

FACTORS INFLUENCING THE OCCURRENCE OF NOSOCOMIAL INFECTIONS AMONG PATIENTS IN THE SURGICAL WARD AT SOROTI REGIONAL REFERRAL HOSPITAL. A CROSS-SECTIONAL STUDY.

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Abstract

Background

Nosocomial infections are acquired by the patient within 48-72 hours or 3 days of admission in the hospital or medical care unit and they affect approximately 15% of all hospitalized patients. This can result in prolonged hospitalization of the patients; therefore, this study aimed to assess the factors influencing the occurrence of nosocomial infections among patients in the surgical ward at Soroti Regional Referral Hospital.

Methodology

A descriptive cross-sectional study design was used employing quantitative methods of data collection. A sample size of 30 was obtained using a simple random sampling method. Data was collected using a structured questionnaire for analysis by SPSS version 24 and then presented in frequency tables, bar graphs, and pie charts.

Results

30 respondents participated in this study and the majority of the respondents were aged 20-30 years while the minority were aged 41-50 years. 67% of respondents were females 33% were males, 73% of the respondents worked in male surgical wards whereas 27% worked in female surgical ward. 40% of the respondents washed hands after a procedure or body fluid exposure while 10% before a procedure, 63% of the respondents agreed that old people are most prone to nosocomial infections while 7% agreed that youth are most prone to nosocomial infections. Half of the respondents performed hand sanitizing while 10% performed routine hand washing.

Conclusion

urinary catheterization and inadequate hand washing were the leading causes of nosocomial infections in the elderly and patients nursed in the general ward.

Recommendation

Health workers should adhere to aseptic techniques when performing sterile procedures and observe the five moments of hand washing.

Keywords; Nosocomial Infections, Patients On A Surgical Ward, Soroti Regional Referral Hospital, Urinary Catheterization.

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Background of the study

Nosocomial infections are infections that patients contract during their stay in the hospital or shortly after discharge, originating from internal or external sources (Saba and Balwan 2023). These infections are acquired by the patient within 48-72 hours or 3 days of admission to the hospital or medical care unit (Joshi et al., 2019).

Nosocomial pathogens include bacteria, viruses, and fungal parasites. WHO estimates that approximately 15% of all hospitalized patients suffer from these infections. During hospitalization, a patient is exposed to pathogens through

different sources; environment, healthcare staff, and other infected patients. Transmission of these infections should be restricted for prevention (Khan et al., 2017).

Hospital-acquired infections (HAIs) include central line-associated bloodstream infections (CLABSI), catheter-associated urinary tract infections (CAUTI), surgical site infections (SSI), hospital-acquired Pneumonia (HAP), Ventilator-associated Pneumonia (VAP), and Clostridium difficile infections (CDI) (Monegro et al., 2017).

Globally, the prevalence rate of nosocomial infections is 0.14% with an annual increase of 0.06% (Raoofi et al., 2023).

The overall pooled prevalence of surgical site infection was found to be 2.5% with the greater prevalence being observed in the African region (Mengistu et al., 2023).

In Europe, it is estimated that over 2.6 million new cases of HAI occur annually. 501 DALYs per 100,000 general population being the burden of the six HAIs. Hospital-acquired pneumonia and hospital-acquired primary bloodstream infections had the biggest burden and represented more than 60% of the total burden, with 169 and 145 DALYs per 100,000 total population, respectively (Cassini et al., 2016).

In sub-Saharan Africa, the overall pooled prevalence of HAI between 2014 and 2023 was estimated at 12.9%. By subregions, the pooled current prevalence of HAI in West Africa, Southern Africa, East Africa, and Central Africa were estimated at 15.5%, 6.5%, 19.7%, and 10.3% of the patient populations respectively (Melariri et al, 2024).

In Tanzania, the prevalence of medically detected nosocomial infections was 8.6% of which 26.7% were confirmed by a positive culture in the laboratory. The prominent HAIs were Central-line-associated bloodstream infection at 43.3% and catheter-associated urinary tract infection at 36.7% (Kassam et al., 2023).

In Uganda, the prevalence of nosocomial infections is 28%. Among the hospital-acquired infections, surgical site infections predominated (41.6%), with bloodstream infections and respiratory tract infections/pneumonia ranking second and third, at 17.07% and 17.04% respectively (Abubakar et al., 2022). This study aimed to assess the factors influencing the occurrence of nosocomial infections among patients in the surgical ward at Soroti Regional Referral Hospital.

Methodology

Study design and rationale

The study adopted a descriptive cross-sectional study design and a quantitative method of data collection was used. It was a cross-sectional design because it involved the collection of data from a single point in time. The design was descriptive as it described the data without any changes.

Study setting and rationale

The study was conducted in the surgical ward at Soroti Regional Referral Hospital located in Soroti City. The hospital is located along the Lira-Mbale highway. Soroti City is found in Eastern Uganda in the Teso sub-region and it is approximately 324km by road from Kampala city. It offers various specialized health services and operates 24 hours from Monday to Sunday serving as the regional referral in the Teso sub-region. Data was collected from August to September 2024 from the participants.

Study population

The study included medical students, nurses, and doctors working on surgical wards at Soroti Regional Referral Hospital.

Sample size determination

According to Kish 1965, the sample of 30 to 200 respondents sufficed if 20% to 80% of the attributes were present. Based on the statement, the sample of 30 respondents was used because it was within the ranges. The sample size was adequate to generate the data needed for the study and was relatively cheaper for the researcher.

Sampling procedure

A simple random sampling method was used to select participants in the study. In this case, the researcher wrote numbers 'A' and 'B' on paper that were folded and put in a box, and each respondent was allowed to choose. The respondents who chose 'B' fell in the study population and those who chose 'A' were eliminated from the study. Sampling was done for 5 days and 6 respondents were selected a day to get the required number of 30 respondents.

Inclusion criteria

The study included only health workers in the surgical ward at Soroti Regional Referral Hospital who were present during the time of data collection and willingly consented to participate in the study.

Exclusion criteria

The study excluded those who had busy schedules but had consented and those who were not present in the surgical ward at the time of data collection.

Independent variable

These easily manipulate or change and are assumed to directly affect the dependent variables. They are the factors influencing the occurrence of nosocomial infections.

Dependent variable

Occurrence of nosocomial infections among patients

Research instruments

A structured questionnaire was used for data collection. It contained close-ended questions. It was pretested on respondents with similar characteristics at Princess Diana Health Centre IV before the actual data collection process. This was done to eliminate vague, ambiguous questions and to check for the validity and reliability of the tool. **Data collection procedure**

The researcher submitted the research proposal to the Research Committee of Soroti School of Registered Comprehensive Nursing for approval and received an

introductory letter that was presented to the hospital director of SRRH seeking permission to carry out the study in the hospital.

The researcher introduced themselves and explained the purpose of the study to the respondents to obtain consent. Then semi-structured questionnaires to the respondents.

Data management

After data collection, questionnaires were checked for completeness, accuracy, and logical flow of responses. The filled questionnaires were kept in opaque envelopes under strict supervision until all respondents were done and then kept in double double-locked cupboard. The data collected was then categorized into different groups, tallied into frequencies, and then converted into percentages which were presented in tables, pie-charts, bar graphs, and narratives.

Data analysis

The collected data was edited, coded, and entered into the computer for data analysis. Microsoft Excel and Statistical Package for Social Science (SPSS) version 24 were used to

analyze data that was then presented in frequency tables, bar graphs, and pie charts.

Ethical considerations

The research committee of Soroti School of Comprehensive Nursing approved the research topic and proposal then the researcher obtained an introductory letter that was presented to the hospital director of SRRH seeking permission to conduct the study in the facility. The researcher obtained informed written consent from all participants by first explaining the objectives, significance, benefits, and risks of the study.

Confidentiality and privacy were ensured by safely keeping the data from the respondents. The proper explanation was given to respondents that there were no incentives given to them by the researcher after participating in the study neither were there any legal implications and prosecution in participating in the study.

Anonymity was observed throughout by allowing participants to withhold their names.

Results

Socio-demographic data of respondents

Table 1: Socio-demographic characteristics of respondents (n=30)

Variable	Category	Frequency(f)	Percentage (%)
Age	20-30 years	16	53
	31-40 years	9	30
	41-50 years	5	17
	Total	30	100
Sex	Female	20	67
	Male	10	33
	Total	30	100
Designation	Nurse	12	40
	Doctor	5	17
	Intern nurse	4	13
	Intern doctor	2	7
	Medical student	7	23
	Total	30	100
Type of Ward	Male surgical	22	73
	Female surgical	8	27
	Total	30	100

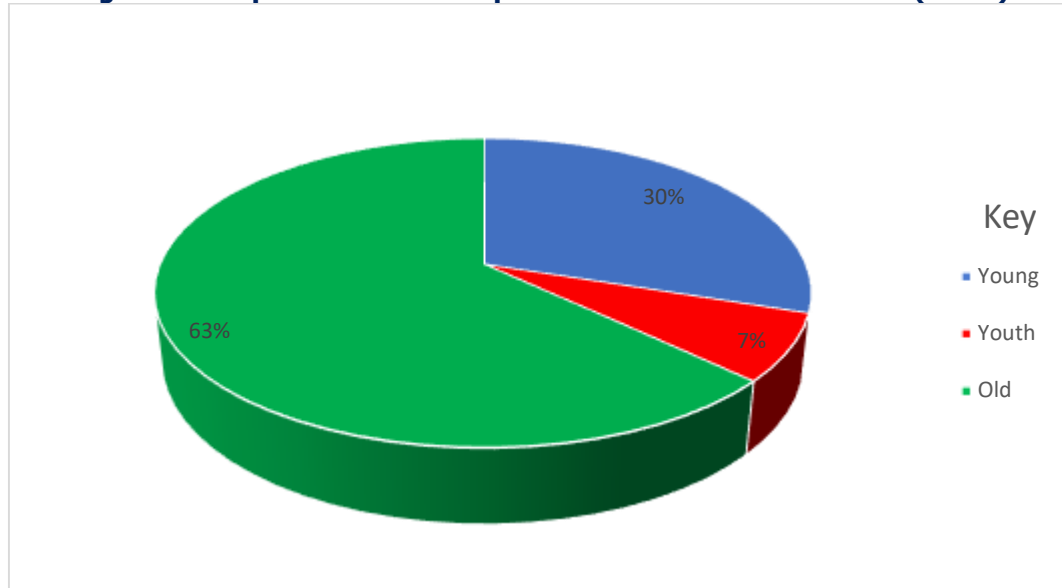
Table 1: Shows, the majority of the respondents were aged 20-30 years while the minority were aged 41-50 years. 67% of respondents were females while 33% were males.

The majority were nurses whereas the minority were intern doctors.

73% of the respondents worked in the male surgical ward whereas 27% worked in the female surgical ward.

Individual factors influencing the occurrence of nosocomial infections

Figure 1: People who are more prone to nosocomial infections (n=30)



63% of the respondents agreed that old people are most prone to nosocomial infections while 7% agreed that youth are most prone to nosocomial infections.

Table 1: Procedures most commonly performed onward (n=30)

Response	Frequency(f)	Percentage (%)
Urinary catheterization	17	57
Central venous catheterization	4	13
Mechanical ventilation	6	20
Others (wound dressing)	3	10
Total	30	100

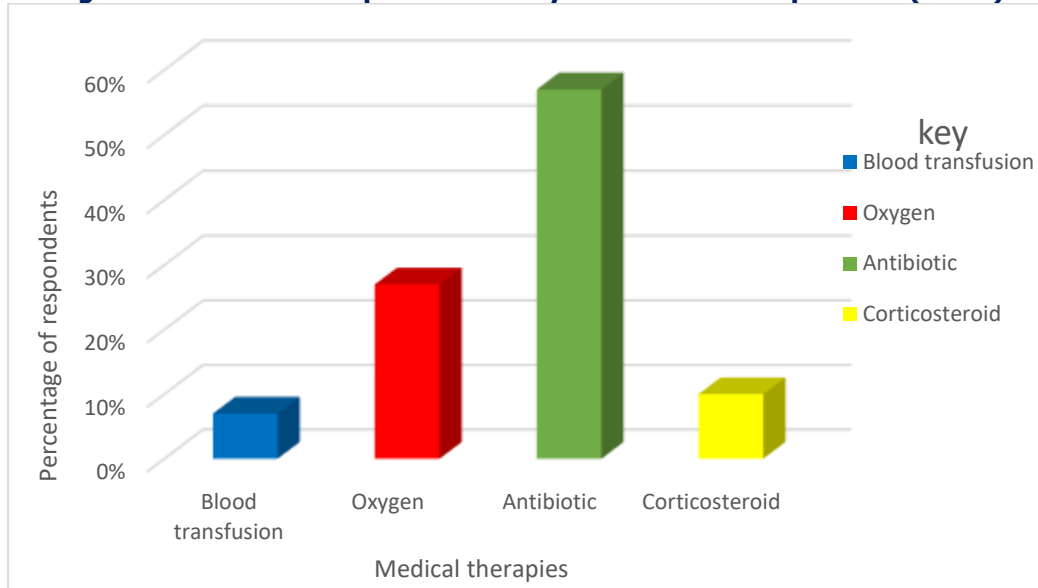
Urinary catheterization is the most commonly performed procedure in the surgical ward whereas wound dressing is the least performed.

Table 2: Common diseases on the wards (n=30)

Response	Frequency(f)	Percentage (%)
Gangrene	1	3
Diabetes mellitus	16	53
Appendicitis	3	10
Prostate enlargement	6	20
Hernia	4	13
Total	30	100

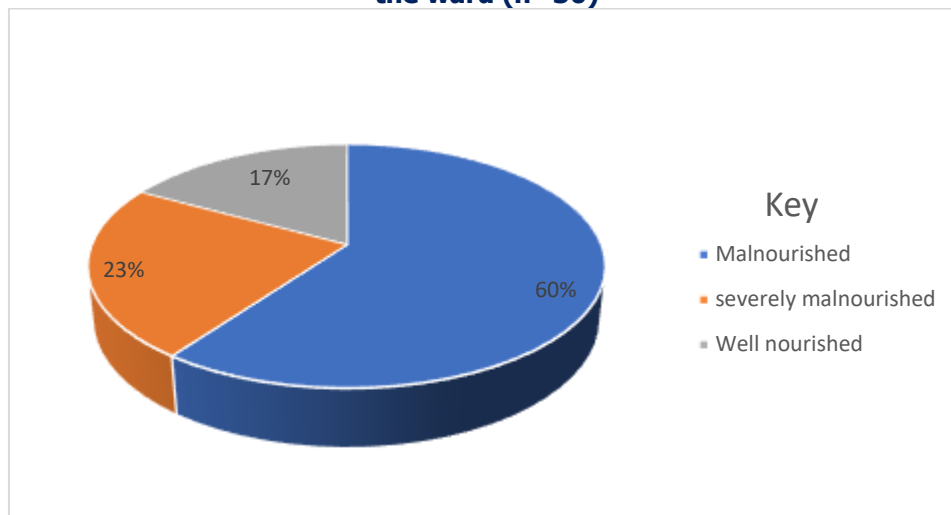
Most patients on the ward had diabetes mellitus while the least had gangrene.

Figure 2: Medical therapies commonly administered to patients (n=30)



Most respondents administered antibiotic therapy to patients while a few administered blood transfusion.

Figure 3: Distribution of respondents according to the nutritional status of the patients on the ward (n=30)

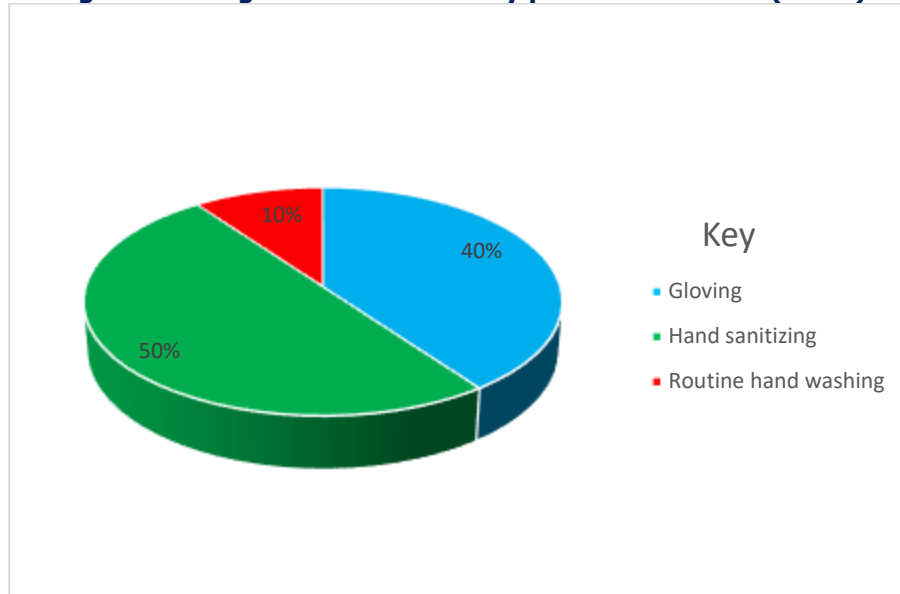


Regarding the nutritional status of patients on the ward, 60% were malnourished whereas 17% were well nourished.

Health facility-related factors influencing the occurrence of nosocomial infections

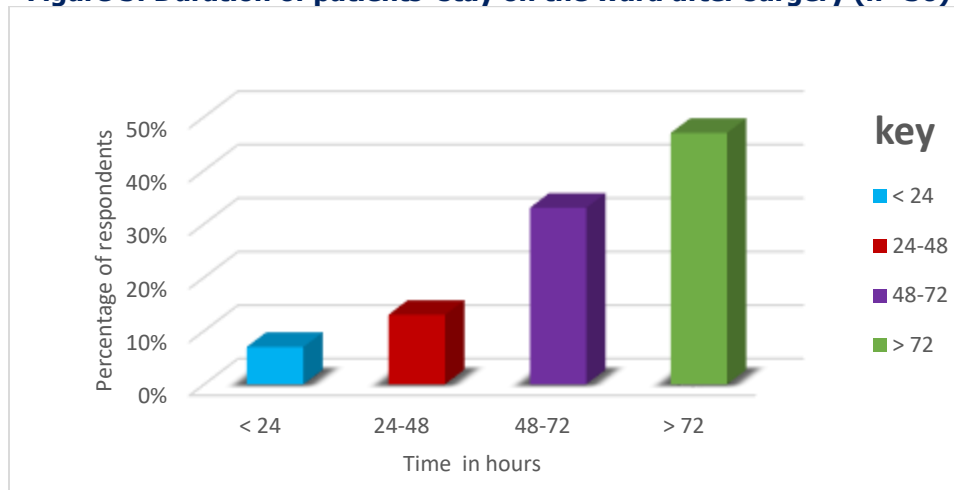
All the respondents have IPC guidelines.

Figure 4: IPC guidelines commonly practiced onward (n=30)



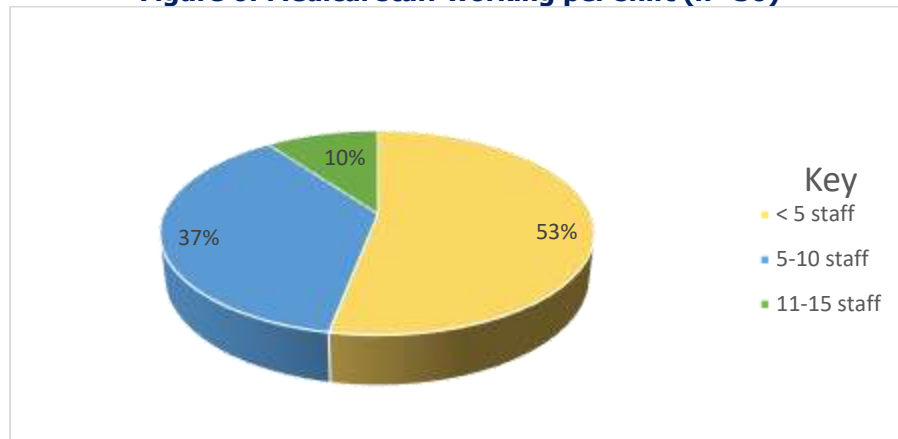
Half of the respondents performed hand sanitizing while 10% performed routine hand washing.

Figure 5: Duration of patients' stay on the ward after surgery (n=30)



The highest number of patients spent more than 72 hours in the hospital while the lowest spent less than 24 hours.

Figure 6: Medical staff working per shift (n=30)



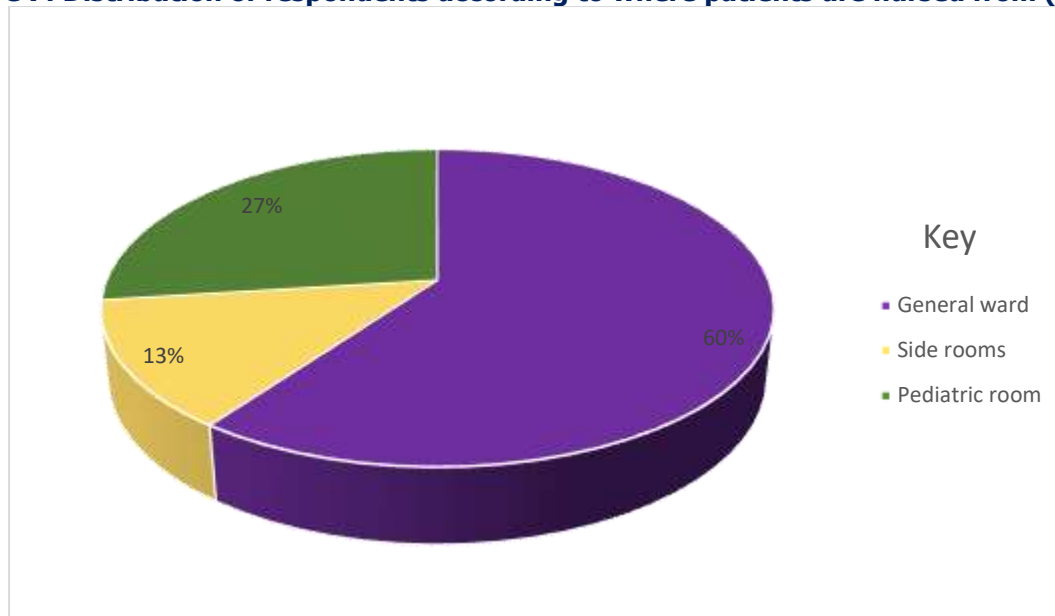
53% of respondents reported working 5 staff per shift whereas only 10% had 11-15 staff working per shift.

Table 3: Frequency of hand washing (n=30)

Response	Frequency(f)	Percentage (%)
Before touching a patient	5	17
Before a procedure	3	10
After a procedure or body fluid exposure	12	40
After touching a patient	6	20
After touching the surroundings of a patient	4	13
Total	30	100

40% of the respondents washed their hands after a procedure or body fluid exposure while 10% before a procedure.

Figure 7: Distribution of respondents according to where patients are nursed from (n=30)



60% of the respondents nursed most patients in the general ward whereas 13% of the respondents nursed their patients in side rooms.

Discussion

The study found that 63% of patients who are prone to HAIs are mainly old people. Older adults and patients with chronic illnesses or medications prolong the healing process and predispose patients to infections. Zhao et al., (2020) argued that the prevalence of nosocomial infections among the elderly is 2.6% compared to non-elderly which is at 1.5%. The study found out that, the most common procedure performed on the patients before surgery is urinary catheterization. The use of catheters, ventilators, and other invasive devices is associated with an increased risk of infections such as catheter-associated urinary tract infections and ventilator-associated pneumonia. The finding is consistent with Ozdermir and Dizbay (2015) who revealed that invasive procedures such as mechanical ventilation, and urinary and central venous catheterizations lead to a greater occurrence rate of HAIs.

Diabetes mellitus is associated with impaired wound healing as a result of poor glucose control which increases the risk of surgical site infections. The study found that most patients on the ward had diabetes mellitus. The finding is consistent with the study done in Ethiopia which showed that diabetes mellitus is one of the chronic diseases associated with nosocomial infections (Taye et al., 2023).

The rise of antibiotic-resistant organisms complicates the treatment of HAIs and contributes to higher morbidity and mortality rates. The overuse and misuse of antibiotics pre- or post-operatively in hospitals are critical factors for the occurrence of HAIs. The study found that the majority of the respondents administered antibiotics to patients either pre- or post-operatively. The finding concurred with a study by Furkranz and Walochnik (2021) which showed that HAIs significantly impact immunocompromised patients depending on both pre- and post-surgical conditions.

The study found that 60% of respondents nursed malnourished patients. Malnutrition is associated with delayed wound closure which increases the risk of wound infections in patients. The finding is consistent with the study conducted in Spain which revealed that the prevalence of nosocomial infections among malnourished patients is 52.1% compared to well-nourished patients which is at 25% (Muresan et al., 2022).

The ineffectiveness of health workers in practicing the proper IPC guidelines is a factor leading to the occurrence of nosocomial infections. Use of hand sanitizer alone without routine hand washing is not effective enough against certain organisms such as *Clostridioides difficile* hence predisposing patients to HAIs. The study found that the majority of the respondents practiced hand sanitizing. Abalkhail and Alslamah (2022) argued that non-compliance

to infection control procedures has been associated with uncertainty among health workers about infection prevention-related issues.

The study found that the highest number of patients spent more than 72 hours in the hospital. Longer hospital stays increase the risk of exposure to multidrug-resistant organisms which predispose patients to hospital-acquired infections. The study finding concurred with a study conducted in the United Kingdom which revealed that hospitalized patients tested positive for nosocomial infections while in the hospital (Mo et al., 2021).

Understaffing leads to staff burnout hence causing gaps in the implementation of IPC guidelines which put patients at a high risk of acquiring nosocomial infections. 53% of respondents reported working 5 staff per shift. Shang et al (2019) argued that understaffed units significantly had patients develop hospital-acquired infections within 48 hours.

Failure to wash hands before a clean or aseptic procedure predisposes patients to acquiring nosocomial infections via the health workers' contaminated hands. The study found that a minority of the respondents washed their hands before a procedure. The finding is consistent with Suleyman et al (2018) which revealed that patients can acquire nosocomial infections through cross-infection.

The study found that 60% of the respondents nursed patients in the general ward. Overcrowding in the general ward increases the risk of airborne transmission of nosocomial pathogens among patients since they are in close proximity to each other. Stiller et al (2016) argued that single-patient bedrooms significantly reduce the risk of hospital-acquired infections.

Conclusions

In conclusion, the study found that urinary catheterization, old age, malnutrition, inadequate hand-washing practices, and nursing patients in general wards led to the occurrence of nosocomial infections.

Recommendations

Health workers should encourage patients to eat a well-balanced diet rich in to strengthen the immune system and promote quick wound healing reducing the risks of nosocomial infection.

The hospital administration should lobby for more medical staff to reduce workload hence allowing staff to focus on enhancing infection control through maintaining proper hygiene and cleanliness standards to minimize the risk of nosocomial infections.

There is a need for health workers to provide relevant information to the patient and caretakers on how to prevent hospital-acquired infections to create awareness hence reducing the incidence of nosocomial infections.

The hospital administration should carry out staff training to ensure that all health workers have adequate knowledge of infection prevention and control measures to reduce the risk of nosocomial infections.

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List of Abbreviations

CAUTI: Catheter-associated urinary Tract Infections
CLABSI: Central Line-Associated Bloodstream Infections
DALYs: Disability-Adjusted Life Years
DM : Diabetes Mellitus
HAI: Hospital-Acquired Infections
HAP: Hospital-Acquired Pneumonia
IPC: Infection Prevention and Control
SDG: Sustainable Development Goal
SRRH : Soroti Regional Referral Hospital
SSI: Surgical Site Infections
UNMEB: Uganda Nurses and Midwives Examination Board
VAP: Ventilator-Associated Pneumonia
WHO: World Health Organization

Source of funding

The study was not funded.

Conflict of interest

The author declares no conflict of interest.

Author contribution

Pita Patricia was the principal investigator of this study. Modi Derick contributed to the data coding, cleaning, and analysis. Kalule Swaliki carried out data collection and entry. Awino Rosemary contributed to the data collection from the participants. Owiny Charles Ayen supervised this research.

Data availability

The data is available upon request.

Informed consent

All the respondents who participated consented to this study.

Author Biography

Pita Patricia is a comprehensive nurse graduate from Soroti School of Registered Comprehensive Nursing. Kalule Swaliki is a comprehensive nurse graduate from Soroti School of Registered Comprehensive Nursing. Awino Rosemary is a comprehensive nurse graduate from Soroti School of Registered Comprehensive Nursing. Owiny Charles Ayen is a medical Tutor from the Soroti School of Registered Comprehensive Nursing. Modi Derrick is a public health specialist from Lira University School of Public Health.

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