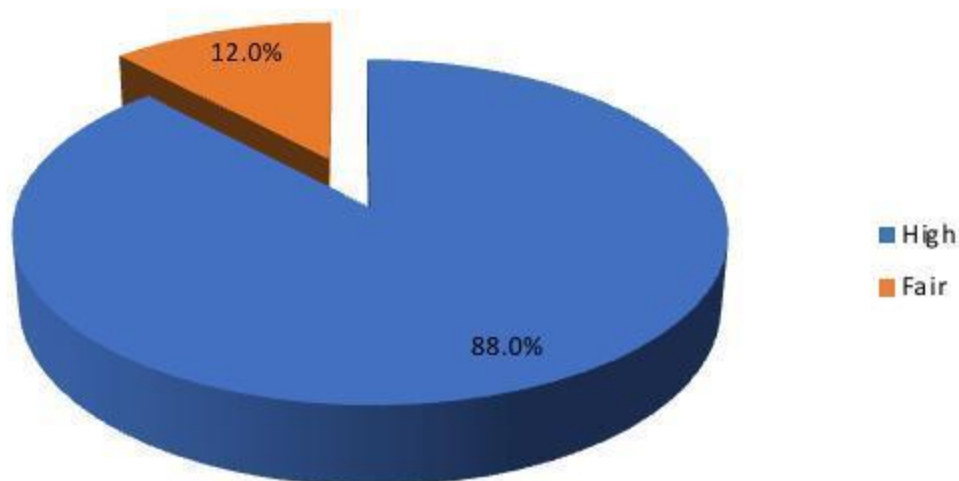


Fig. 1: Level of Knowledge on Surgical Site Infection

Table 3 shows the level of practice in preventing surgical site infection

Variables	Yes n (%)	No n (%)
Do you use alcohol preparation as an antimicrobial skin preparation in your ward	76(76.0)	24(24.0)
Do you wash your hands before and after changing wound dressings, touching surgical site and before wearing sterile gloves?	92(92.0)	8(8.0)
Do you advise your patients to take peri-operative showering with antimicrobial agents 6-12 hours before surgery	63(63.0)	37(37.0)
Do you use aseptic techniques during surgical wound dressing	80(80.0)	20(20.0)
Do you assess and monitor surgical site condition	89(89.0)	11(11.0)
Do you administer pre and postoperative antibiotics to prevent and treat possible infection	91(91.0)	9(9.0)
Do you use surgical mask when doing surgical wounds	98(98.0)	2(2.0)

**Table 4 shows perceived factors associated with surgical site infection**

Variables	YES n (%)	NO n (%)
Is it recommended to protect a primarily closed incision?	87(87.0)	13(13.0)
I clean and disinfect the surface of the dressing trolley with an antiseptic solution.	70(70.0)	30(30.0)
Surveillance succeeds in reducing the incidence of SSI.	60(60.0)	40(40.0)
I discard the soiled material in the proper place after performing wound dressing.	81(81.0)	19(19.0)
The type of dressing material used postoperatively may contribute to surgical site infection.	65(65.0)	35(35.0)
Are hand washing materials put in place in your ward before any procedure?	80(80.0)	20(20.0)
Are sterile gloves made available before wound dressing to prevent the risk of patient being infected?	83(83.0)	17(17.0)
Is there a balanced diet available to help in preventing infection?	55(55.0)	45(45.0)
Are there available materials and lotions to carry out proper wound dressing to prevent the risk of surgical site infection?	72(72.0)	28(28.0)
Taking medications at the right time reduces the risk of surgical site infection.	92(92.0)	8(8.0)
Do you believe that personal hygiene helps in preventing surgical site infection?	85(85.0)	15(15.0)
Do you clean the dressing trolley using Savlon and methylated spirit each time before doing a postoperative dressing?	87(87.0)	13(13.0)
Do you use a surgical mask each time you do a postoperative dressing?	96(96.0)	4(4.0)
Do you think the financial status of the patient is associated with surgical site infection?	67(67.0)	33(33.0)
Do you think the brand of antibiotics used by the patient postoperatively has any association with surgical site infection?	31(31.0)	69(69.0)

Hypotheses Testing

Hypothesis 1

H01: There is a significant relationship between nurses' knowledge and preventive practice of surgical site infection.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.20 ^a	4	.023
Likelihood Ratio	7.21	1	.017
Linear-by-Linear Association	8.93	2	.031
N of Valid Cases	100		



The Pearson chi-square showed a significant relationship between knowledge and preventive practice of surgical site infection ($X^2= 20.20$, $df=4$, $p<0.05$). Therefore, we accept the alternate hypothesis and reject the null hypothesis.

Hypothesis 2

H02: There is no significant association between the duration of surgery and surgical site infection.

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.21 ^a	3	.021
Likelihood Ratio	7.34	1	.054
Linear-by-Linear Association	8.93	2	.021
N of Valid Cases	100		

The Pearson chi-square showed a significant relationship between the duration of surgery and surgical site infection ($X^2 = 18.21$, $p<0.05$). Therefore, we accept the alternate hypothesis and reject the null hypothesis.

DISCUSSION

The demographic data of the nurses who participated in this study showed that 35% were above 55 years old, and 34% were between 36 and 55 years old. Most of the nurses were females, thus implying nursing is a female-dominated profession. Regarding the nurses' unit, 22% were from the surgical unit of the hospital, 18% were from the orthopaedic unit, 24% were from the medical unit, and 15% were from A&E and the pediatric ward, respectively. Surgical site infections (SSIs) are the most common hospital-acquired infections, accounting for 20% of total documented infections each year and costing approximately \$34,000 per episode (Nicole, 2016). In this study, less than half of the nurses had reported an increase in surgical site infection with approximately a 20% mortality rate. Likewise, 67% of the respondents thought that long-hour surgeries resulted in surgical site infection, and 12% had reported 1-10 infections within the last six months in their respective units. This finding was similar to the report by Labrague, Arteché, Yboa, and Pacolor (2012), who indicated that patients who developed surgical site infections were two times more likely to die than other postoperative patients. Also, the finding conformed with the study by Nawab Shah (2010), in which the surgical site infection rate was reported as 9.3%. In addition, another study conducted by Malik, Nawaz, Abdullah, Waqar, and Zahid (2013) reported an 8.6% surgical site infection rate. Furthermore, in this study, virtually all nurses have had training on infection, and most of the nurses agreed that the correct purpose of surgical hand washing was to reduce the risk of surgical site infection. Moreover, the majority of the nurses asserted that surgical site infection occurred within 30 days after operation. This was similar to the study conducted by Owens and Stoessel (2008), who reported that SSI was an infection which occurred within 30 days after a surgical procedure or up to one year in those surgical patients who have an implant placed in their organ.



This current study found that nurses' knowledge of surgical site infection was high. This high level of knowledge was also observed in the study conducted by Fashafsheh, Morsy, Ismaeel and Alkaiasi (2013) in the government hospitals of Palestine in which more than half (53.9%) of the participants had a fair knowledge level. However, this present study was in contrast to the study conducted in Nigeria by Famakinwa, Bello, Oyeniran, Okhiah, and Nwadike (2014), which revealed that the majority of the nurses had poor knowledge as regards the prevention of postoperative wound infection. Also, in this study, nurses have shown good surgical site infection preventive practices. In the study, nurses stated that they do make use of alcohol preparation, wash hands before and after changing wound dressing, use aseptic techniques during surgical wound dressing as well as administering pre- and postoperative antibiotics to prevent and treat possible infection. This high level of preventive practice was obtained in the study carried out by Mwakanyamale (2013), who reported high preventive practice (98.3%) among their respondents. Furthermore, this study reported that more than average of the nurses agreed that they disposed of used materials appropriately and that sterile gloves were always made available. Moreover, the nurses believed that personal hygiene helped in preventing surgical site infections, while 87% did clean dressing trolleys with Savlon and methylated spirit. In this study, the majority of the respondents had a good perception of factors associated with prevention of SSI. The result of the first hypothesis showed a significant relationship between knowledge and preventive practice of surgical site infection ($X^2 = 20.20$, $p < 0.05$). Also, the second hypothesis showed a significant relationship between duration of surgery and surgical site infection ($X^2 = 18.21$, $p < 0.05$).

CONCLUSION

The study concludes that SSI is well known among the respondents. However, the factors identified seem to be contributing to the increase in SSI among the patients the respondents cared for.

IMPLICATIONS TO NURSING PRACTICE

Healthcare-associated infections are major healthcare problems for people globally. Millions of people are affected by them yearly (Teshager, Engeda, & Worku, 2015). Nurses have a distinctive chance to lessen the prevalence of hospital-acquired infections. They can assist patients in their recovery while reducing the complications associated with infections by utilizing adequate knowledge and practices (Benson & Powers, 2011). The role of nurses in preventing surgical site infection cannot be overemphasized. Nurses should be aware that precautions are necessary to prevent infection due to impairment in the patient's skin integrity. There is a need to intensify efforts toward preventing surgical site infection considering the high incidence rates and the challenges it poses on the lives of the patients and their relatives.



RECOMMENDATIONS

Based on the findings from this study, the following recommendations were made:

- Evidence-based nursing practices regarding the prevention of surgical sites and nurses' knowledge regarding the prevention of surgical site infection should be explored.
- Nurses should conduct a routine evaluation of patients' nutritional status to detect earlier any malnourished condition.
- Nurses should have adequate knowledge of important antibiotics and appropriate timing for their administration prior surgery.
- Nurses should try as much as possible to identify and use the nursing process to protect the patient pre- and postoperatively.
- Pre-operative antiseptic baths using adequate strengths of Savlon should be encouraged.
- Nurses should use face masks always when dressing a postoperative wound.

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