A study on Awareness and Knowledge of Surgical Site Infection among Dental Patients in a Nigerian Tertiary Hospital

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Abstract

Background: Risk of surgical site infection (SSI) can be reduced or eliminated if its awareness and knowledge is optimal among patients.

Aim: The aim of this study was to assess the level of awareness and knowledge of SSI among dental patients in a Nigerian Tertiary Hospital.

Materials and methods: This was a cross-sectional study design conducted in hospital setting on adult Nigerian population visiting a tertiary hospital between December, 2022 and February, 2023. The data was collected with a pretested 36-item, structured, close-ended, self-administered and interviewer - administered questionnaires. The data collected were socio demographic characteristics, past admission, days of hospitalization, reason for admission and history of SSI. Other collected data were awareness and knowledge of SSI. Both descriptive and inferential statistics were analyzed. The data was entered and analyzed using the statistical package for the social sciences (SPSS), version 26 (IBM, Armonk, NY, United States of America). A critical probability level (p-value) of <0.05 was used as the cut-off level for statistical significance.

Results: A total of 102 dental patients were interviewed in this study. The age range and the mean age were 20 -76 years and 45.3± 5.1 years respectively. There was slight (55.9%) preponderance of female gender. Only 24(23.5%) respondents had heard of SSI and this was mainly through medical personnel. The majority (76.5%) of the respondents had never seen anyone diagnosed of SSI. Few (6.9%) respondents claimed they were enlightened about SSI prior to surgery. Overall, half (50%) of the respondent had poor knowledge while only 13(12.7%) had good knowledge. Marital status, level of education and previous admission were significantly associated with poor knowledge (p<0.05).

Conclusions: The awareness and knowledge of surgical site infection among patients in this study were relatively poor. Therefore, awareness campaign among Nigerian population can help improved the level of knowledge for better wound care and quality care.

Key words: Awareness, knowledge, Surgical Site Infection, Dental Patients, Nigerian Tertiary Hospital.

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Introduction

Though several definition of surgical site infection (SSI) exist in the literature, the most widely used and accepted definition is the 1992 reclassification and definition by United States of America Centre for Disease Control and Prevention (CDC) which defined SSI as "an infection that occurs after surgery in the part of the body where the surgery took place

within 30 days of an operative procedure or within one year if an implant is left in place."[1] It affects either the incision or deep tissue at the operation site and may require surgical intervention.[2]

Globally, the rates of SSI remain considerably high despite advances in surgical techniques and this cut across all surgical procedure such as oral and maxillofacial surgeries, general surgeries, appendectomies.[3-5] SSI rates differ across countries depending on various factors.[3,6,7] In Nigeria, SSIs have been reported to be 45.8%, 16.2%, and 16.7% following orthopaedic surgeries, appendectomies and obstetrics and gynecological surgeries respectively.[8-10] SSI is a considerable disease and healthcare burden, as it increases hospitalizations, costs, and mortality rates.[11] In developed countries, SSI increases the average hospital length of stay that can result in an annual additional cost.[2] In developing countries, SSI can pose a serious economic burden.[12] Therefore, there is need to lower the rates of SSIs worldwide. One of the effective strategies for SSI prevention is increasing patient engagement.[13] Studies[14-18] have reported a gap in patient engagement to reduce SSIs. To develop effective engagement strategies, it is important to understand the current knowledge and awareness of SSI among patients.

Though retines of studies[19-24] were found in the literature on awareness and knowledge of SSI among health care providers, it appears few studies[25,26] were reported only in the developed countries. To the best of our knowledge, none was found among dental patients. Therefore, the aim of this study was to evaluate the awareness and knowledge of SSI among dental patients in a Nigerian teaching hospital. The findings of this study would aid in the development of SSI preventative strategies in Nigeria.

Materials and method

Ethical consideration: Prior to commencement of the study ethical approval was not sought from the Research and Ethics Committee of the University of Benin Teaching Hospital.

Study setting: This study conducted between December, 2022 and February, 2023 at dental complex of a Nigerian teaching hospital. This hospital serves as one of the main government healthcare centers in southern Nigeria and have a high volume of surgical procedures.

Study design: This was a cross-sectional study design.

Sample size calculation: The minimum sample size of 96 was determined using the statistical formula of Cochrane[27] for sample size calculation: $N= Z2P (1-P)/ d2$. Where N is the minimum sample size for a statistically significant survey, Z is normal deviant at the portion of 95% Confidence Interval (C.I) = 1.96, Since this is preliminary study in Nigeria, a best guess prevalence of 50% was chosen for the estimation of sample size,[28] and d is margin of error acceptable or measure of precision = 10%. However, the sample size was increased to 102 to compensate for non-responses.

Study population: The study population was all adult Nigerians. All participants were provided with relevant information regarding the study and informed consent was obtained from them. The participants' responses were held in strict confidence. There were no identifiers on the questionnaire to maintain anonymity. Access to questionnaires was restricted. The study did not pose any risk or harm to the research participants. Recruitment was based on participants' voluntariness to take part in the study. They were free to withdraw their consent at any time.

Inclusion and exclusion criteria: Included in the study were any adult Nigerian who gave their consent to be included in this study and who came to our facility for treatment; able to understand, read, speak or write English; and capable of answering the questions either in written form or by interview. The questionnaire was self-administered and interviewer administered. Excluded were those that did not give consent to participate in the study.

Sampling method: All eligible samples was recruited based on non-randomized convenience sampling technique.

Study instrument: The tool used in this study was validated in a previous study.[26] The data was collected with 36-item, structured, close-ended, self-administered questionnaire which was pretested for feasibility. The questionnaire was in English and categorized into four sections. The first section of seven items elicited the demographic information (age, gender, marital status, level of education, occupation, religion and ethnicity). The second section of 4 items investigated the clinical

characteristics such as previous admission reason for admission, day of admission and history of SSI. The third section with 7 questions was on the awareness of SSI and the last section with 8 questions was on knowledge of SSI. To determine the level of knowledge, any positive response was scored 1 while negative response was scored 0 and the overall score was 0-8. Score from 0-2 was considered as poor, 3-5 as fair and 6-8 as good. The questionnaire was pilot tested in 10 randomly chosen samples following which no additional changes were deemed necessary; these responses were not included in the full-scale study analyses. The reliability of the questionnaire was assessed using Cronbach's alpha and was found to be 0.8.

Data management: The data collected were age, gender, department of respondents, medical status, years of experience, additional degree. Other collected data were awareness, knowledge, and practice of radiation protection. Both descriptive and inferential statistics were analysed. In the descriptive statistics, the categorical variables were expressed in frequency and percentages while numerical variables were expressed in mean and standard deviation. In the inferential statistics, Chi-square test was used to found any association between the dependent and independent variables. The data was entered and analyzed using the statistical package for the social sciences (SPSS), version 26 (IBM, Armonk, NY, United States of America). A critical probability level (p-value) of <0.05 was used as the cut-off level for statistical significance.

Results

A total of 102 dental patients were included in this study. The age range and the mean age were 18-76 years and 45.3 ± 5.1 years respectively. Table 1 shows the demographic characteristics of the respondents.

Most (68.6%) of the respondents were within the age range of 18-34 years while the least (1%) were those older than 65 years. There was slight (55.9%) preponderance of female gender. Two-third (73.5%) of the respondents was singles. Slightly more than half (52.9%) of the Nigerian population recruited had a tertiary level of education and more than half (63.7%) of the respondents were skilled workers. Majority of the respondents were Christians. Most

Table 1: The sociodemographic characteristics of the respondents (n=102)

Characteristics	n (%)
Age(years)	
18-34	70(68.6)
35-44	17(16.7%)
45-64	14(13.7)
>65	1(1.0)
Gender	
Male	45(44.1)
Female	57(55.9)
Marital Status	
Single	75(73.5)
Married	24(23.5)
Widowed	1(1.0)
Separated	2(2.0)
Education Level	
None	2(2.0)
Primary	2(2.0)
Secondary	25(24.5)
Tertiary	54(52.9)
Post graduate	19(18.6)
Occupation	
Skilled	65(63.7)
Semi-skilled	17(16.7)
Dependent	20(19.6)
Religion	
Christianity	90(88.2)
Muslim	1(1.0)
Traditional	8(7.8)
Others	3(2.9)
Ethnicity	
Yoruba	5(4.9)
Hausa	4(3.9)
Ibo	15(14.7)
Others	78(76.5)

Table 2: The clinical characteristics of the respondents (n=102)

Questions	n (%)
Previous admission	
No	78 (76.5)
Yes	24 (23.5)
Days of hospitalization	
1-7	18(17.6)
8-14	4(3.9)
>14	2(2.0)
Nil	78(76.5)
Reason for admission	
Surgical	7(6.9)
Medical	13(12.7)
Others	4(3.9)
Nil	78(76.5)
History of SSI	
Yes	5(4.9)
No	19(18.6)
I don't know	78(76.5)

(76.5%) of the respondents were not of the major ethnic groups in Nigeria and this was followed (14.7%) by the Ibos.

Table 2 shows the clinical characteristics of the respondents. Of the total number of respondents, almost two-third (76.5%) had no previous admission history and for the that were previously admitted, only 2(2.0%) had hospital stay greater than 14 days the admission was mainly (12.7%) due

Table 3: The level of awareness of SSI among the respondents (n=102)

Questions	n (%)
Have you heard about SSI	
Yes	24(23.5)
No	78(76.5)
If yes, how did you hear?	
Family	3(2.9)
Friends	3(2.9)
Social media	4(3.9)
Medical personnel	9(8.8)
Others	5(4.9)
Nil	78(76.5)
Do you know anyone diagnose with SSI	
No one	78(76.5)
Family member	6(5.9)
Colleague/friends	11(10.8)
Others	7(6.9)
Did HCW discuss SSI with you before surgery?	
Yes	7(6.9)
No	95(93.1)
Any educational material given by HCW?	
Yes	16(15.7)
No	86(84.3)
Have you ever learnt about SSI outside the hospital?	
Yes	7(6.9)
No	95(93.1)
Will you wash your hands before handling surgery site?	
Yes	29(28.4)
No	73(71.6)

Table 4: The level of knowledge of SSI by the respondents (n=102)

Questions	N (%)
Infection of skin of surgery site	14(13.7)
Infection of deep organs	10(9.8)
Infection of skin and deep organ at surgical site	20(19.6)
Redness and pain at suture site	6(5.9)
I don't know	52(51.0)
Signs and symptoms of SSI do you know?	
Redness	27(26.5)
Delay healing	29(28.4)
Fever	20(19.5)
Pain	32(31.4)
Tenderness	21(20.6)
Warmth	12(11.8)
Drainage	14(13.7)
All of the above	5(4.9)
None of the above	5(4.9)
I don't know	48(47.1)
Which of these is considered risk factor?	
Age	22(21.6)
Prolonged hospitalization	21(20.6)
Smoking	28(27.5)
Malnutrition	27(26.5)
Corticosteroids	17(16.7)
Obesity	22(21.6)
Diabetes	28(27.5)
Renal failure	20(19.5)
Anaemia	19(18.6)
All of the above	8(7.8)
None of the above	1(1.0)
I don't know	54(52.9)
Do you think SSI is preventable?	
Yes	55(53.9)
No	47(46.1)
How can SSI be prevented?	
Clean hands	35(34.3)
Preoperative antibiotics	21(20.6)
Stop smoking before surgery	16(15.7)
Keep wound clean and dry	33(32.4)
Shaving surgery site	16(15.7)
All of the above	3(2.9)
None of the above	2(1.9)
I don't know	52(51.0)
Do you think SSI can be treated?	
Yes	57(55.9)
No	45(44.1)
If yes, 1st line of treatment?	
Suture removal and debridement	26(25.5)
No need	5(4.9)
I don't know	44(43.1)
Debridement	8(7.8)
Antibiotics	11(10.8)
If you have thick hair.	
Razor	24(23.5)
Clipper	14(13.7)
Scissors	8(7.8)
Other	8(7.8)
I don't know	48(47.1)
Rating of knowledge score	
Poor	51(50.0)
Fair	38(37.3)
Good	13(12.7)

to medical conditions. For those that were admitted due to surgical reasons, only 5 had a history of SSIs. Table 3 shows the level of awareness of SSI among the respondents. Just only 24(23.5%) respondents had heard of SSI and this was mainly through medical personnel. The majority (76.5%) of the respondents had never seen anyone diagnosed of SSI. Just few (6.9%) respondents claimed they were enlightened about SSI prior to surgery. Surprisingly, majority (71.6%) of the respondents are not aware of hand washing before touching surgical wounds.

Table 4 shows the level of knowledge of SSI by the respondents. More than half (51%) of the respondents do not know what is SSI. Greater (47.1%) number of the respondents could not identify any signs and symptoms of SSI. In the same va in, more than half (52.9%) of the respondents could not identify any risk factor of SSI. Though more than half (53.9%) knew it is preventable but more than half (51%) do not know the preventive measures. Those that know that SSI treatable was more (55.9%) than those who don't know but they mainly (43.1%) don't know about the treatment. Most (47.1%) of the respondents don't know that electric clipper is the recommended method to shave the operation site. Overall, half (50%) of the respondent had poor knowledge while only

13(12.7%) had good knowledge. Marital status and level of education were significantly associated with poor knowledge (Table 5).

History of previous admission significantly affected the rate of poor knowledge among the respondents as observed in Table 6.

Table 5: The effect of sociodemographic characteristics on poor knowledge of SSI among the Nigerian population

Variables	Poor knowledge of SSI(n=102)		Chi value	p-Value
Age range(years)	Yes (n=51)(n(%))	No (n=51) (n(%))		
18-34	37(72.5)	33(64.7)		
35-44	8(15.7)	9(17.6)	1.57	0.67
45-64	6(11.8)	8(15.7)		
>65	0(0.0)	1(2.0)		
Gender				
Male	26(51)	19(37.3)	1.949	0.163
Female	25(49)	32(62.7)		
Marital status				
Single	43(84.3)	32(62.7)	8.780	0.032
Married	7(13.7)	17(33.3)		
Widow	1(2.0)	0(0.0)		
Seperated	0(0.0)	2(3.9)		
Education Level				
None	2(3.9)	0(0.0)	16.431	0.002
Primary	0(0.0)	2(3.9)		
Secondary	17(33.3)	8(15.7)		
Tertiary	29(56.9)	25(49.0)		
Post graduate	3(5.9)	16(31.4)		
Occupation				
Skilled	35(68.6)	30(58.8)	1.243	0.537
Semi-skilled	8(15.7)	9(17.6)		
Unskilled	0(0.0)	0(0.0)		
Dependent	8(15.7)	12(23.5)		
Religion				
Christian	51(100.0)	50(98.0)	1.010	0.315
Muslim	0(0.00)	1(2.0)		
Traditional	0(0.00)	0(0.0)		
Others	0(0.00)	0(0.0)		
Ethnicity				
Yorubas	4(7.8)	1(2.0)		
Hausas	2(3.9)	2(3.9)	2.072	0.558
Ibos	8(15.7)	7(13.7)		
Others	37(72.5)	41(18.4)		

Table 6: The effect clinical characteristic on poor knowledge of SSI among the Nigerian population

Variables	Poor knowledge of SSI		Chi value	p-value
	Yes	No		
previous admission				
No	46(90.2)	32(62.7)	10.67	0.001
Yes	5(9.8)	19(37.3)		
Days of hospitalization				
0.7	49(96.1)	46(90.2)	1.428	0.490
8-14	1(2.0)	3(5.9)		
>14	1(2.0)	2(3.9)		
Reason for admission				
Surgical	7(13.7)	13(25.5)	2.383	0.307
Medical	9(17.6)	9(17.6)		
Others	35(68.6)	29(56.9)		
History of SSI				
Yes	1(2.0)	2(3.9)	3.309	0.191
No	32(62.7)	39(76.5)		
I don't know	18(35.3)	10(19.6)		

Discussion

The awareness and knowledge of surgical site infection among patients visiting the dental center in a Nigerian tertiary hospital was studied. In the literature, much attention has been given to the health care providers on their level of knowledge of prevention of SSI globally[19-24] with little attention on the patients who their engagement can help reduce this global health burden. Though few studies are available in the developed countries[25, 26] however, to the best of our knowledge this is the first study to evaluate the level of awareness and knowledge of SSI among the populace in a developing country. This study is timely due to the higher rate of SSI in developing countries despite the reported adequate level of practice of prevention of SSI among the health care providers in Nigeria.[8-10]

The result of this study demonstrated that the prevalence of the Nigerian population that had poor knowledge was 50% and this value is alarmingly high and this is a clarion call for establishment of awareness programmes among the populace. The 50% prevalence rate in this study is higher than the 35.2% reported in a multi-centre study in Saudi Arabia in 2022 by Alsahli et al.[26] The difference in prevalence could be related to variation in sample size of the recruited populations. In this study, we found difference in level of knowledge based on marital status. Being unmarried was a significant factor associated with poor knowledge of SSI. This finding is in contrast with that of a previous study[25] that didn't observe an association between poor knowledge of SSI and marital status. The difference could be to the fact that most (62.4%) respondents were married in the previous study while most (73.4%) where single in the present study. Like the

study of Alsahli et al[26] and Anderson et al.[25] level of education was related to the level of knowledge of SSI among the population studied. This could be the fact that those with higher level of education seek information more compared to those with basic educational levels.

A total of 102 patients were interviewed in this study. To the best of our knowledge only two studies were seen in the course of literature searched that focus on patients rather than health care workers as regard SSI awareness and knowledge. Though the current study has a sample size less than the 219 recruited by Alsahli et al[26] in Saudi Arabia but is higher than 52 recruited by Anderson et al[25] in US. It is therefore, suggested the findings of the present study can be generalized to the Nigerian population as a whole. In this study there more female respondents and this finding is different from that reported in a previous study.[26] The likely reason for this variation could be the fact that women seek health care than their opposite folks. Unlike in a previous study that reported more respondents at a secondary level of education, the current study[25] found more than half of the Nigerian population that had a tertiary level of education. This implies the elites utilize health care services than those with lower level of education in developing countries like Nigeria.[9] History of previous admission was found to be associated with the level of knowledge of SSI in the present study. This is in contrast with the findings of Alsahli et al[26] who did not found any difference in knowledge of SSI as regard previous admission. Sample size variation could be attributable to the difference in findings.

This study had few limitations. First, it was a single centre study; however, the response rate was high. Second, the sample size could have been more though it was statistically estimated. Lastly, being the first to evaluate awareness and knowledge of SSI among non-health caregiver in my clime, it comparison of its findings was challenging.

Conclusion

The awareness and knowledge of surgical site infection among dental patients in a Nigerian population were relatively poor. Therefore, awareness campaign among Nigerian population can help improved the level of knowledge for better wound care and quality care.

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