Student's Journal of Health Research Africa
Vol. 4 No. 9 (2023): September 2023 Issue
https://doi.org/10.51168/sjhrafrica.v4i9.374
Original article

FACTORS ASSOCIATED WITH PREVALENCE OF SURGICAL SITE INFECTION AMONG POSTOPERATIVE PATIENTS ON THE SURGICAL WARD AT HOIMA REGIONAL REFERRAL HOSPITAL. A CROSS-SECTIONAL STUDY.

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Abstract

Background:

Surgical site infections refer to infections occurring up to 30 days after surgery and affecting either the incision or deep tissue at the incision site. This study was conducted to assess the prevalence of surgical site infection among postoperative patients in the surgical ward at Hoima Regional Referral Hospital.

Methodology:

A descriptive cross-sectional study design employed quantitative methods of data collection. 50 respondents (postoperative patients) were obtained by simple random sampling technique. Convenient sampling was also employed to select 20 nurses to participate in the study.

Results:

This study established that 7(14%) of the participants had developed surgical site infection, 3(42.9%) of those suffering from diabetes, 1(14.2%) required minimal assistance, 3(42.8%) required moderate assistance and 3(42.9%) required significant assistance, 1(14.3%) was aged less than 20 years, 2(28.9%) were in the 40-49 age group while 4(57.1%) were aged 50 years or greater while none of them smoked or had a history of smoking.

Out of the 7 patients with SSI, 5(71.4%) had emergency surgeries, and 2(28.6%) had elective surgeries. 5(71.4%) did not have their operation site shaved before surgery while 2(28.4%) had shaved. 3(42.9%) of 7 patients with SSI had an operation duration between 1-3hours while 4(51.9%) had a duration of greater than 3 hours. 3(42.9%) had a postoperative stay between 7-14 days while 4(57.1%) had had an operative stay greater than 14 days.

Conclusion.

There was a 14% prevalence of surgical site infection related to illnesses such as diabetes, patient dependence and age 40 years or greater, healthcare factors, emergency surgery, abdominal surgery, not shaving the operation site, operation duration 1 hour or greater and postoperative stay 7 days or more.

Recommendations:

The staff of Hoima Regional Referral Hospital, particularly in the surgical department should strengthen preoperative care given to patients before surgery especially those undergoing abdominal surgeries

Keywords: Surgical site infection, Surgeries, surgical ward, postoperative patients, Submitted: 2023-04-13 Accepted: 2023-07-27

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1. Background

Surgical site infections refer to infections occurring up to 30 days after surgery (or up to one year after surgery in patients receiving implants) and affecting either the incision or deep tissue at the incision site.

According to the new WHO recommendations on preoperative measures for surgical site infections, the incidence of surgical site infections (SSI) ranges from 1.2 to 23.6 per 100 surgical procedures. Worldwide, it has been reported that more than one-third of postoperative deaths are related to SSIs (Shiferaw, et al, 2020). The incidence of surgical site infections (SSIs) is higher in developing countries relative to developed nations and is reported as the 2nd most common cause of hospital-acquired infections in Europe and the USA. (Benedetta Allegranzi, et al., 2016)

All over the world, around 300 million surgeries are performed every year. This increasing number of surgeries leads to an increase in the incidence of postoperative wound infections on surgical sites (Mohammad Salahuddin, et al, 2022). A recent report published by the world health organization (WHO) showed that surgical site infection (SSI) is one of the most commonly occurring hospital-acquired infections (HAI) in low- and middle-income countries. This affects up to one-third of the patients who have undergone a surgical procedure. In the past, some authors have made attempts to find the different risk factors for postoperative infections and commonly reported factors are the long duration of surgery, improper pre-operative skin preparation, type of surgery, and associated comorbid conditions (Mohammad Salahuddin et al., 2022).

In addition, the most crucial issue in preventing surgical site infections is the entire and absolute compliance of health professionals with the recommendations in the guidelines (Mohsen et al., 2020). Nurses play a major comprehensive role and span of continuum care in preventing surgical site infections (dos Santos et al., 2023). Therefore, they can modify SSI risk factors in their daily practice such as improper hand hygiene and skin preparation to prevent SSI(Mohsen et al., 2020). However, adherence to recommended best practices remains low among nurses. Multiple studies have reported that proper practices for the prevention of infection among nurses have been affected by some barriers such as lack of knowledge, resources, and SSI preventive guidelines among others(Mohsen et al., 2020)

In Africa, surgical site infections were the leading infections in hospitals with a cumulative incidence of SSIs ranging from 2.5 to 30.9% (Ayamba.,2022). According to recent evidence, the risk factors for SSIs are multifactorial and complex, these include pre-existing illness, wound contamination, non-use of prophylactic antibiotics, longer duration of operation, alcohol use, and absence of wound care among others. (Wondimeneh Shibabaw Shiferaw, et al, 2020)

Unlike other health professionals, nurses spend the majority of their time with patients and cover most SSI prevention activities. This shows that nurses are the primary responsible bodies and can play a central role in preventing efforts by improving the quality of care they deliver. A study conducted in Ethiopia about the practice of and associated factors regarding the prevention of SSI among nurses working in surgical units of public hospitals revealed that more than half of the participants had a poor level of practice and this was partly attributed due to insufficient knowledge regarding prevention of SSI. (Ayelign Mengesha, et al, 2020)

Very little is known about the aspects of Surgical site infections in sub-Saharan Africa.

In Rwanda, the overall incidence of SSIs was 10.9%. the associated risk factors were found to be an increased age, wound classification, skills and experience of the surgeon, prolonged duration of surgery, blood transfusion, and emergency surgery. (Marie Josée Mukagendaneza, et al, 2019)

In Uganda, data about SSI is still scarce and the true incidence and cost per patient are unknown. A study conducted in Mbarara regional referral hospital showed an incidence of surgical site infec-

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tion of 16.4% with wound class and the property of suture material being significantly associated with surgical site infection. At bivariate logistic regression, the use of drain, dirty wounds, using chlorohexidine as skin shrub, using absorbable sutures, and ASA score was associated with surgical site infection (Lubega Abubaker, 2017). This study was conducted to assess the prevalence of surgical site infection among postoperative patients in the surgical ward at Hoima Regional Referral Hospital.

2. METHODOLOGY.

2.1. Study design.

The study used was a descriptive cross-sectional study that involved both qualitative and quantitative study designs for data analysis. A cross-sectional study design was used because it is cheap and less time-consuming as it is a one-time activity. The qualitative study design was used because it is suitable for collecting data from a small population while the quantitative study design is best for data collection from a large number of respondents.

2.2. Study area

The study was carried out from 5th January 2023 to 2nd February 2023. at Hoima Regional Referral Hospital, a government hospital located in the city of Hoima. It serves people from various districts such as Bulisa, Kagadi, Kakumiro, Kikuube, Hoima, Kibaale, Kiryandongo, and Masindi.

2.3. Study population

The study population encompassed postoperative patients admitted to the surgical ward including both the young and the adults as well as male and female patients. Most of the participants were Banyoro, Baganda, and Bakiga by tribe. In addition, it also included health workers of different cadres such as medical officers, clinical officers, and nurses allocated to the surgical ward and theatre at Hoima Regional Referral Hospital.

2.4. Sample size determination

The sample size will be determined using the Kish Leslie formula.

N=

For postoperative patients,

Where;

Is the desired sample size

Is the standard normal deviation (1 96 corresponding to a 95% confidence level

P is the proportion in the population estimated to have particular characteristics, which is the prevalence of surgical site infection, 16.4% (Lubega Abubaker 2017).

Q = 1 – P Is the degree of accuracy desired (0 1

Therefore; n =52.66

n=53respondents

Due to financial constraints and time limitations for the researcher, the study involved 50 respondents.

For Nurses,

Being specific to the surgical ward and theater, the study involved 20 respondents, being nurses. Henceforth the overall study involved 70 respondents with 50 being postoperative patients and 20 nurses.

2.5. Sampling technique.

A simple random probability sampling technique was used to select postoperative patients to participate in the study. This gave all the postoperative patients allocated to the surgical ward equal chances of being selected to participate in the study.

Convenient sampling was employed to select nurses to participate in the study, as this enabled the researcher to obtain adequate information depending on the degree of interaction with the health workers.

2.6. Sampling procedure.

Using the lottery method of simple random sampling, the researcher obtained a register having in-patient numbers of the patients admitted to the surgical ward during the study period. He then wrote down the in-patient numbers on small pieces of paper which were folded and placed in

a box. The researcher, while blindfolded, chose random papers and patients who corresponded to those numbers and those who consented to participate in the study. For those patients who did not consent or had their numbers selected again in the next session of data selection, the researcher selected at random another piece of paper to replace one of the previously selected participants. This was carried out three times a week for one month until the required sample size was obtained.

Health workers allocated at the surgical ward and theatre were conveniently recruited, depending on how accessible and cooperative they were with the researcher and their willingness to participate in the study.

2.7. Data collection method.

Data was collected from the respondents using the questionnaire. Here the sample of postoperative patients and health workers were given questionnaires which they were required to answer and the questionnaires were collected back from them for those who were unable to read or write, the researcher helped them to translate and write down the answers respondents

This method is simple and cheap as many questionnaires were administered to many respondents simultaneously. Also, record-keeping and retrieval were made easy.

2.8. Data collection tool.

The tool used was a questionnaire: with the section on Individual related healthcare-related factors being answered by the postoperative patients and knowledge of nurses on the prevention of surgical site infection exclusive for nurses only. It also included questions about the demographic data of the respondents. Questions were simplified to the easiest language so that caretakers could easily understand and interpret the questions very well.

2.9. Data collection procedure.

Qualitative data was collected from a sample of postoperative patients in the surgical ward at Hoima Regional Referral Hospital, Hoima district. The participants were explained to and their consent was sought using both informed and oral consent after which they were allowed to fill out the questionnaires and for the respondents who were unable to read or write, they were helped by the research assistant and/or the researcher to understand better the questions and write down their answers.

Some relevant information about the respondents' operation history such as duration of surgery, was obtained from the participants' admission and post-operative notes/files.

Data were collected three times a week until the required population was met.

2.10. Piloting the study.

A pilot study was carried out a week before the start of actual data collection at the surgical ward of Hoima regional referral hospital

2.11. Quality control.

Questionnaires were pre-tested at Masindi General Hospital and revised by the researcher. The researcher also trained research assistants who helped him during data collection. Research questions were checked for errors and omissions to ensure consistency, completeness, and accuracy in the filling. The participants were explained in their local language where needed to make sure they understood the questions to give correct answers. The collected data was later analyzed and interpreted by the researcher.

2.12. Inclusion criteria.

All postoperative patients admitted to the surgical ward at Hoima Regional Referral Hospital and consent were eligible for the study.

Nurses who were allocated to the surgical ward and the theater were eligible for the study.

2.13. Exclusion criteria.

Postoperative patients not admitted to the surgical ward were not eligible for the study.

Postoperative patients that did not consent did not participate in the study.

Nurses who were not allocated to the surgical ward or theater were not eligible for the study.

2.14. Data analysis and presentation.

Hand sorting and tallying according to the themes developed from the objectives and literature review were used to analyze the information in the questionnaires. Charts and/or graphs were used to present the analyzed results and this was done by the researcher.

2.15. Study variables.

These included independent and dependent variables.

2.15.1. Independent variables.

The independent variables of this study included Factors associated with surgical site infections among postoperative patients in particular, Individual related factors, Health-related factors, and the level of knowledge of nurses on the prevention of surgical site infection.

2.15.2. Dependent variables.

The dependent variable of this study was the Prevalence of surgical site infection among postoperative patients.

2.16. Ethical Consideration.

An introductory letter allowing the researcher to collect data from the respondents was issued to the researcher from Medicare Health Professionals College which was to be approved by the school, then presented to the Director of Hoima Regional Referral Hospital and/or the In charge of the health facility where the research was conducted.

Participants were given details about the ongoing program to help them easily analyze and know what they are answering. Consent forms were used to attain respondent's consent and only the respondents who consented are the only ones who participated in the study. This helped to prevent bias in the responses given.

Ethical issues like confidentiality, clients' and caretakers' privacy, autonomy, and not harm were followed during the research by not sharing their information, names, and other things with other people without their permission, seeking both oral and informed consent from the respondents, and using screens or private rooms to talk to the respondents and explain to them the aims of the study so that they are aware that it will cause no harm to them.

3. RESULTS.

3.1. Demographic information of postoperative patients.

In table 1, 5(10%) of the participants were aged less than 20 years. Similarly, 5(10%) belonged to the 20-29 years' age group, 7(14%) were aged 30-39 years and 15(30%) aged 40-49 years. Majority of the postoperative patients, 18(36%) were 50 years and greater.

The male gender, 32(64%) were more the females,18(36%).

Most of the respondents belonged to the Christian dominion,42(84%) with only 8(16%) being Muslim. 34(68%) of the respondents came from rural areas with 16(32%) living in urban centers.

20(40%) of the respondents were single, 28(56%) were married and only 2(4%) were separated.

Majority of the respondents were 36(72%) were employed, 9(18%) were unemployed with 5(10%) being students.

Lastly, 8(16%) had no formal education, majority 29(58%) had at most reached primary, 10(20%) reached secondary and only 3(6%) made it to tertiary level.

3.2. Demographic information of nurses. (n=20)

In table 2, 13(65%) of the respondents were aged between 20-29 years, 5(25%) between the age of 30-39 years, 2 (10%) between 40-49 years while none of the participants belonged to the 50 or greater years' age group.

5(25%) were male while 15(75%) were females.

17(85%) belonged to the Christian domination while 3(15%) were Muslim.

10(50%) had attained a certificate in nursing, 6(30%) had were at Diploma level while 4(20%) had a bachelor's degree in nursing.

Table 1: Showing the Demographic information of postoperative patients(n=50)

		Frequency(f)	Percentage (%)
Age	less than 20	05	10
	20-29	05	10
	30-39	07	14
	40-49	15	30
	50 or greater than	18	36
Sex	Male	32	64
	Female	18	36
Religion	Christian	42	84
	Muslim	08	16
	Others	00	0
Resi-dence	Rural	34	68
	Urban	16	32
Marital status	Single	20	40
	Married	28	56
	Separated	02	4
Job status	Employed	36	72
	Unemployed	09	18
	Student	05	10
Level of educa-tion	No formal education	08	16
	Primary	29	58
	Secondary	10	20
	Tertiary	03	6
TOTAL		50	100

Table 2: Showing the demographic information of Nurses (n=20)

		Frequency(f)	Percentage (%)
Age	20-29	13	65%
	30-39	05	25%
	40-49	02	10%
	Greater than or =50	0	0
Sex	Male	05	25%
	Female	15	75%
Religion	Christian	17	85%
	Muslim	03	15%
Educa-tion level	Certificate	10	50%
	Diploma	06	30%
	Bachelors	04	20%
TOTAL		20	100%

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Table 3: Showing distribution of respondents regarding history of chronic illness (n=50)

		Frequency(f)	Percentage (%)
Yes	Diabetes	05	62.5
	HIV	03	37.5
	Others	00	0
	Subtotal	08	16
No		42	84
Total		50	100

3.3. *Individual-related factors associated with prevalence of SSI.*

In table 3, 8(16%) of the postoperative patients suffered from chronic illness while 42(84%) did not have history of any chronic disease. 5(62.5%) patients suffered from diabetes mellitus and 3(37.5%) from HIV.

In figure 1, Patients who could carry out personal activities with minimal assistance were 6(12%), those who required moderate assistance were 34(68%) and those requiring significant assistance were 10(20%).

In figure 2, 3(6%) of the participants had history of smoking while 47(94%) did not smoke.

3.4. *Healthcare-related factors associated with SSIs.*

In table 4, 32(64%) of the participants had emergency surgery while 18(36%) had elective surgery.

34(68%) of the participants had undergone abdominal surgeries, 4(8%) had orthopedic while 12(24%) had other types of surgeries such as excision of tumors.

28(56%) of the respondents had the operation site shaved while 22(44%) did not.

2(4%) of the participants had an operation duration of 1 hour, 26(52%) had a duration of 1-3 hours while 22(44%) had duration of greater than 3 hours

In figure 3, 28(56%) of the respondents had had a postoperative stay of less than 7 days, 16(32%) had had a postoperative stay between 7-14 days while only 6(12%) had had a postoperative stay greater than 14 days.

3.5. *Knowledge of nurses regarding prevention of SSIs.*

In table 5, 5(25%) of the participants defined SSI as infection of any part of the body following surgery, 11(55%) defined SSI as infection of the surgical site while 4(20%) defined it as a systemic infection after surgery.

Regarding classification of SSI, 9(45%) classified SSI as deep and superficial infections, 7(35%) classified it skin and tissue infection while 4(20%) classified it as abdominal or orthopedic.

In figure 4, 15(75%) mentioned chlorohexidine as the best agent for preoperative skin preparation while 5(25%) mentioned iodine.

In table 6, 20(100%) of the participants agreed to the importance of preoperative counselling as a preventive measure of SSI.

In figure 5, 6(30%) of the participants identified a high fruit and vegetable diet as the recommended diet of a postoperative patient, 10(50%) mentioned a high protein diet while 4(20%) picked energy giving foods.

3.6. *Prevalence of surgical site infection.*

In figure 6, results revealed that out of 50 patients, 7 had developed SSI, accounting for a prevalence of 14%.

In table 7, Overall, results showed that of the 7 participants who had developed SSI, 1(14.3%) was aged less than 20 years, 2(28.9%) were in the 40-49 age group while 4(57.1%) were aged 50 years or greater. 3(42.9%) suffered from diabetes, 1(14.2%) required minimal assistance, 3(42.9%) required moderate while 3(42.9%) required significant assistance. All the patients with SSI 7(100%) did not smoke cigarette.

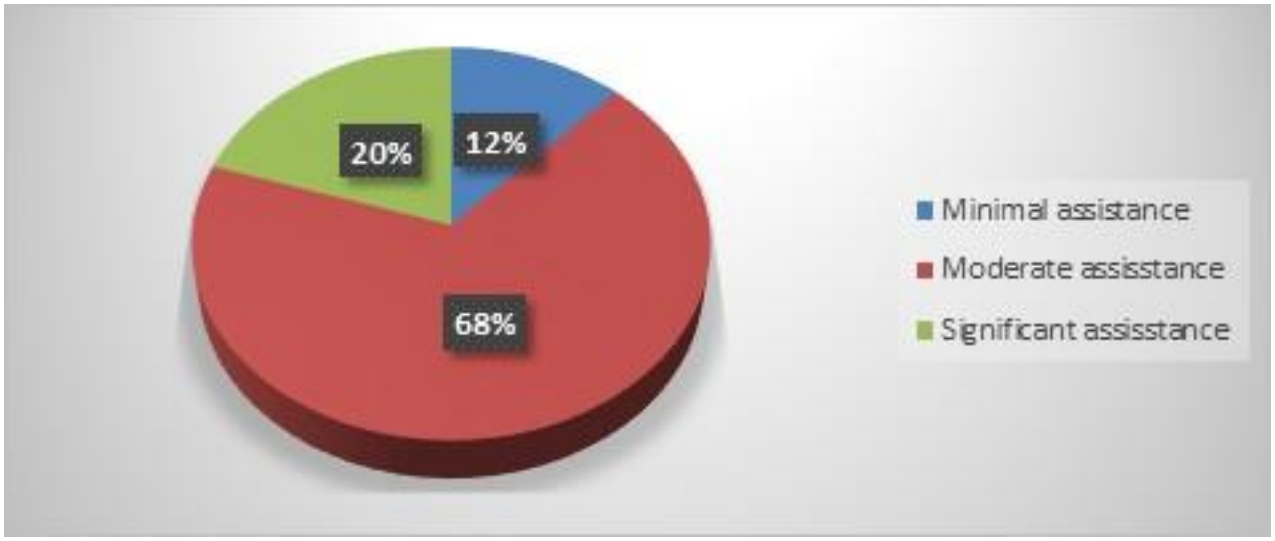

Figure 1: Showing distribution of respondents regarding Patient dependence (n=50)

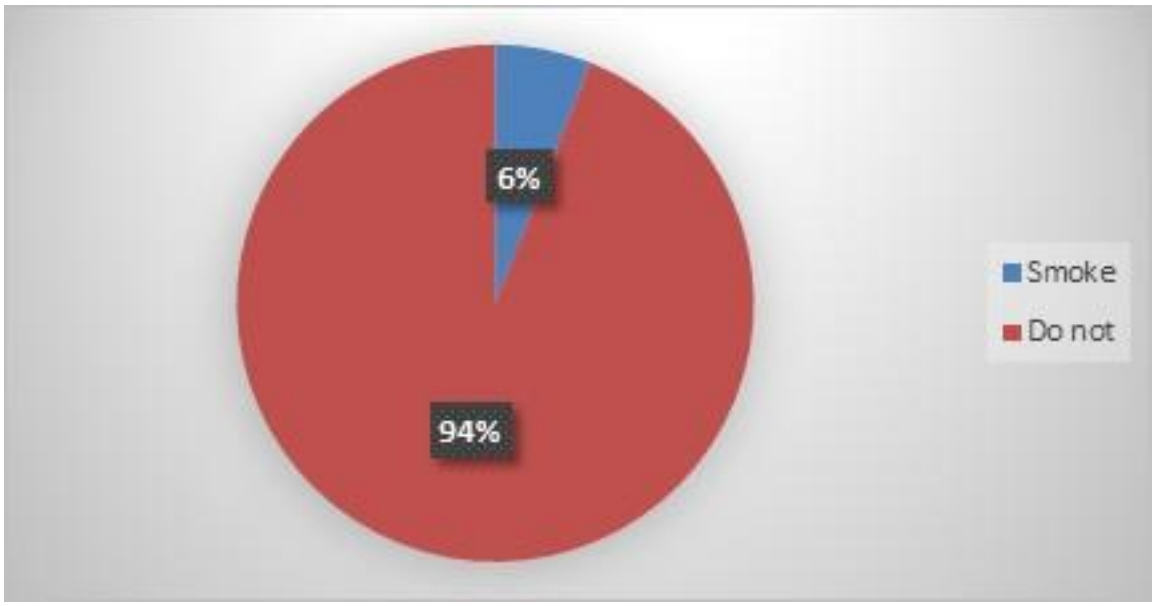

Figure 2: Showing Distribution of respondents regarding smoking (n=50)

In table 8, The prevalence of SSI was 14% with 7 out of 50 respondents developing SSIs.

5(71.4%) of the patients with SSI had emergency surgeries while 2(28.6%) had elective surgeries, 7(100%) had had abdominal surgeries.

5(71.4%) did not have their operation site shaved prior to surgery while 2(28.4%) had shaved. 3(42.9%) of 7 patients with SSI had an operation duration between 1-3hours while 4(51.9%) had a duration of greater than 3 hours while 3(42.9%) out of 7 of the patients SSI, had had a postoperative stay between 7-14 days while 4(57.1%) had had an operative stay greater than 14 days.

4. Discussion of results.

4.1. Individual-related factors associated with the prevalence of surgical site infection.

The objective of the study was to assess the individual-related factors associated with the prevalence of surgical site infection among post-operative patients in the surgical ward at HRRH.

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https://doi.org/10.51168/sjhrafrica.v4i9.374
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Table 4: Showing distribution regarding Type of surgery, Shaving prior to surgery and Duration of operation. (n=50)

	Variable	Frequency (f)	Percentage (%)
Type of surgery	Emergency surgery	32	64
	Elective surgery	18	36
	Abdominal surgery	34	168
	Orthopaedic surgery	4	8
	Others	12	24
Shaving	Yes	28	56
	No	22	44
Duration of operation	1 hour	2	4
	1-3 hours	26	52
	>3 hours	22	44
TOTAL		50	100%

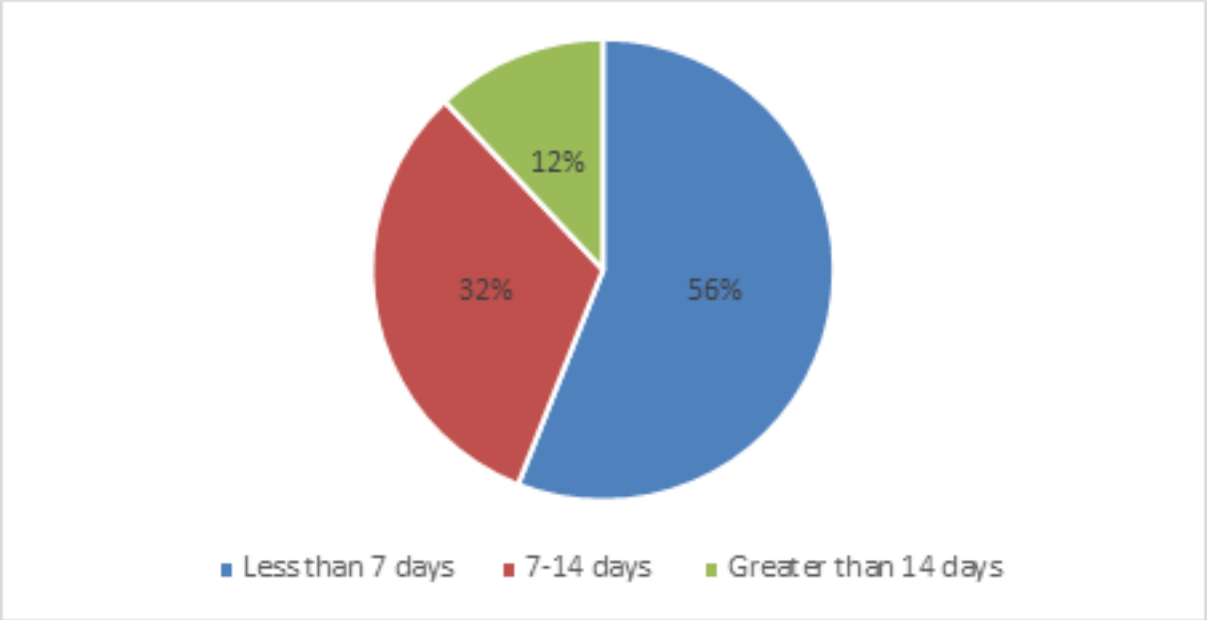

Figure 3: Showing distribution of respondents regarding postoperative stay (n=50)

Table 5: Showing distribution of respondents regarding definition and classification of SSI (n=20)

	Frequency(f)	Percentage (%)
Definition		
Infection of any part of the body following surgery	05	25
Infection of surgical site	11	55
Systemic infection after surgery	04	20
Total	20	100
Classification		
Deep and superficial	9	45
Skin and tissue	7	35
Abdominal, orthopedic	4	20
Total	20	100

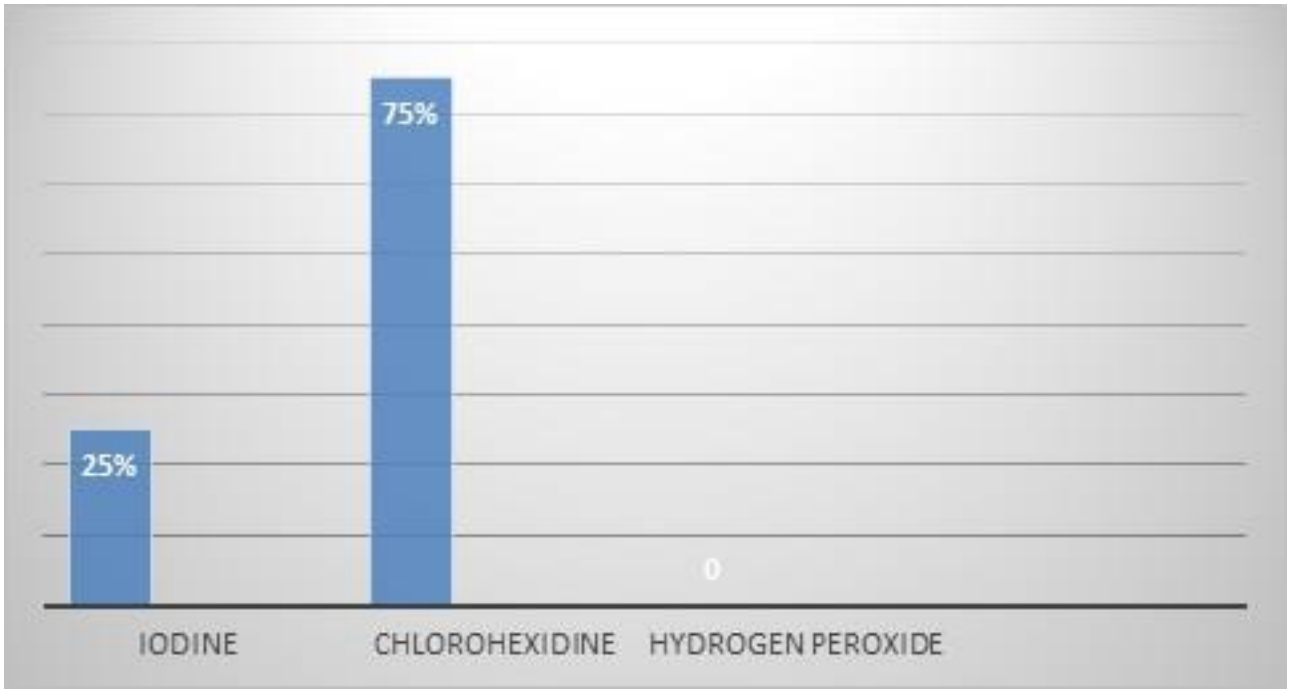

Figure 4: Showing distribution of respondents regarding the best agent for preoperative skin preparation (n=20)

Table 6: Showing distribution of respondents regarding importance of preoperative counselling towards prevention of SSI (n=20)

	Frequency(f)	Percentage (%)
Yes	20	100%
No	0	0
Total	20	100%

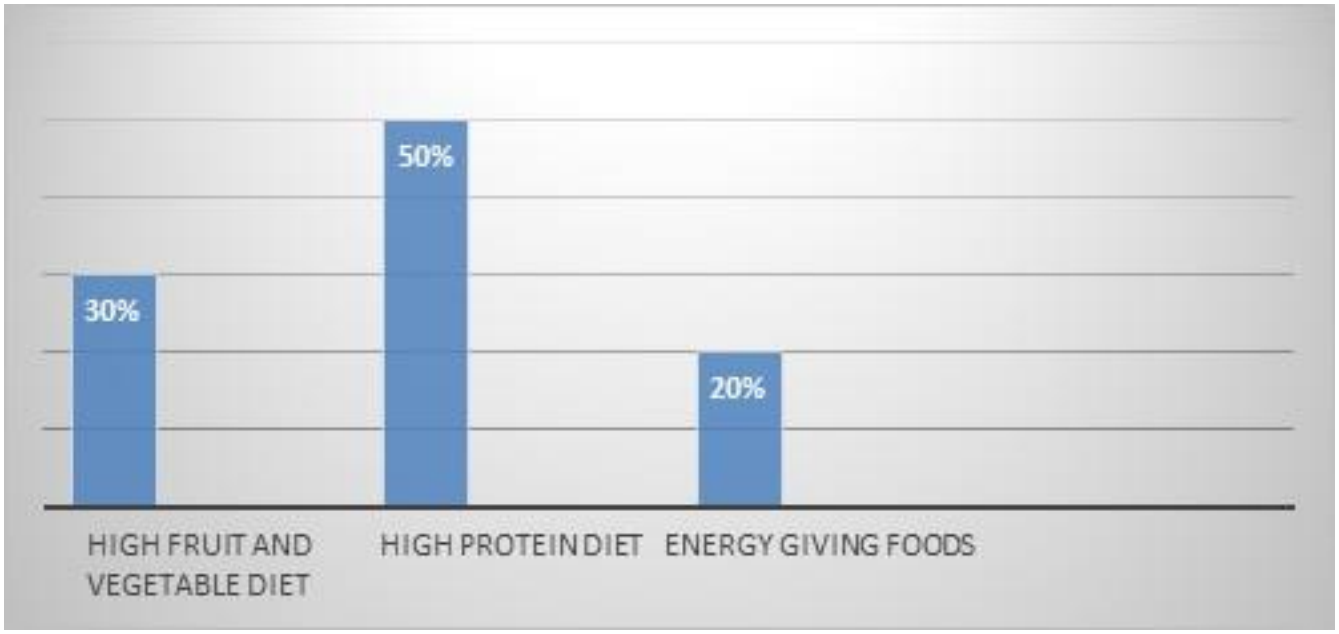

Figure 5: Showing distribution of respondents regarding recommended diet of postoperative patients (n=20)

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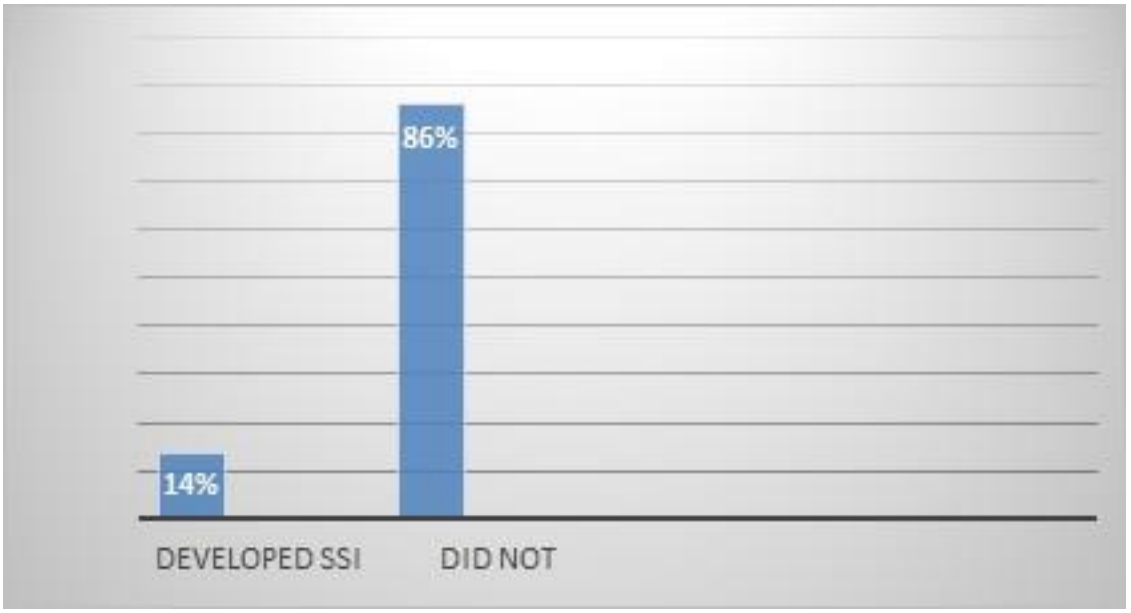

Figure 6: Figure 6:Showing the prevalence of Surgical site infection (n=50)

Table 7: Showing distribution of individual related factors associated with SSI in relation to prevalence of SSI (n=7)

		Developed SSI	Percentage (%)
Age	Less than 20	01	14.3
	20-29	00	0
	30-39	00	0
	40-49	02	28.6
	50 or greater	04	57.1
	Diabetes	03	42.9
Chronic illness	HIV	00	0
	No	04	57.1
	Minimal assistance	01	14.2
Patient dependence	Moderate assistance	03	42.9
	Significant assistance	03	42.9
Smoking	Yes	00	100
	No	07	100

Data analysis and interpretation revealed the following major findings under this objective:

The study revealed that 5(10%) of the participants were aged less than 20 years. Similarly, 5(10%) belonged to the 20-29 years age group, 7(14%) were aged 30-39 years, and 15(30%) were aged 40-49 years. The majority of the post-operative patients, 18(36%) were 50 years and greater. Furthermore, of the 7 participants who had developed SSI, 1(14.3%) was aged less than 20 years, 2(28.9%) were in the 40-49 age group and 4(57.1%) were aged 50 years or greater. These findings indicate that age 40 years or greater is associated with surgical site infection. This is probably because people at this age are more predisposed to surgical conditions such as hernias among others and this is further precipitated by the reduced body functions as compared to the younger age with stronger immunity. These findings agree with Tamrat Legesse Laloto, et al, 2017 where age above 40 years was an independent predictor of SSIs in the multivariate logistic regres-

Table 8: Showing distribution of healthcare factors associated with SSI in relation to prevalence of SSI (n=7)

	Variable	Developed SSI	Percentage (%)
Type of surgery	Emergency surgery	05	71.4
	Elective surgery	02	28.6
	Abdominal surgery	07	100
	Orthopaedic surgery	00	0
Shaving	Yes	02	28.6
	No	05	71.4
Duration of operation	1 hour	00	0
	1-3 hours	03	42.9
	>3 hours	04	57.1
Postoperative stay	< 7 days	00	0
	7-14days	03	42.9%
	>14 days	04	57.1%
Total		07	100%

sion analysis. Those aged greater than 40 years were 7.72 times more likely to develop SSIs compared with patients aged between 19 to 40.

It revealed that 8(16%) of the postoperative patients suffered from chronic illness while 42(84%) did not have a history of any chronic disease. 5(62.5%) patients suffered from diabetes mellitus and 3(37.5%) from HIV. Results further showed that out of 50 patients, 7 had developed SSI, accounting for a prevalence of 14%. 3(42.9%) of those with surgical site infection, suffered from diabetes. These findings indicate that a history of a chronic illness was associated with surgical site infection. This is probably because chronic illnesses such as diabetes interfere with the wound-healing process while HIV greatly affects the immune system hence reducing the body's resistance against infectious microorganisms. These findings agree with Farhan Sattar, et al, 2019, where the percentage of patients with associated morbidities who developed SSIs was 44.44%. In patients with diabetes 2 (66.66%) patients developed SSIs and in patients with other morbidities such as renal failure, hypertension, and hepatitis, 6 (50%) developed SSIs.

In this study, patients who could carry out personal activities with minimal assistance were 6(12%), those who required moderate assistance were 34(68%) and those requiring significant assistance were 10(20%). Out of the 7 patients with SSI, 1(14.2%) required minimal assistance, 3(42.9%) required moderate assistance while 3(42.9%) required significant assistance. These findings indicate that patient dependence was associated with SSI. This is probably because immobility is associated with significant assistance and results in reduced blood flow to the incision site hence predisposing it to infection that cannot be overcome by the immune system. These findings agree with Emil Aga, et al, 2015 where lower functional status was found to be significantly associated with surgical site infection.

The findings also showed that 3(6%) of the respondents had a history of smoking while 47(94%) did not smoke. Of the 7 patients who had developed surgical site infection, none of them had a history of smoking. These findings indicate that smoking was not significantly associated with surgical site infection. This is probably because the effects of smoking require long-term exposure before blood supply to a given area can be significantly impaired to interfere with wound healing. These findings disagree with Tamrat Legesse Laloto, et al, 2017 where patients who smoked cigarettes were 3.70 times more likely to develop SSIs compared to those who did not smoke.

4.2. *Healthcare-related factors associated with the prevalence of surgical site infection.*

The objective of the study was to assess the healthcare-related factors associated with the prevalence of surgical site infection among post-operative patients in the surgical ward at HRRH. Data analysis and interpretation revealed the following major findings under this objective:

It revealed that 38(76%) had emergency surgery while 12(34%) had elective surgery. The prevalence of SSI was 14% with 7 out of 50 respondents developing SSIs. 5(71.4%) of the patients with SSI had emergency surgeries while 2(28.6%) had elective surgeries. These findings indicate that the type of surgery organized for the patient is significantly associated with SSI. This is probably because not enough time is given to obtain a detailed clinical prognosis of the patient's condition hence some important information about the patient's health that could affect the outcome of the surgery may be missed out. These findings agree with Aroub Alkaaki, et al, 2019 where emergency surgery was a potentially modifiable independent risk factor for SSI.

In this study, 34(68%) had undergone abdominal surgeries, 4(8%) had orthopedic and 12(24%) had other types of surgeries such as excision of tumors. Of all of the patients,7(100%) with SSI had had abdominal surgeries. These findings indicated that type of the surgery in regards to the body part operated was significantly associated with SSIs. This is probably because abdominal surgeries are the commonest due to the different abdominal conditions patients present with such as intestinal obstruction, peritonitis, appendicitis, and hernias among others. These findings disagree with Rahel Mezemir, et al, 2020, where the prevalence of SSI was higher in orthopedics (54.3%) than abdominal surgery (30%).

The findings also revealed that 28(56%) of the respondents had the operation site shaved while 22(44%) did not. 5(71.4%) of the 7 patients with SSI did not have their operation site shaved before surgery while 2(28.4%) had shaved. These findings indicate that not shaving before surgery increases one's chances of developing SSI. This is probably because shaving reduces the chances of microorganisms, especially staphylococcus aureus from inhabiting the skin. These findings agree with Cyriaque Degbey, et al, 2021 where patients who did not shave the surgical site before surgery were 2.52 times more likely to have an SSI than those who had shaved.

Furthermore, the findings revealed that 2(4%) had an operation duration of 1 hour, 26(52%) had a duration of 1-3 hours and 22(44%) had a duration of greater than 3 hours. 3(42.9%) of 7 patients with SSI had an operation duration between 1-3hours while 4(51.9%) had a duration of greater than 3 hours. The findings indicate that duration of operation greater than 1 hour is associated with the development of SSI. This is probably because the internal tissues below the incision site are exposed to the external environment for a longer time hence increasing contact time with microorganisms such as S. aureus from the outside during surgery. These findings agree with Kidanie Fisha, et al, 2019, where surgical operations lasting above 1 hour were more likely to end in SSI compared to their counterparts.

Lastly, results also revealed that 28(56%) of the respondents had had a postoperative stay of fewer than 7 days, 16(32%) had had a postoperative stay between 7-14 days while only 6(12%) had had a postoperative stay greater than 14 days. 3(42.9%) out of 7 of the patients with SSI, had had a postoperative stay between 7-14 days while 4(57.1%) had had an operative stay greater than 14 days. These findings indicate that postoperative stay greater than 7 days is associated with SSI. This is probably because there are higher chances of contracting other infections from other patients while at the hospital. These findings agree with Rahel Mezemir, et al, 2020 where participants admitted for 7-14 days and > 14 days were 5 times more likely to acquire surgical site infection than those admitted < 7 days.

4.3. *Level of knowledge of nurses towards prevention of surgical site infection.*

The objective of the study was to assess the level of knowledge of nurses on the prevention

of surgical site infection at HRRH. Data analysis and interpretation revealed the following major findings under this objective:

The findings revealed that 5(25%) of the participants defined SSI as infection of any part of the body following surgery, 11(55%) defined SSI as infection of the surgical site within 30 days after surgery while 4(20%) defined it as a systemic infection after surgery. These findings indicate that the knowledge of nurses regarding the definition of SSI was average as 11(55%) were able to give the right definition. This is probably because most of them have come across various cases of SSI among postoperative patients in the surgical ward. These findings closely agree with Eta Vivian Enow Ayamba, et al, 2022, where 65% of the nurses knew what surgical site infection was.

In this study, 9(45%) classified SSI as deep and superficial infections, 7(35%) classified it as skin and tissue infection and 4(20%) classified it as abdominal or orthopedic. These findings indicate that the knowledge of nurses regarding the classification of SSI is low as only 45% were able to classify SSI correctly. This is probably because less information is availed to nurses regarding what SSI is besides its management. These findings agree with Mahmoud N Qasem, et al, 2017, where only 36% of the nurses knew the correct classification of SSI.

Results further revealed that 15(75%) mentioned chlorohexidine as the best agent for preoperative skin preparation while 5(15%) mentioned iodine. These findings indicate that the knowledge of nurses regarding the best agent for skin preparation is good. This is probably because most nurses are well-versed in nursing procedures such as wound dressing and are familiar with most antiseptic agents. These findings agree with Haleema Sadia, et al, 2017 where better knowledge was observed about the best agent for preoperative skin preparation and the purpose of preoperative skin preparation.

In this same study, 20(100%) of the participants agreed with the importance of preoperative counseling as a preventive measure for SSI. These findings indicate that the knowledge of respondents regarding preoperative counseling as a preventive measure is good. This is probably because most of the nurses are familiar with the preoperative care of any patient together with its benefits and risks that can happen if one doesn't receive it. These findings agree with Eta Vivian Enow Ayamba, et al, 2022, where 100% of the nurses approved the importance of preoperative counseling in the prevention of surgical site infection.

Lastly, 6(30%) of the participants identified a high fruit and vegetable diet as the recommended diet of a postoperative patient, 10(50%) mentioned a high protein diet while 4(20%) picked energy-giving foods. These findings indicate that knowledge regarding the diet of a postoperative patient is average. This is probably because most nurses focus more on pharmacological therapy and neglect the conservative therapy that constitutes nutrition during the management of patients. These findings are in line with Haleema Sadia, et al, 2017, where about half of the participants gave a correct answer to the kind of diet that should be provided for post-operative patients.

5. Conclusions.

This study specifically sought to access the individual-related factors associated with the prevalence of surgical site infection. This study established that participants who were aged 40 years or more, had a history of a chronic illness diabetes mellitus in particular, required moderate to severe assistance, and were more likely to develop surgical site infection. However, none of the participants with surgical site infections smoked cigarettes or had a history of smoking. Given these findings, a history of a chronic illness such as diabetes, or patient dependence was significantly associated with surgical site infection while smoking or a history of smoking was not associated with SSI.

This study also specifically sought to access the healthcare-related factors associated with the prevalence of SSI. This study established that participants who had emergency surgeries, and abdominal surgeries, did not have their operation site shaved before surgery, had an operation dura-

tion of 1 hour or greater, and had a postoperative stay of 7 or more days were more likely to develop surgical site infection. Given these findings, emergency surgery, abdominal surgery, not shaving the operation site, operation duration greater than 1 hour and postoperative stay greater than 7 days were significantly associated with SSI.

In addition, the study sought to access the level of knowledge of nurses regarding the prevention of surgical site infection. This study established that more than half of the participants gave the correct definition of surgical site infection, and less than half were able to classify SSI correctly as deep or superficial infection. The majority mentioned the correct option for the best agent for skin preparation. All of the participants agreed to the importance of preoperative counseling as a preventive measure of SSI. while half of the participants identified the recommended diet of a postoperative patient. Because of these findings, the overall level of knowledge of nurses regarding the prevention of SSI was good.

6. Study limitations

Wrong information from uncooperative respondents was a challenge but this was overcome by a thorough explanation of the purpose of the study, confidentiality of their information, and privacy.

The researcher lacked adequate funds for the study but this was solved by the provision of funds from parents, relatives, and some funds from my sponsor and using the money appropriately as per the budget to avoid wastage.

7. Recommendations.

From the results obtained from the study, the researcher, therefore, recommends that:

The government through the Ministry of Health should prioritize the management of Diabetes mellitus by carrying out public awareness campaigns and availing of medicines for treating diabetes. This is because diabetes mellitus is a chronic disease that can affect the outcome of management of other comorbidities of patients as well as medical interventions at large.

The staff of Hoima Regional Referral Hospital, particularly the surgical department should strengthen preoperative care given to patients before surgery especially those undergoing abdominal surgeries, through the provision of appropriate preoperative counseling such as diet, shaving before surgery, monitoring of vitals as well as identification of other patient's problems /comorbidities.

The administration, of Hoima Regional Referral Hospital, together with the government should uplift and expand the theatre and surgery department of the hospital along with maintenance of strict sterility and infection control protocols.

The administration of Hoima Regional Referral Hospital should organize regular continuous medical education, CMEs regarding surgical site infection with a full exploration of the predisposing factors, multi-disciplinary management, treatment, and prevention.

8. Acknowledgement.

I would like to extend my deepest gratitude to the Almighty God for granting me the gift of life, wisdom, and knowledge to enable me to accomplish this project.

Along the same line, I'm grateful to my supervisor, Miss Namutebi Florence, for her indebted support, encouragement, and guidance throughout writing this research report. Her role has been a major building block to the accomplishment of this work.

My heartfelt thanks also go to all the participants attending Hoima Regional Referral Hospital that spared their precious time and agreed to participate in the study. May the almighty God reward all your efforts.

9. Abbreviations.

ASA: American Society
CDC: Centre for disease control
HAIs: Hospital Acquired Infections
LMICs: Low- and Middle-Income Countries
SSIs: Surgical site infections
WHO: World Health Organization

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11. Publisher details:

Publisher: Student's Journal of Health Research (SJHR)
(ISSN 2709-9997) Online
Category: Non-Governmental & Non-profit Organization
Email: studentsjournal2020@gmail.com
WhatsApp: +256775434261
Location: Wisdom Centre, P.O.BOX. 148, Uganda, East Africa.