THESIS ABSTRACT

Master of Public Health

Adventist University for Africa

School of Postgraduate Studies

Title: PRACTICES AND BARRIERS TO HEALTHCARE WORKER COMPLIANCE WITH GUIDELINES PREVENTING NOSOCOMIAL INFECTIONS AMONG SEVERELY ACUTELY MALNOURISHED CHILDREN AT A NATIONAL REFERRAL HOSPITAL NUTRITION UNIT IN UGANDA

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Globally, malnutrition is a rapidly growing public health concern that is associated with high costs of healthcare and increased mortality. Undernutrition is associated with an overwhelming percentage of child deaths aged 5 years and below. The stakes are even higher when it comes to Severely acutely malnourished children. The condition is further complicated by nosocomial infection attacks hence increasing the risk of death. Nosocomial infections are common occurrence in facilities in Sub-Saharan Africa like Uganda and prevention measures and guidelines have been put in place for them. Nonetheless, nosocomial infections continue to be a difficulty in the management of severe acute malnutrition. There remains scanty information on the practices and barriers to the prevention of Nosocomial Infections among severely acutely malnourished children in Ugandan nutrition rehabilitation units. While there are standard recommendations on practices, the prevalence of nosocomial infections

remains a concern. This study, therefore, looked into which practices are employed in the nutrition unit. How well and consistently the practices are carried out since poor execution and lapse in behaviour create a gap that hinders the success of nosocomial infection control.

For this study 18 eligible healthcare workers employed by the nutrition unit were recruited to participate in this study as respondents since they interact with patients daily and are custodians of patients' health. Informed consent was obtained from all participants before responding to any questions on the interview protocol. Additional information was obtained by observation with the guidance of an observation checklist. Document analysis of the IMAM and MIYCAN guidelines was carried out and the findings added to those of interviews and observation. Interview data and document analysis data were analyzed using the interactive model of data analysis. While observation data were analyzed using attached numeric scores that are interpreted on a Likert scale. The themes developed that informed the results and implications of the study were proper use of personal protective equipment, proper hygiene, health education, presence of environmental cues and routine surveillance were the practices mentioned. The themes under predisposing factors were skills gap, and poor knowledge while themes under barriers to a nosocomial-free hospital stay were limited financial and human resources as well as infrastructural setup. Results of the study indicate that despite some prevention practices being known, they are neither practised well nor consistently in the cases were they are well done and therefore are not effective. There is a lot of room for improvement. Practices such as cohorting patients according to arrival, giving systemic antibiotics to all patients and an active surveillance system are important prevention practices that were not mentioned and respondents. Recommendations following the finding of the study are

for caretakers to heed advice and guidance offered during health education and to ask for help when needed to bridge the knowledge and skills gap. Healthcare workers carry out routine health education for patients and caretakers while on the ward and acquaint themselves with the guidelines used by the nutrition unit. Hospital authorities to avail appropriate environmental cues, ensure reliable access to supplies used in infection prevention, and offer training and retaining of health care workers on Infection prevent Control measures. To carry out IPC audits and put in place surveillance systems to monitor occurrence, actions taken and the prevalence of NIs. For future research, interventions and investigations of IPC behaviour change with a focus on consistence is ideal. Planning interventions in key areas such as hand washing and health education. Future surveillance studies through laboratory investigations to find out the prevalence of NIs among SAM children in nutrition units around Uganda.

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A thesis

presented in partial fulfillment

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CHAPTER 1

INTRODUCTION

Malnutrition is a global public health concern that requires urgent attention as it affects mostly children who are the future of a nation. Individuals that suffer from Severe Acute Malnutrition (SAM) are at an increased risk of acquiring infections that are more severe and lead to death in the majority of cases (Jones and Berkley, 2014). Even amongst children with SAM, infections often lead to death. The diagnosis and management of infections are often different in malnourished versus well-nourished children as the malnourished deserve to be treated with even more urgency.

Therefore, hygiene through hand washing, use of gloves, and care for wounds and invasive treatment points among other practices are of much importance when dealing with this delicate group of patients to ensure a successful recovery journey. This study investigated the current practices carried out by healthcare workers and barriers to compliance with guidelines for nosocomial infections among severely acutely malnourished children in a nutrition rehabilitation unit in Uganda. Emphasis was put on practices carried out by healthcare workers and barriers to compliance with health guidelines at the nutrition unit. This information will be helpful to the patients, caregivers, health care providers, and hospital authorities to pay more attention to the points of concern to avoid nosocomial infections best as possible.

Background of the Study

Globally, nosocomial infections in the paediatric section are a problem. Many countries around the world recognize their negative impacts and work towards

fighting them. Rutledge-Taylor et al. (2012) completed a study done in seven paediatric hospitals in Switzerland that showed Bacteraemia to be the leading cause of this type of infection there. Hospital-acquired diarrhoea especially in children under age 3 is an enormous hazard in developed and developing countries as 2–32% of children admitted to general medicine wards acquire it (Patil, 2019). Then what more for malnourished children admitted to general wards?

Literature suggests that nosocomial infections occurred in 5%-10% of all admissions in European countries and more than 40% of admissions in parts of Asia, Latin America, and sub-Saharan Africa (Zare-Bidaki, Allahyari, Nikoomanesh, and Ebrahimzadeh, 2021). A study by Glance, Stone, Mukamel, and Dick (2011) indicates the need for developing countries to accord the prevention of NIs a higher priority. This is because of the sky-high prevalence of Nosocomial Infections in developing countries

Guinea Bissau in West Africa registered diarrhoeal infections related to the Rotavirus are a leading cause of nosocomial infection among children (Fischer, Aaby, Molbak, and Rodrigues, 2010). Uganda, like most developing countries, has a high prevalence of nosocomial infections due to an insufficient healthcare surveillance system, as well as the high economic strength required to test for this type of infection that patients can hardly afford (Murni, Duke, Kinney, Daley, and Soenarto, 2015). In a survey on hospital-acquired infections in Northern Uganda, it was found that nosocomial infections are the most common, severe, and fatal in malnourished children (Greco and Magombe, 2011).

According to the IMAM guidelines 2020, malnutrition, particularly undernutrition is a condition when the body does not have access to the required nutrients in both quality and quantity leading to wasting, stunting, or both. Under

nourishment in particular lower the immune system rendering the child prone to multiple infections among several other complications. An under nourished child has two times a higher chance to catch infections as compared to a well-nourished child. Nosocomial infections are hospital-acquired and the patient is completely free from them at the time of admission (Khan, Ahmad, and Mehboob, 2015). When a hospitalized Severely Malnourished Child catches an infection, their situation is further complicated leading to sepsis, dehydration, shock, organ failure, respiratory distress, and death if not treated in time. The proposed study will scrutinize practices and barriers to the prevention of nosocomial infections among severely acutely malnourished children.

Following the Covid 19 pandemic and a wide spread sensitization of the Ugandan population, a bigger percentage of citizens started to frequently wash their hands with water and soap or an alcohol base sanitiser (Kitara and Ikoona, 2020). Unfortunately, several studies have shown that adherence to hand hygiene guidelines remains low and that improvement efforts often lack sustainability. Some reason for low compliance to hand hygiene is that HCWs don't realize that they are carrying pathogenic microbes since are not visible, limited access to convenient hand rubbing alcohol and the fact that HCWs are not affected by NIs, there is a measure of negligence.

Additionally, the lack of compliance with hand hygiene is related to the cost of time. This behaviour change is important as it may impact the occurrence and spread of nosocomial infections in hospitals. This is confirmed by a study that was done in tertiary care hospitals in Pakistan where the consumption of hand sanitisers by healthcare workers was four times higher than it was pre-pandemic (Roshan et al., 2021). On the other hand, a study in Italian healthcare facilities showed that contrary

to what would be expected, no significant increase in hand washing and sanitizing was seen despite the fear of contagion with the disease (Ragusa et al., 2021). Proper bed spacing and isolation of infected patients is ideal but not realistic in very busy facilities that are limited in capacity therefore the use of temporary popup isolation spaces is recommended (Graves, Cai, Mitchell, Fisher, and Kiernan, 2022). Proper use of PPE is another important practice. A study showed 53% of nurses received training on the proper use of PPE, 39% demonstrated knowledge and skills to do with proper donning and doffing sequence and a 92.5% lapse in technique (John, Tomas, Hari, Wilson, and Donskey, 2017)

This study will contribute to the body of knowledge on the nosocomial infections situation in Uganda specifically in nutrition rehabilitation units and among Severely acutely malnourished children. Studies have been done on nosocomial infection in paediatric wards but very little has been done on nosocomial infections among this delicate population of patients which this study focuses on. Being a hospital setting, the expectation is that all practices are done exceptionally well but this is not the case at all since nosocomial infections continue to occur and a 0% prevalence remains a goal many inpatient care facilities continue to strive toward.

Jones and Berkley's (2014) study of Severe Acute Malnutrition and Infections revealed that 53% of all deaths in Severely acutely malnourished children are associated with Nosocomial Bacteraemia alone. When the risk factors for NIs are well kept under control, prevention given priority and guidelines followed, it eliminates or reduces loss of money due to infections treatment, shortens hospital stay, reduces disease burden on the patient, and the risk of further complications or death. The results will inform patients, caretakers, healthcare personnel, and other stakeholders about what practices are done and therefore highlight which ones are not done, what

factors predispose patients to NIs in this setting and what barriers hinder healthcare workers from complying with provided guidelines and therefore create a platform for follow-up studies and interventions to not only stop occurrence and spread but also broaden knowledge about nosocomial infections among the severely acutely malnourished children.

Statement of the Problem

Although the mortality rate among children under five years in Uganda declined from 90 per 1,000 live births in 2011 to 43 per 1,000 live births in 2020 (You et al., 2015), it remains high compared to the proposed target for Infant Mortality Rate according to the Sustainable Development Goals of as low as 12 deaths per 1,000 live births. Severely acutely malnourished children are especially at a high risk of mortality.

When severely acutely malnourished children are hospitalized, the start to a successful recovery journey is ideal. Unfortunately, this is not a reality for many patients at nutrition rehabilitation facilities in developing countries (You et al., 2015). Jones and Berkley (2014) revealed through their study on Severe Acute Malnutrition and Infections that 53% of all deaths are a result of Nosocomial Bacteraemia alone.

Nosocomial infections not only further increase the burden of disease and illness but also increase the length of the hospital stay and the financial burden for treatment for patients (Glance et al., 2011). In nutrition health rehabilitation centres, healthcare givers are the persons of focus in this study. They are custodians of the Severely acutely malnourished children (SAM) under treatment and rehabilitation and therefore are responsible for looking out for the value of prevention as well as the expectancy of reduced occurrences of nosocomial infections. Limiting factors healthcare workers experience in the quest for a nosocomial-free hospital stay for

patients are a lack of knowledge by caretakers about their patients' vulnerability to infections, poor surveillance systems, and the high costs associated with testing and treatment (Alp and Damani, 2015).

However, compliance with hand washing, a popular easy and effective infection prevention control practice was recorded at 18.9% among healthcare workers (Murni et al., 2015). Given well-trained healthcare workers on nosocomial infections, barriers such as over worked staff due to limited human resources, and limited access to supplies such as gloves, soaps, disinfectants, beds and bed space among others make it impossible to comply with the guidelines (Alp and Damani, 2015).

An enabling environment for infection prevention control practices to be continually carried out well and consistently needs to be provided. This is not the case in many Sub-Saharan Africa facilities like this one. The magnitude of this problem has not been accorded due attention in Uganda since no information stating the prevalence or death rate among severely acutely malnourished children in Uganda due to nosocomial infections was found (Murni et al., 2015). This is attributed to poor surveillance systems. Few studies on nosocomial infections especially studies on health workers' contribution in regards to infection prevention practices and barriers to compliance with guidelines which this study focuses on.

Research Questions

1. What are the prevention practices currently implemented by healthcare workers against nosocomial infections?
2. What factors or circumstances predispose SAM children to nosocomial infections in this facility?
3. What barriers hinder healthcare workers from complying with health guidelines provided against nosocomial infections?

Theoretical Framework

A theoretical framework is a structure that supports the theory of a study by casting more light on why the problem being studied exists. The trans-theoretical Model has been chosen for this study as it best explains and even predicts relationships, events and behaviours between stakeholders and nosocomial infections in nutrition rehabilitation centres. The trans-theoretical model is an integrative framework for understanding how individuals and populations progress towards adopting and maintaining health behaviour change for optimal health.

The Trans-Theoretical Model

This theory was developed by Prochaska and Diclemente (1983). The trans-theoretical model has 6 stages of change. Pre-contemplation, contemplation, preparation, action, maintenance and termination or relapse (Manoj Sharma, 2021). In the first stage, pre-contemplation, the healthcare workers in this case do not see any problem with the practices being carried out concerning how they affect the occurrence of nosocomial infections and therefore do not see the need for change. In the second stage/contemplation, the actors realize that there is a problem that could be solved by their input at various levels and therefore contemplate a change shortly which is considered not later than six months.

Preparation is the third stage, here the actors start to plan and take small steps towards making change within the next thirty days. In this case, the amount of times the ward is mopped, opening all windows to allow proper ventilation or putting in a request for the purchase of more gloves and sanitisers for use on the ward as well as a disinfectant to use while cleaning surfaces.

Next is a stage called Action. Healthcare persons have made changes in practice and intent to maintain it to prevent and manage existing cases of nosocomial

infections while preventing new infections. Maintenance is the second last stage in which the health-promoting action has been maintained for a while and actors intend to continue with it. The last step of behaviour change is termination or relapse. Here, the healthcare workers have incorporated and practised actions that ensure a signification reduction in the occurrence of nosocomial infections and are sure they will not relapse. Relapse can happen at any stage from action to termination where for some reason, the action cannot be sustained.

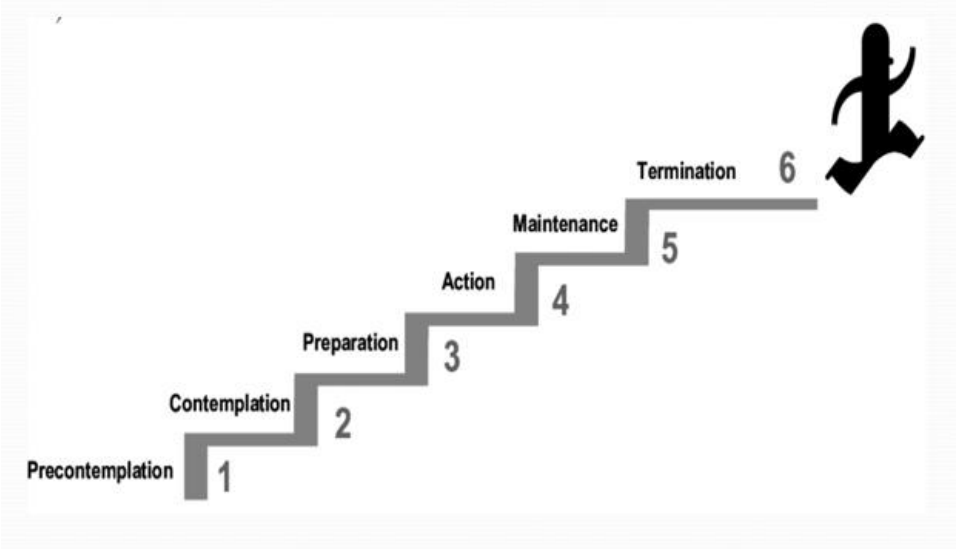

Figure 1. Six Steps of Change

In nutrition health rehabilitation centres, healthcare givers are the persons of focus in this study. They are custodians of the Severely acutely malnourished children (SAM) under treatment and rehabilitation and therefore are responsible for looking out for the value of prevention as well as the expectancy of reduced occurrences of nosocomial infections.

The TTM aims at preventing illness where possible by highlighting the benefits of prevention through the six stages of change. Finding out the possible barriers gives a head start to over-come them. Literature shows that guidelines on how

to limit nosocomial infections among SAM children have been provided by sources like the Ministry of Medical Services and Ministry of Public Health and Sanitation (2020) and the Centre for Disease Control. Despite this, rates of SAM children that contract nosocomial infections are still high in Uganda's Nutrition rehabilitation facilities. This shows a loophole in compliance.

What are the barriers that hinder action or cause a relapse of health workers and patients from successfully preventing this infection? Empowering patient care givers and other stakeholders to take the upper hand in curbing the infections can surely result in a downward trend of the infection curve. Only where applicable, the Trans-theoretical model steps of behavioural change have been applied or referred to. The relationship between the steps of change and practices for nosocomial infections will be discussed more in the results, conclusion and recommendation sections of this research paper.

Theoretical Domains Framework

The Theoretical Domains Framework (TDF) was developed by behavioural scientists and researchers. They aimed to develop a widely applicable, ‘one-size-fits-all’ evidence-based, theory-informed framework to point out determinants of behaviour. The TDF includes 14 domains to describe behaviour namely; knowledge, skills, environment context, reinforcement, intentions, resources, behavioural regulation, social influence, beliefs about capability, optimism, emotions, goals, memory and decision processes. Based on the Theoretical Domains Framework, information collected during interviews, observation and document analysis was coded to 6 domains including knowledge, reinforcement, skills, environmental context and resources, intentions, and behavioural regulation that led to the development of themes as discussed below.

1. **Knowledge.** The knowledge domain encompasses awareness or familiarity with a concept. Knowing is the basis of behaviour, human beings can practice only what they know. Therefore to influence behaviour, teaching, education, and explaining a given act is vital to the recipient of this information to successfully influence behaviour.

2. **Skills.** The skills domain considers the ability or proficiency acquired through practice. For purposes of this study, skills in practices that are aimed at infection prevention and control are considered. Knowledge is largely theoretical while skills are practical. Knowledge is complemented by the ability to practically carry out the desired task. Skills are dependent on knowledge.

3. **Memory, attention and decision process**. After knowledge and skills have been imparted to the target person or group of people. Carrying out the desired task or practice is dependent on their ability to pay attention to what is required to fulfil the task, remember the knowledge and skills it takes and then decide to implement it.

4. **Behavioural regulation.** The behavioural regulation domain comprises the activities aimed at managing or changing objectively observed or measured actions.

5. **Intentions.** The intentions domain encompasses the conscious decisions that an individual makes to perform a behaviour or an individual's resolve to act in a certain way. This domain is the basis of the Trans-theoretical model of health behaviour change which focuses on the decision-making of the individual. The authors of the Trans-theoretical model acknowledge that change is to a large extent, intentional.

6. **Environmental context.** The environmental context and resources domain comprises any circumstances of a person's situation or environment that discourage or encourages the development of skills and abilities, independence, social competence and adaptive behaviour.

7. **Reinforcement.** Reinforcement is basically about increasing the probability of a response by arranging a dependent relationship or contingency between the response and a given stimulus.

The TDF can be a theoretical basis for research to identify behaviours which can be changed to meet a desired output or targeted for interventions (Atkins et al., 2017). The TDF can be used hand-in-hand with the Behaviour Change Wheel, as the domains of the TDF can fit into the COM Behaviour system. The core of behavioural change is opportunity, capability, and motivation. An enabling environment with enough, constant supply of tools like gloves, nose masks, soap, disinfectants, and

running water needs to be in place to provide Healthcare workers with the opportunity to successfully prevent the occurrence of nosocomial infections.

By empowering healthcare workers through training and retaining in infection prevention control as well as following health guidelines. This encourages them to tap into their compatibilities to effectively prevent the occurrence and spread of nosocomial infections.

Motivation is key in any behavioural change, good scores in IPC audits are one way to motivate healthcare workers to practice infection prevention well and consistently. Having an active IPC surveillance program is recommended too. According to findings from interviews and observation, the facility neither does IPC audits nor has a surveillance system in place yet this is the recommendation of the health guidelines used at this facility. Not all domains were used in this study as not all were applicable. Only those that were applicable have been explained. Relationships between components of the theory of domains framework and the domains under them will be further explained in the results, conclusions and recommendation sections of this paper.

COM-B component		TDF Domain
Capability	Psychological	Knowledge
		Skills
		Memory, Attention and Decision Processes
		Behavioural Regulation
	Physical	Skills
Opportunity	Social	Social Influences
	Physical	Environmental Context and Resources
Motivation	Reflective	Social/Professional Role & Identity
		Beliefs about Capabilities
		Optimism
		Beliefs about Consequences
		Intentions
		Goals
	Automatic	Social/Professional Role & Identity
		Optimism
		Reinforcement
		Emotion

Figure 2. Theoretical Domains Framework and COM-B Behaviour System
Adapted from Atkins et al. (2017)

Significance of the Study

Nosocomial infections are a great bother to patients, caregivers, healthcare providers, and the healthcare system at large. This is in several countries but especially in sub-Saharan Africa to which Uganda belongs. This study will investigate the current practices carried out by healthcare workers and barriers to compliance with guidelines for nosocomial infections among severely acutely malnourished children in this nutrition rehabilitation unit. Emphasis will be put on practices in place and barriers to compliance with health guidelines at the nutrition unit helping both the patients, caregivers, and health care providers to pay more attention to the points of concern to avoid nosocomial infections as much as possible.

Patients

The risk of death due to complications brought about by nosocomial infections will be avoided as a result of the input of all stake holders that care for the patients. The burden of disease, treatment interventions and length of hospital stay will be reduced. This will promote the quick recovery of the patients.

Caretakers

When nosocomial infections are successfully prevented, the costs attached to surveillance by carrying our laboratory test and treatment of nosocomial infections is reduced. Also costs as a result of longer hospital stays will be eliminated. Most importantly, there will be no life-threatening instances of vulnerable children as a result of being affected by nosocomial infections.

Health Workers

This study will shed light on the gaps, which will provide action points to successfully prevent nosocomial infections. The guidelines will also be highlighted to provide the basis for action and to help educate caretakers as they partner to fight nosocomial infections.

Bodies of Authority

Exploring barriers to compliance with guidelines provided will benefit the authorities regarding assisting healthcare providers to put emphasis on prevention and treatment guidelines and hence improve compliance to reduce the burden of NIs. The guidelines used at this facility are Integrated Management of Acute Malnutrition IMAM and Maternal, Infant, Young Child, and Adolescent Nutrition MIYCAN. The study as a whole will highlight the contribution and gaps by hospital workers as major players in ending these costly infections. To hospital heads and the Ministry of Health, the study will aid in decision-making for resource allocation. Therefore the results of this research are suitable for consumption at different organisational levels such as the government, hospitals as well as other public health specialists, bodies planning interventions and research as a whole.

Justification of the Study

An undernourished child has a two times higher chance to catch infections as compared to a well-nourished child. This is due to a compromised immune system resulting from under nutrition in addition to the invasive procedures such as intravenous treatments, use of caterers and nasal gastric feeding that they are exposed to. Oedema, a common complication among SAM children when resolving leaves open wounds on the skin which furthermore puts the child at risk of an infection.

SAM is in a delicate condition as is. When a SAM child is attacked by

nosocomial infections, it greatly increases the chance of mortality in addition to the financial implications. Therefore, prevention and compliance with the IMAM and MIYCAN guidelines against nosocomial infections are key to standing in the gap and ensuring a more progressive hospital stay for SAM children reducing the burden of disease and infant mortality.

Scope and Limitations of the Study

The proposed study will be limited to only healthcare workers that treat children that are Severely Malnourished as they have twice as much the chance to catch nosocomial infections. To more wholesome views, health workers from these four categories were included in the study. These were Doctors, Nurses, Nutritionists and Social workers. The Nutrition Rehabilitation Unit of a National referral hospital in Uganda in the central region of the country will be the case of study. The results of the proposed study will be useful to all stakeholders that are involved in the treatment and rehabilitation of SAM by providing adequate knowledge to ensure the reduction of nosocomial infections through prevention and overcoming barriers.

One of the largest limitations of the study is the available time. Being a qualitative study, a lot of useful information may be obtained but not all of it can be used. Respondents are expected to answer truly and honestly. Covid 19, the current pandemic was a barrier to gaining access to health facilities for extended periods. This was addressed by the use of recorded phone interviews in circumstances where the researcher cannot access the hospital or the health workers and a structured observation checklist that requires a shorter time on the ward.

Operational Definition of Terms

Barriers. Barriers are obstacles or circumstances that make it difficult or impossible to access or effect desired action.

Children. Biologically, children are human beings between the stages of birth and puberty, however for this study, children under five years will be targeted.

Health guidelines. Guidelines are documents to guide decisions and criteria regarding diagnosis, management, and treatment in specific areas of healthcare such as severe acute malnutrition.

Health workers. For this study, doctors, nurses and nutritionists will be the healthcare workers of focus excluding emergency medical personnel, dental professionals and students, medical and nursing students, laboratory technicians, pharmacists and administrative staff.

Infection Control. The process by which health care facilities develop and implement specific policies and procedures to prevent the spread of infections among health care staff and patients

Nosocomial infections. Nosocomial infections (NI) or healthcare-associated infections (HAI) are infections acquired during the process of receiving health care that was non-existent during the time of admission.

Patient caretakers. A parent or guardian or friend that gives immediate personal care to patients under inpatient therapeutic care.

Practices. Actions intended to protect, promote or maintain the health and wellbeing of patients by preventing disease.

Severe Acute Malnutrition. Severe acute malnutrition is defined by very low weight for height (below -3z scores of the median WHO growth standards), by visible severe wasting or the presence of nutritional oedema.

CHAPTER 2

REVIEW OF LITERATURE

This section of the paper highlights various studies previously done that relate in one way or another to the core values of the study at hand. The pieces of work from the previous studies contribute ideas in addition to highlighting vital concepts. This section will emphasize the three research questions.

Prevention Strategies and Practices

Preventive strategies have been discussed and provided by authoritative bodies. First is the WHO guidelines that emphasize spacing of patients' beds to reduce chances of contact and therefore transmitting infects (WHO, 2016). According to the IMAM guidelines 2020, caregivers are advised to not give any additional feeds on top of the therapeutic feeds to patients under the stabilization and transition stages of nutrition rehabilitation without the knowledge of the health workers. This is to avoid gastrointestinal infections among other complications in these stages.

Proper use of antibiotics is paramount to the successful treatment of nosocomial infections and to avoid instances of recurring infections or drug resistance (M. Sharma, Damlin, Pathak, and Lundborg, 2015). Especially routine antibiotics must be used cautiously. Proper disposal of waste both medical waste like gloves and patient waste like used diapers is key in a hospital setting to prevent nosocomial infections (Muhumuza et al., 2015). Additionally, the presence of clean running water in washrooms and laundry rooms accessible to patients and caretakers goes a long way in this endeavour.

Limiting the number and duration of visitation to patients limits exposure of patients to the microbial life outside of the hospital that may cause them even more ill-health is a good prevention practice. Changing gloves between patients is key as it prevents cross-contamination from patient to patient especially when working with catheters, Nasal gastric tubes and wounds or body openings (Muhumuza et al., 2015). In the same light, hospital facilities should be constructed in such a way that they always allow for sufficient and safe ventilation and light in the rooms. There is a need for workshops and education routes for health workers and patient caregivers on NIs, their dangers, and what can be done to prevent them routinely in addition to good surveillance systems to track and trace infections (Shoemaker et al., 2012).

Prevention Practices in Place

At the nutrition unit, several prevention strategies and practices are in place. Knowledge of what practices are carried out by the healthcare workers is obtained through interviewing them and then cross-checking this information with what the guidelines recommend seeing if indeed they do all that is expected of them. Observation is ideal to show how well practices are done and how consistently they are done to successfully prevent nosocomial infections. This will show points of concert and therefore call responsible and capable individuals and organizations to action in the endeavour to prevent nosocomial infections among SAM children, a delicate population of patients.

These practices are adopted from the IMAM and MIYCAN guidelines availed by the government of Uganda. They include giving routine, antibiotics to all SAM children on the ward to prevent infections. Patients are handled with gloves. A stool chart is provided on each bed for caretakers to identify abnormal stool and report to health workers for quick investigation and action in case of infections. In the

endeavour to avoid cross-contamination and the spread of infections among severely acutely malnourished children while on the ward, the beds are adequately spaced, and the ward is fitted with wide windows to allow in light and facilitate proper ventilation.

Caretakers are routinely taught and reminded how to clean and dispose of vomit and poop to avoid cross-contamination. Clean and running water is put in place to ensure maintained cleanliness of the severe acute malnourished children, care takers, wards and toilets. Care takers whose children have wounds resulting from resolving oedema are advised to secure and treat wounds with zinc oxide cream to avoid wound infection while promoting healing.

Guidelines

The existing guidelines currently used are the Integrated Management of Acute Malnutrition (IMAM) and the Maternity, Infant, Young child and Adolescent Nutrition (MIYCAN) guidelines.

MIYCAN

These are guidelines set by the ministry of health of Uganda targeting Maternal, Infant, Young Child, and Adolescent Nutrition in recognition of the critical role played by optimal nutrition in the health and well-being of women, mothers, adolescents, and children. They are evidence-based and developed with global and regional agreements and the current national legislation, policies and guidelines. These guidelines provide a framework for standardization, prioritization and implementation of nutrition interventions in the human life cycle. Guiding treatment and rehabilitation of pregnant and lactating women, older children, adolescents and adults with undernutrition and chronic illnesses such as HIV/AIDS, Tuberculosis and in terminal illnesses. And lastly to Pool adequate resources from all stakeholders for the management of acute malnutrition. They are to be implemented for optimal child

survival and development outcomes and to break the intergenerational cycle of malnutrition. Other countries that have adopted and used the MIYCAN guidelines include India, South Sudan, Ethiopia and Kenya among others.

The MIYCAN in regards to nosocomial infection prevention recommends timely reporting of nosocomial infection cases. This requires testing that had been deemed expensive and therefore not accessible to most patients. Supervising and monitoring visits to health facilities to ensure infection prevention control is given priority in the pediatric wards. Capacity building of healthcare workers by strengthening the utilization of guidelines and additional valuable information from reputable organizations for nosocomial infection prevent is ideal. The MIYCAN recommends collaboration of health facilities with other programs such as Water, Sanitation and Hygiene WASH, food security, and gender among others for benefits at many levels empowering all stake holders that treat SAM children in various capacities and therefore prevent nosocomial infections. MIYCAN also recommends open cup feeding as spoon feeding especially in resource-restricted environments to prevent diarrhoeal diseases.

IMAM

Integrated Management of Acute Malnutrition (Ministry of Medical Services and Ministry of Public Health and Sanitation, 2020) is the latest edition following 2015 According to the Ministry of Medical Services and Ministry of Public Health and Sanitation (2020), Severe Acute Malnutrition is defined as weight for age less than three standard deviations from the median of the WHO child growth standards, MUAC less than 11.5cm and /or presence of bilateral pitting oedema. Clinical forms are wasting, bilateral pitting or a combination of both. SAM is classified as a disease according to the international classification of Diseases (ICD-10). The purpose of the

IMAM guidelines is to standardize the identification, treatment and management of acute malnutrition in Uganda. These guidelines are also used by the Ministry of Health of the government of Kenya as seen in Kimani-Murage et al. (2019) study on Integrated and simplified approaches to community management of acute malnutrition in rural Kenya. In Zimbabwe, malnourished children living with HIV were treated using the IMAM guidelines in a study by Kamazizwa et al. (2018).

Ministry of Medical Services and Ministry of Public Health and Sanitation (2020) is for use by Health care providers responsible for the care and treatment of acutely malnourished individuals, as a step-by-step guide for health care providers to implement outpatient therapeutic care (OTC), inpatient care or a supplementary feeding where it exists, and to ensure appropriate referral and tracking mechanisms. Policy makers and program managers including NGOs responsible for programs and policies related to the management of acutely malnourished children as well as supervisors responsible for monitoring and reporting on any component regarding IMAM.

In regard to nosocomial infections, the IMAM guidelines recommend training and retaining healthcare workers on infection prevention especially when dealing with malnourished persons. Routine checkups on patients to monitor progress or quickly identify decline to take cation. Documentation from the daily checkups to make treatment transparent and care seamless for other healthcare workers. The IMAM guidelines recommend minimized turnover of healthcare staff. Supervision of IPC activities, isolation and treatment of infected patients, gave special care to skin lesions and dermatosis and well as ensuring patient hygiene. Health education and counselling are paramount for caretakers, no sharing of feeds between patients, giving only therapeutic feeds given by the nutritionists or nurses, using open cup or spoon

feeding and not teats, spouted cups and straws. Use of clean and sterilized utensils for feeding patients.

Care for nasal gastric intubation, catheters and canoers is very important and only use when it is indeed necessary to limit exposure of patients to nosocomial infections. Involving mothers in care by providing health education is a recommendation by the IMAM guidelines. Use of a stool chart and other aiding tools to make infection prevention easy. Use so systemic antibiotics for prevention and treatment of nosocomial infections and employment of adequate staff to prevent employee burnout as a result of being over worked. And lastly, early dictation and reporting of infections as well as having a surveillance system for nosocomial infections in place

By analyzing the IMAM and MIYCAN, practices recommended but not done can easily be pointed out and therefore a call to action through the recommendations. Practices that are not done well

Multi-Modal Approach

In 2016, WHO released guidelines on the core components of IPC programs at both the national and health facility levels. One of the core components stipulated in this guideline is the use of a multi-modal strategic approach to promote IPC activities (WHO, 2016). According to WHO (2016), this particular approach comprises 5 components which include system change, education and training of healthcare workers and other key players, monitoring of infrastructure, practices, processes, and outcomes and providing data feedback, and reminders in the workplace/communications and cultural change within the establishment or the strengthening of a safety climate. Based on evidence from several studies, systematic reviews and meta-analyses, the WHO (2016) asserts that IPC activities using multi-

modal strategies should be implemented to improve practices and in effect, reduce the incidence of nosocomial infections (WHO, 2016).

The WHO Guidelines Development Group (GDG) noted that the 5 components of the multi-modal approach didn't have the component of patient involvement in the IPC improvement programs. As such, this group recommended that patient involvement in IPC improvement activities should be given due attention as a matter of consideration in this multimodal approach (WHO, 2016). It was emphasized that patient involvement should be extended to accommodate their care attendants as well since these attendants often contribute to care delivery in some healthcare settings (WHO, 2016).

Step-by-Step Hand Washing Technique

It has been demonstrated that hand hygiene improvement programs based on a multi-modal approach as stipulated by WHO (2016) register greater improvement in compliance with hand hygiene among healthcare workers (Oliveira, Gama, and Paula, 2018). The technique for hand hygiene in the healthcare facility differs from the routine handwashing procedure in the community. As far back as 2009, a visual aid document was published by WHO to aid healthcare workers to follow a specific step by step hand washing technique that is aimed at reducing the microbial load on the hands.

This technique requires that one first wets the hands with water. This is then followed by applying enough soap to cover all hand surfaces then rubbing the right palm over the left dorsum with interlaced fingers and vice versa. After this, one further rubs palm to palm with fingers interlaced followed by rubbing the back of the fingers to opposing palms with fingers interlocked. This is further followed by rotational rubbing, backwards and forwards with clasped fingers of the right hand in

the left palm and vice versa. The hands are then rinsed with water followed by drying the hands thoroughly using a single-use towel. Finally, a single-use towel is used to turn off the faucet (WHO, 2009).

Barriers to Compliance with Prevention and Control Guidelines

There are several reasons why guidelines are not followed. First, there is a need to acknowledge the fact that man has never been 100% compliant with authority and the law as he seeks freedom to do as he pleases (Buehrle, Pisano, Han, and Pettit, 2017). This further brings to light the English proverb, “man is his enemy”. Man hurts himself and his own by his actions, especially in cases when the guidelines are provided but not followed. Sometimes one might want to follow guidelines but fails due to limited resources.

From the start of the second millennium, studies have been done in Uganda on the prevention and control of infectious disease outbreaks like Ebola, cholera, and HIV among others (Sandqvist, Wahlberg, Muhumuza, and Andersson, 2011; Shoemaker et al., 2012). There is however scanty information and studies were done on the prevention and control of nosocomial infections in Ugandan hospitals in SAM children.

Cross-contamination and infection transfer is to a larger extent aided by healthcare providers’ hands if hand hygiene is not taken into account (Muhumuza et al., 2015). In Mulago hospital’s paediatrics unit, a national referral in Uganda. It was observed that proper hand hygiene by healthcare providers was limited due to a shortage of running water and shortage of gloves to change with each patient, according to a practice implementation project by Muhumuza et al. (2015) on Health care worker hand hygiene in the paediatric special care unit at Mulago Hospital in

Uganda. In this study, the baseline audit for healthcare providers was poor. After the practice implementation project, an improvement was noted but still below 74%. Being a low resource facility, the project was faced with several limitations hence not reaching its full potential.

The reasons for low compliance to nosocomial infection prevention health guidelines in Low-middle income countries of which Uganda is part are numerous. They include a lack of education and training, a heavy workload as the staff-to-patient ratio is so low in addition to a shortage of instruments of use by healthcare workers leading to cross-transmission of pathogens from patient to patient (Alp and Damani, 2015). Because many hospitals in low and middle-income countries experience a shortage of appropriate diagnostic facilities for nosocomial infections, they are encouraged to use broad-spectrum antibiotics to cover all possible pathogens (M. Sharma et al., 2015). This practice is not only wasteful at times but also leads to incidences of drug-resistant infections in addition to antibiotic-associated infections like *Clostridium difficile* infections and secondary yeast infections.

Centre for Disease Control's practical guide on prevention of hospital-acquired infections, 2nd edition emphasizes the detection and isolation of patients with NIs to limit their spread. This is because colonized patients are a major reservoir for the spread which is effectively achieved by barrier precautions.

Providing effective leadership and changing the noncompliance attitude begins with a belief in the importance of spread by prevention. According to Alp and Damani (2015), compliance is limited in facilities of developing countries due to a shortage of hospital space, few healthcare givers, limited resources, and poor Infection Prevention Control infrastructure. Additionally, the lack of awareness results from an absence of basic surveillance, education, and training, and inappropriate use of antibiotics due to

the failure of early diagnosis of infections to provide instrumental data to curb nosocomial infections.

Risk Factors for Nosocomial Infections

Uganda is no exception to the burden of nosocomial infections that further complicates a state of undernourishment in children under treatment and rehabilitation. Nosocomial infections are infectious events that are diagnosed after a patient has been hospitalized for more than forty-eight hours without evidence that the pathogen was already in the incubation stage (Garner, Jarvis, Emori, Horan, and Hughes, 1988). This is the oldest and yet most current definition offered by the CDC (Kouchak and Askarian, 2012).

Nosocomial infections (NIs) are a major cause of increased morbidity and mortality among Severely Acute Malnourished (SAM) children in hospitals in the developing world. However, hospitals can reduce morbidity and mortality by curbing nosocomial infections (Jones and Berkley, 2014). Nyamurenje and Archary (2018) define Severe malnutrition as the weight for height z-score <−3SD, bilateral oedema, or mid-upper arm circumference (MUAC) < 11.0 cm (if > 65 cm in length). According to a report by the Centers for Disease Control and Prevention (2016), the most common pathogens causing nosocomial infections are *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *E. coli*.

Paediatric nutrition rehabilitation centres handle a unique patient population, one that differs in numerous aspects. They care for children that have vulnerable immune systems in addition to undergoing multiple invasive procedures mostly intravenous treatments, the use of Nasal gastric tubes, and urinary catheters especially in the stabilization stage of rehabilitation (Shoemaker et al., 2012). The most common

nosocomial infections are diarrhoeal illnesses, urinary tract infections, respiratory pneumonia, and sepsis (Jones and Berkley, 2014).

Age

Age is a big risk factor for nosocomial infections. The younger the child, the more vulnerable they are because their immune system is not at its best. This is further complicated by catching an infection. A study completed by de Gentile et al. (2001) on Nosocomial infections in children's hospitals in Argentina reveals that patients below 2 years are at significantly greater risk for NIs especially if they are malnourished, had previous surgery, and had invasive procedures such as venepuncture or central venous catheterization.

Prolonged Hospital Stay

We must not ignore the fact that prolonged hospitalization increases infection risk by increasing exposure to a high-risk environment which is a ward with other patients. The longer they stay and if they catch infections, they may be exposed to invasive devices and more opportunity for person-to-person transmission of infectious agents. There is a reflective relationship between prolonged hospital stays and nosocomial infections where catching nosocomial infections leads to prolonged hospital stay and prolonged hospital stay increases exposure and risk of catching infections.

Malnutrition

Nyamurenje and Archary (2018), in their study on Bacterial infections in hospitalized severely malnourished children in Durban, South Africa show that mortality varied greatly from 18% to 47.4% among Sever Acute Malnutrition cases. Mortality from bacteraemia was 17%, but doubled with SAM, HIV, or tuberculosis,

and was multiplied by five with bacterial resistance. They further revealed that when the mortality of children in Kenya was investigated, it greatly varied between 18% and 47.4% among SAM cases.

Invasive Procedures

Patients most susceptible to NIs are SAM children below 2 years, and those with invasive procedures like catheters, venepunctures, and Nasal Gastric intubation. This is because they are hygiene-sensitive practices and the sites affected are prone to sepsis if not hygienically handled (Shoemaker et al., 2012). Patients recovering from surgical procedures too are at great risk.

Hygiene

Proper hygiene is at the core of it all. Personal hygiene of the patients and caretakers as well as the hygiene of their environment. Caretakers may transfer disease-causing microbes from themselves to the patient. When patients are not appropriately cleaned, this may lead to sepsis of wounds. Then hygiene of the patient's utensils directly affects the occurrence of diarrhoeal infections.

Five Moments of Hand Hygiene

The 5 Moments of hand hygiene according to the WHO approach defines the key moments when health-care workers should perform hand hygiene to effectively prevent the spread of pathogenic microbes. First is before touching a patient, before clean/aseptic procedures, after body fluid exposure/risk, after touching a patient, and after touching the patient's surroundings.

Impact of Nosocomial Infections

Notably, the cost of nosocomial infections is high. Nosocomial Infections are a significant health problem globally (Zaragoza, Ramírez, and López-Pueyo, 2014).

They result in high morbidity and mortality, prolonged hospital stays greater use of antibiotics, and increased hospital costs. Patients affected by nosocomial infections experience prolonged hospital stays and have higher morbidity and mortality. This further puts an economic burden on the healthcare system (Alp and Damani, 2015). For the given reasons, in low-to-middle-income countries, the scale of the problem is rather huge. Several Sub-Saharan Africa countries experience a shortage in finances among other resources for healthcare. Hence the absence of hospital infection control programs and the ability to access their effectiveness. The few available programs can only serve a given number of patients which is not sufficient (de Gentile et al., 2001).

In more developed countries like the United States, infection control programs have been evaluated and found that one-third of NIs could be prevented by the implementation of infection surveillance and control programs (Shoemaker et al., 2012). Yet in resource-restricted countries like Uganda, problems such as a lack of administrative and financial support, inadequate numbers of trained healthcare providers, and the absence of hospital-acquired infection control programs. In addition to overcrowding in wards, insufficient equipment and supplies continue to plague the health system (Muhumuza et al., 2015).

Nyamurenje and Archary (2018), in their study on Bacterial infections in hospitalized severely malnourished children in Durban, South Africa show that mortality varied greatly from 18% to 47.4% among SAM cases. Mortality from bacteraemia was 17%, but doubled with SAM, HIV, or tuberculosis, and was multiplied by five with bacterial resistance. They further revealed that when the mortality of children in Kenya was investigated, it greatly varied between 18% and 47.4% among SAM cases. Patients most susceptible to NIs are SAM children below 2 years, those with invasive procedures like catheters, venepunctures, and Nasal Gastric

intubation, especially with hygienic sensitive practices. Notably, a revised use of antibiotics is vital to prevent the rise in antimicrobial resistance infections.

CHAPTER 3

METHODOLOGY

This section of the research paper shows the research methodology that was used to conduct the study. The study area, research design, research population, sample size, sampling procedure, research instruments, data collection procedure, data analysis, and ethical considerations are described here.

Research Design

This study is purely qualitative and employs a case study research design of explanatory nature which provides a general understanding of the phenomena while providing a breath of information that provides the basis for further investigations, interventions and more research studies. This is especially important since there is not much information on nosocomial infections among severely acutely malnourished children. A case study helps gain richer, in-depth information on the topic of interest. This research design makes it possible to explore the characteristics, meanings and implications of infection prevention practices against nosocomial infections on the wellbeing of SAM children.

Qualitative research gives a chance to the respondent to fully express themselves hence bringing forth new themes that play an important role in a phenomenon. The fact that it is explanatory in nature helps explain why certain phenomena work in the way they do about the problem under investigation. Interview protocols, observation checklists and document analysis of health guidelines were

used to obtain data for an analysis hence providing a rich pool of experiences, suggestions, and recommendations.

Description of the Research Setting

The facility of focus is a Nutrition Rehabilitation Unit at a major national referral hospital in Uganda. This nutrition unit specifically manages under nutrition among children and has two inpatient wards which are the stabilization ward and rehabilitation ward and one outpatient ward. The bed capacity of the entire facility is fifty-seven beds for inpatients. The facility employs a total of thirty-five staff members including doctors, nurses, nutritionists, social workers, cooks, cleaners, and security personals.

Severely acutely malnourished children are admitted to the stabilization phase as soon as a diagnosis is made. After treatment at this stage, if patients improve and meet the criteria, they are moved to the rehabilitation ward. Moderately Acute Malnourished children are admitted to the stabilization phase only if they fail a RUTF feed appetite test or if they have bilateral pitting oedema, diarrhoea and dehydration. Otherwise, moderately acute malnourished children without complications and with a good appetite are admitted to the rehabilitation phase.

Population and Sampling Procedure

The target population was health workers working in the Nutrition Unit. They also were the unit of analysis for this study. The members of this population interact with and treat patients of interest and therefore are well acquainted with the data required to be collected. Additionally, they are in close interaction and influence the decision-making process and actions of the patient care takers, hospital authorities and the country's healthcare systems at large. These are doctors, nurses, nutritionists, and social workers.

The facility employs a total of 35 staff members. 4 doctors, 3 nutritionists, 1 social worker, 19 nurses, 1 medical records personnel, 4 cleaners, 2 security guards and 1 pastor. All doctors, nutritionists, nurses and social workers that were willing to participate, provided informed consent and were included in the study. The remaining ten slots were occupied by nurses recruited using, critical case sampling. This is a type of purposive sampling where the respondent chosen have rich information about the phenomenal of interest. This was done with the help of the head nurse and worker's register. In total, 18 respondents were interviewed. 4 doctors, 4 nutritionists, 1 social worker and 9 nurses.

Using this approach made it easier to collect better quality data on the subject matter and was more time and cost-effective. Doctors prescribe medication, and nurses provide general care and administer the medication. Nutritionists cater for prescribe feeds at the different stages in the stabilization phase and supervise feeding sessions. Social workers provide relevant health information to patients and care takers and help re-enforce guidelines. They provide information on how to maintain safety for themselves and the patients, how to use hospital facilities and general guidance and counselling.

Table 1. Gender and Work Status

Respondent	Gender	Work status	Duration of work at MNU
D01	Female	Regular	Over 6 months
D02	Female	Regular	Over 6 months
D03	Female	Rotation	Over 6 months
D04	Female	Rotation	4 weeks
Nur01	Female	Regular	Over 6 months
Nur02	Female	Regular	Over 6 months
Nur03	Male	Regular	Over 6 months
Nur04	Female	Rotation	5 weeks
Nur05	Female	Rotation	1 week
Nur06	Female	Rotation	4 weeks
Nur07	Female	Regular	Over 6 months
Nur08	Female	Regular	Over 6 months
Nur09	Female	Regular	Over 6 months
Nur10	Female	Rotation	3 weeks
Nut01	Female	Regular	Over 6 months
Nut02	Female	Regular	Over 6 months
Nut03	Female	Regular	Over 6 months
Nut04	Female	Rotation	3 weeks
SW01	Female	Rotation	Over 6 months

Justification of Sample Size

The sample size was 18 respondents. The minimum number of respondents acceptable in qualitative research especially when interviewing subjects with adequate knowledge about the phenomenon is 12 respondents and this was my lower limit. 50% of the total employees at the Nutrition Unit is 18 respondents, this was why it was made the upper limit. Data saturation is a point at which no more new data is being collected or when respondents give only repetitive responses. All 18 healthcare workers were interviewed.

Inclusion Criteria

A signed consent form was the criteria for inclusion in addition to the eligibility criteria explained below. Categories that were included are those that directly interact with the SAM children such as doctors, nurses, nutritionists and social workers that are

employed by the nutrition unit, giving priority to those that have worked at the nutrition unit for six months and above. Those that are reliably and richly informed about current practices and barriers employed to prevent nosocomial infections among SAM children at the nutrition unit.

A respondent was eligible if they were:

1. Health workers employed by at nutrition facility, giving priority to longer-serving employees.
2. Are either a doctor, nurse, nutritionist or social worker
3. Willing to participate
4. Willing and able to provide informed consent
5. Only healthcare workers in the SAM children's wards.

Exclusion Criteria

1. The support staff i.e. cooks, cleaners, pastors and security personals were excluded from this study as well.
2. Healthcare workers that have been working at SAM wards for less than a week.

The Benefit and Risk Assessment

Benefit

Respondents will benefit from the finding and recommendation**s** of the study. **O**btaining Knowledge and education which is helpful to healthcare workers to find which recommended practices they are not carrying out. To sight areas of improvement in how well IPC practices are carried out and the consistency of carrying them out. While this information is available to healthcare workers, a zero per cent prevalence of nosocomial infections has not been recorded anywhere in the world. This means there is still a lot of work and improvement in this regard. Because guidelines are updated often, it is important to keep well-informed through health

education and training on infection prevention for healthcare workers. Knowing the risk factors will help find mitigating strategies. And knowing barriers will call to action responsible bodies to aid do away with them for healthcare workers to successfully prevent the occurrence and spread of nosocomial infections. Additionally, study findings shall help to inform decisions and aid in policy setting at both the hospital level and higher.

Risk

There is minimal risk posed to respondent**s** as the questions asked are not sensitive in nature. Respondents were allowed to skip answering any questions that they found uncomfortable or completely stop the interview at any time. Respondents' identity was maintained under strict confidentiality identifying them by their occupation and study number. Data collected w**ere** stored under lock and key and accessed only by the researcher.

Instrument for Data Collection

One-on-One Interview

Health care workers. Qualitative data were collected using semi-structured one on one interviews. This allowed respondents to share their experiences working at nutrition rehabilitation facilities on the factors associated with nosocomial infections in Severely Malnourished Children and how these infections are prevented in their respective hospitals. The interview protocol was developed as per the study goals and research questions enhancing the study's trustworthiness. The interview's semi-structured flow further enhanced the study's reliability. In qualitative research, the interviewer is also an instrument, and therefore the way they relate to the respondents should be bias-free to collect better-quality data.

Key informants. A key informant is an individual with first-hand knowledge and quality information about the nutrition facility. An authoritative figure with lengthy years of work at the facility who therefore is knowledgeable about the facility's practices. This was done to further improve the credibility of the research findings given the fact that several health workers interviewed may be on rotation. Workers on rotation may have worked for less than a week, therefore not able to give responses rightfully reflective of the facility. With this approach, by hearing from the healthcare workers, their knowledge of practices for infection control is shown.

Observation Checklist

The second method of data collection was using an observation checklist comprising core practices and tools concerning hygiene and infection control that affect the occurrence and spread of nosocomial infections. Event sampling observation was carried out. This is a type of observation where short observations of particular situations are done to inform why certain behaviour occurs. The results can be used to identify what sparks off the behaviour, to identify possible causes and consequences of the behaviour under study and therefore plan interventions to address it where necessary.

Specifically, it shows what practices are not yet recommended and also how well and consistently the carried-out practices are done. A Likert scale was used during data processing and draw a better understanding of the phenomena of interest. On the Likert scale, excellent with a score of 5 also means completely agree or always, very good with a score of 4 means often or agree, good with a score of 3 means sometimes or neutral, fair with a score of 2 also means rarely or disagree while poor with a score of 1 also means never or completely disagree.

Document Analysis

Treatment, practices and management of malnourished children at the nutrition unit are guided by recommendations from the Integrated Management of Acute Malnutrition, IMAM and the Maternal, Infant, Young child and adolescent Nutrition MIYCAC. These are both reviewed and approved by the Ministry of Health of the government of Uganda for use in this facility. By reviewing them, more strategies for the prevention of nosocomial infections were revealed noted and analyzed.

The findings from observation and the respondents were cross-checked with the findings from the guidelines set for use by the facility. The IMAM and MIYCAN guidelines are further enriched by the WHO guide to hand washing and the WHO multi-modal approach to Infection Prevention Control. By analyzing these guidelines, it is clear what practices are recommended according to guidelines yet are not practised at the nutrition facility.

Table 2. Methods and Tools

Method	Tool
Interviews (what HCWs know)	One on One interview protocol
Observation (What HCWs do)	Observation checklist
Document analysis (Is it aligned with recommendations)	IMAM, MIYCAN

Data Collection Procedure

Data were collected at the nutrition facility through a face-to-face discussion following a phone appointment. Before the interviews, a pilot study was also conducted to ensure the interview questions kept participants stay on track with the topic of interest. The pilot study helped point out any issues that the interview a protocol may have been as postulated by Mayring (2015). A similar study

population at a nutrition rehabilitation centre for malnourished children was secured. With the help of the head of the unit, five respondents were obtained using random sampling. Three nurses, one nutritionist and one doctor were interviewed.

The progression of the interviews in terms of flow and information to be able to answer the research questions was assessed. It was noticed after carrying out the pilot study that the tool effectively corrected the data required. No major changes were made before using the tool. Recruitment of participants for the study was aided by the health nurse who is also the head of the Nutrition Rehabilitation unit. She provided information and schedules of the health workers and she helped recommend workers with rich information on the subject of discussion since the selection was purposive.

The researcher followed up on the recommendations and only those that signed and informed consent form were included. Because some respondents were unable to participate, the rest of the respondents were obtained using critical care sampling. This was done by giving priority to those that have worked for a minimum of one week to over six months as they have richer information on infection control in the wards of SAM children. Those on shift on the day of data collection were asked to participate and those who gave consent were also included.

A place suitable for audio recording, the triage area, was identified at the facility to hold the sessions. An audio recorder was used to capture the interview in addition to filling the interview protocols for accurate transcription. Member checking was done shortly a few days after transcription to further more ensure data quality. The time spent with each respondent was between 10-20 minutes. The audio and written data were then kept awaiting analysis. Data source triangulation was done by conducting interviews, observation using an observation checklist and document

analysis of health guidelines, Ministry of Medical Services and Ministry of Public Health and Sanitation (2020) and Ministry of Health (2020) to obtain their contribution to the study research questions.

To collect observation data, on arrival, the researcher introduced themselves at the hospital front desk and presented my letters of authorisation to gain access to the facility. I then proceeded to the ward where I observed several healthcare practices while filling out the observation checklist before meeting the scheduled respondents. The hard copies of the data collected were kept safely under lock and key. The soft copies were put on a hard drive during the study and accessed only by the researcher and authorized personnel where necessary. After the study is completed and the research project ended, the data will be destroyed as it will not be used for any other purpose.

Triangulation

Triangulation was done simultaneously. Responses from the health workers through interviews, use of the observation checklist and then studying of the guidelines to obtain their contribution to the study and to crosscheck it with the data collected from the respondents and by observation. Member checking was done where before analysis, the transcribed data was sent to some respondents by email to seek their opinion on if what was written accurately reflects their contributions.

Study Duration

The study was carried out in August 2022. Two or three respondents were interviewed every day, depending on availability until the desired sample size was covered. This was a one-time engagement except for member checking which was done over a phone call for twelve out of eighteen respondents. Observation and filling

of the checklist was done intermittently, and all data was obtained within 3 weeks. Week 4 was dedicated to document analysis of the IMAM and MIYCAN guidelines.

Method of Data Analysis

The interactive model of data analysis by Miles, Huberman, and Saldana (2019) was used to carryout data analysis for this study. This model employs three ways of analytic processes namely, data reduction, data display, and conclusion. During reduction, data is selected, focused, simplified and transferred from the written notes, observation checklists, interview responses and guidelines for Infection Prevention Control. Miles et al. (2019) by condensing, data is stronger and hence more meaningful.

1. **Step one.** Reading transcripts and making notes about first impressions.
2. **Step two.** Coding. This involves, circling out relevant pieces of information. Anything that is deemed important by respondents, observation results or guidelines. Anything the researcher found surprising or repeated by several respondents.
3. **Step three**. Identifying which codes are similar or related and then grouping them. Categories were formed at this stage, a few codes were dropped while others were added. Later generated themes that were displayed with supporting verbatim excerpts of participants in the analysis. Data reduction steps such as summarizing, coding, theme and category development, and writing analytical memos may happen simultaneously during data collection and continued during analysis. Below is a diagrammatic representation of the three processes.
4. **Step four.** Themes and categories were arranged according to hierarchy and a connection between them was explored and explained under each research question. Later generated themes were displayed with supporting verbatim excerpts of participants in the analysis.
5. **Step five.** A further arrangement of data or information into figures to enhance deep understanding by the reader.

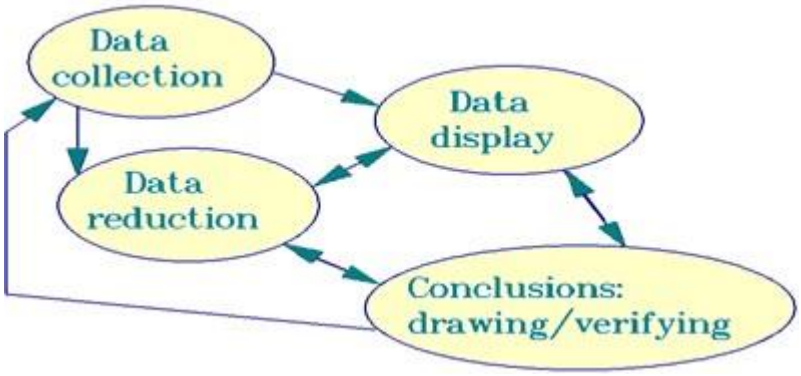

Figure 3. Data Analysis Process
Adapted from Miles et al. (2019)

By developing codes, categories and themes, coding is equated to analysis according to Miles et al. (2019). Cohen, Manion, and Morrison (2011) state that coding involves a process of marking segments of data usually in text data with symbols, descriptive words, or categories.

Finally, results were obtained to be discussed and conclusions drawn. The findings were checked to ascertain if they agree with previously done studies to minimize bias. The conclusion was contributed to by the data obtained through interviewing respondents, observation checklists and guidelines set by bodies of authority.

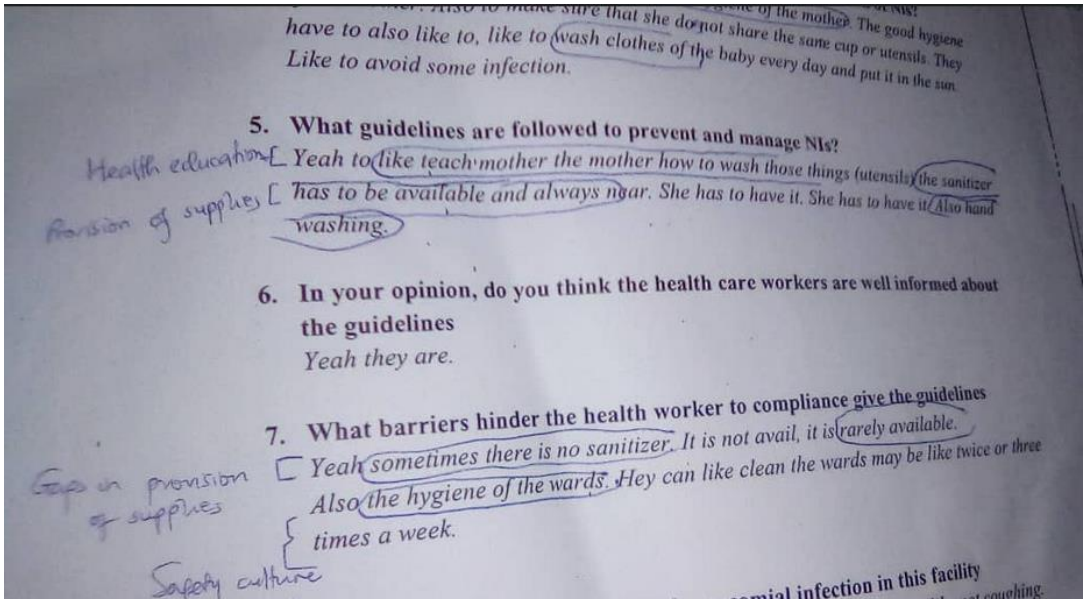

Figure 4. Sample of the Coding Process

In the end, 9 themes arose from data analysis. Theme 1. Proper use of PPE, theme 2. Proper hygiene, theme 3 health education, theme 4. Environmental cues, theme 5 routine surveillance, theme 6. Poor knowledge, theme 7 skills gap, theme 8 limited resources, theme 9. Infrastructural setup.

Ensuring Rigor and Trustworthiness

Trustworthiness shows the transparency of how a study was conducted. This is paramount to the integrity and hence usefulness of the findings. Trustworthiness or rigour of a qualitative research study refers to the degree of confidence in the data collected, its interpretation, and the methods used to ensure the quality of a study (Pilot and Beck, 2014).

In this study, Guba's trustworthiness model was used to address the issues of validity and liability equivalent in quantitative research. Guba's (1981) model of trustworthiness (Anney, 2014; Creswell, 2013) has often been used by several researchers to address the issue of validity, reliability, and objectivity in studies. Guba's aim for proposing this model was to evaluate the quality of qualitative data

and increase the trustworthiness of the study's results. To help readers evaluate the findings as they construct meaning and relate it to their context (Anney, 2014). Creswell (2013) and Anney (2014) summarized Guba's trustworthiness model with its four criteria to achieve trustworthiness as explained below.

Credibility

The credibility of the study, or the confidence in the truth of the study and therefore the findings, is the most important criterion (Pilot and Beck, 2014). A link between the research findings and reality is shown hence enhancing the study's credibility. The study was conducted using standard procedures typical for the case study qualitative research approach. Quality time, 12-30 minutes was allocated to each respondent to allow them to freely express themselves. Member-checking was carried out to ensure the data collected is accurate and agreed with the respondent's experiences. This was done using emails and phone calls.

Triangulation

Triangulation is the use of more than 2 data collection methods when carrying out qualitative research. For this study, interviews, observation and document analysis where data collection methods used. This technique facilitates the validation of data through cross-verification from more than two sources. Specifically, it refers to the application and combination of several research methods in the study of the same phenomenon to deepen understanding (Creswell, 2013; Kornbluh, 2015).

In this study, the researcher collected data from health workers including doctors, nurses, nutritionists, and a social worker using semi-structured interview protocols. A key informant was interviewed too to further enrich the data collected. Verification was done through observation and filling an event sampling observation checklist of a Likert scale nature. For triangulation purposed, the data collected was

cross-checked with guidelines from bodies of authority that are used by the nutrition rehabilitation unit where the study was carried out. Also the contributions from the guidelines where included during data analysis through the process of coding and coming up with themes.

Member Checking

The researcher requests some respondents in the study to check if the written account is accurate and consistent with what was said (Creswell, 2013). It involves returning the data after transcription to the respondents to seek their perception of the accuracy of the interpretation of the data (Anney, 2014). In this study, member checking was done after transcription where the researcher availed a copy of transcribed data to the participants. This was done through email and later followed up with phone calls. After getting feedback, revisions were done until a consensus was reached that what was documented reflected what was said hence, trustworthiness was enhanced.

Dependability

Dependability refers to the consistency and reliability of research findings. It entails the degree to which research procedures are documented allowing ease for someone out of the study to audit and critique the research process. An inquiry audit was carried out where an external person reviewed and examined the process and data analysis making sure the findings are consistent and repeatable. A constant reach to the supervisor will be maintained for continued guidance throughout all steps of the study.

Transferability

Transferability examines the degree to which findings obtained in the study can be transferred to different contexts or settings, especially by different researchers. Therefore, a detailed description of the research context is well expressed in this proposal as well as the assumptions central to it. Furthermore, evidence will be availed during the conclusion that the study findings can be reapplied to other populations, in different times, situations and contexts. For example practices like hand washing an surface cleaning for hospital facilities, the same information and guidance can be used repeatedly in different settings.

Confirmability

Confirmability aims at seeking confirmation or collaboration of the study findings by other researchers. This ensures that the data and its interpretation are factual and not merely from the inquirer's imagination, hence tackling bias. An audit trail was done where an external reviewer checked to ensure the process and interpretation used is consistent with both the literature and methodology required.

Applicability and consistency are ably shared within the four major components of trustworthiness in qualitative research namely, credibility, dependability, transferability, and confirmability.

Table 3. Summary of the Strategies Used to Increase Rigour and Trustworthiness

Quality Criterion	Provision Made by the Researcher
Credibility	• Use of appropriate, well-recognized research methods such as interviews, observation and document analysis • Triangulation by use of different data collection methods, and different types of participants' i.e. doctors, nurses, nutritionists, and social workers. • Debriefing sessions between researcher and adviser. At every step seeking guidance and opinion from the school research supervisor. • Peer scrutiny of research and debriefing which intend to discuss with colleagues regarding the process of the study, congruence of emerging findings with raw data, and tentative interpretations. This was done with the help of the health nurse, nutritionist and the research supervisor. • Member checks of data collected and interpretations/theories formed. Taking data and tentative interpretations back to the people from whom they were derived and asking if they are reflective of their opinions. This was done by the use of emails and follow-up phone calls during and after transcription. • Examination of previous research and literature review to frame findings was done in chapter 2
Transferability	• Provision of background data to establish the context of the study and a detailed description of the phenomenon in question to allow comparisons to be made. This was done in the introduction and literature review. • o Thick description of the phenomenon under scrutiny. This will provide adequate description to contextualize the study such that readers will be able to determine the extent to which their situations match the research context, and whether these findings can be transferred. This was done throughout the paper, from the introduction to the conclusion.
Dependability	• Employment of more than one method i.e. interviews, observation, document analysis. - In-depth methodological description to allow the study to be repeated. Case study, exploratory research design. • Adequate engagement in data collection. To reach data "saturation" when no new information is being shared. But since some respondents had worked for 1 week, a decision to interview all 18 HCWs was made.
Confirmability	• Triangulation to reduce the effect of investigator bias by use of 4 categories of health workers. Doctors, nurses, nutritionists and social worker • Recognition of shortcomings in the study methods and their potential effects, for example, some respondents on rotation having worked for a short period i.e 1 week and therefore the need to collect data from all 18 respondents • In-depth methodological description to allow the integrity of research results to be scrutinized. The study site is a governmental referral hospital nutrition unit with a high number of patients.

Ethical Considerations

Ethical clearance and Institutional approval were secured from the Institutional Review Board at the Adventist University of Africa. After approval from Infectious Disease Institute Research Ethics Committee was obtained, it enabled seeking clearance by the Uganda National Council of science and technology. With these two bodies in approval. An introductory letter and request for permission to carry out the study at the nutrition unit was submitted to the authorities at the nutrition unit and the referral hospital Director. Following approval by the nutrition unit's authorities, the researcher then proceeded to contact the respondents with the assistance of the ward in-charge. Each respondent was required to sign an informed consent form before they could take part in the study.

Other ethical responsibilities of the researcher were to protect the rights and welfare of the research participants. Privacy was maintained as respondents were identified only by occupation and study numbers. Informed consent was sought to ensure that there is voluntary participation and protection of study participants. Study participants were informed what the study is for, how the information will be used, and whether there is any potential risk involved. They were also encouraged to ask questions to ensure clarity of what the study is about.

All the texts and quotes, or sayings from other authors were duly recognized and acknowledged. Intellectual property rights were observed. In reporting results from findings, no data was fabricated or falsified, data analysis was unbiased and based on actual data collected. Notes gathered during interviews were scanned and kept in a folder secured by an administrative password along with recordings taken during interviews while maintaining respondents' privacy. The hard copies of all notes and materials collected during the study were kept under lock and key. The risk

and benefit a participant may have was well indicated on the informed consent which all participants were required to sign in addition to other eligibility or inclusion criteria before being included in the study.

CHAPTER 4

RESULTS AND DISCUSSION

This chapter comprises a presentation of the results and analyses of the findings. The characteristics of the respondents are summarized. Information from the interviews is presented where applicable as domains based on the Theoretical Domains Framework. And in other cases, the stages of change as per the Trans-theoretical Model have been explained alongside the domains. The themes that emerged from the interviewee's responses are presented and explained under the domains or by the six stages of behavioural change.

This is to show the aspects of Infection Prevention Control practices, factors predisposing Severely Acute Malnourished patients to Nosocomial infections and barriers to compliance to recommended practices will be addressed as per the study objectives. Supporting evidence obtained from observation and the key informant is also presented under each theme and crosschecked with contributions and evidence from the WHO Infection Prevention Control guidelines, MIYCAN and IMAM guidelines.

Practices by Healthcare Workers for Nosocomial Prevention

Practices for infection control are at the core of this study and practices that respondents mentioned and that were observed included hand washing, use of PPE, ward hygiene, patient and caregiver hygiene, routine check-ups, hygienic feeding, use of open cup or spoon feeding, use of visual aids to remind HCWs to take part in IPC,

bed spacing, patient isolation, bed spacing, wound care, health education for both care givers and HCWs, not sharing feeds, visitors conduct on the ward to avoid overcrowding, proper lighting ventilation. Also due to poor knowledge of all recommended practices for healthcare workers to prevent nosocomial infections and a skills gap on how well or effectively the practices should be carried out was identified. Barriers like limited resources and infrastructure, HCWs are unable to practice infection prevention control.

These hinder successful compliance with the IMAM and MIYCAN guidelines even if this information is available to the HCWs. The practices that are recommended by the IMAM and MIYCAN that are not practised at the facility include the cohorting of patients according to the time or period of admission to the ward. Having a surveillance system to enable monitoring and evaluation of all activities regarding infection prevention. Treatment of all admitted patients with systemic antibiotics was not mentioned but was observed as well as supported by document analysis. The IMAM guidelines recommend giving systemic antibiotics to all patients admitted to the inpatient therapeutic care wards.

Table 4. *Summary of results*

Research Question	Themes	Categories
RQ1: Infection Prevention Practices	Theme 1: Proper use of PPE	Gloves, Nose Masks
	Theme 2: Proper hygiene	Hand hygiene, Personal hygiene (patients, caretakers), Open cup feeding, Ward hygiene.
	Theme 3: Health education	Safety culture/ significance of Infection Prevention Control, each party's role in Infection Prevention Control
	Theme 4: Presence of environmental cues	Visual cues, Bed spacing
	Theme 5: Routine surveillance	Daily patient check-ups (Wound care, treatment of oedema), Infection Prevention Control audit (accountability)

RQ2 Predisposing factors	Theme 6: Poor knowledge	Consequences of not practising Infection Prevention Control, Infection Prevention Control guidelines used
	Theme 7: The skills gap	5 moments of hand washing, Use hand hygiene equipment
RQ3 Barriers to compliance	Theme 8: Limited resources	Financial limitations, Human resource
	Theme 9: Infrastructural setup	Isolation rooms, Ward size

Respondents Demographics

Categories

The health workers' roles of interest were doctors, nurses, nutritionists, and social workers. Members of these role groups interact with and treat patients of severely acutely malnourished children and therefore are well acquainted with nosocomial diseases and their prevention, the topic of interest. Additionally, they are in close interaction with the patients and not only influence patients' day-to-day treatment and living but also to a large extent the decision-making process and actions of the patient care takers, hospital authorities and the country's healthcare systems at large.

Table 4. Summary of the Study Respondents

Role Groups	Number	Percentage
Doctors	4	22.2%
Nurses	9	50%
Nutritionists	4	22.2
Social workers	1	5.6%

Half (50%, 9 of 18) of the respondents were nurses while only 1 (5.6 %) was a social worker.

Work Status

Work status was investigated. Eight out of 18 respondents were health workers on rotation while ten respondents were permanent employees of the nutrition unit. Being a government facility, a percentage of the healthcare workers that attend to patients are not permanently employed by the nutrition facility. Most are students and some volunteers and are therefore rotated or assigned shifts of work depending on their targets. Rotation periods vary depending on one's profession and what their goal is.

Therefore, health workers on rotation depending on when they joined the nutrition unit may not be as acquainted with nosocomial infections on this nutrition unit and the prevention measures in place and yet interact with patients. The implication this has on the study is not significant since, during purposive sampling and critical care sampling, priority was given to longer-serving staff especially those that have worked at the nutrition unit longer than 6 months. Also, the entire population sample was interviewed to compensate for any deficiencies in the information from the shorter-serving staff.

More regular workers were interviewed than rotation workers. This was done to collect information from the person's most acquitted with the day-to-day and general operations of the ward to be able to obtain data that is most reflective of practices carried out by healthcare workers to prevent nosocomial infections. The figure below shows participation by regular and rotation workers.

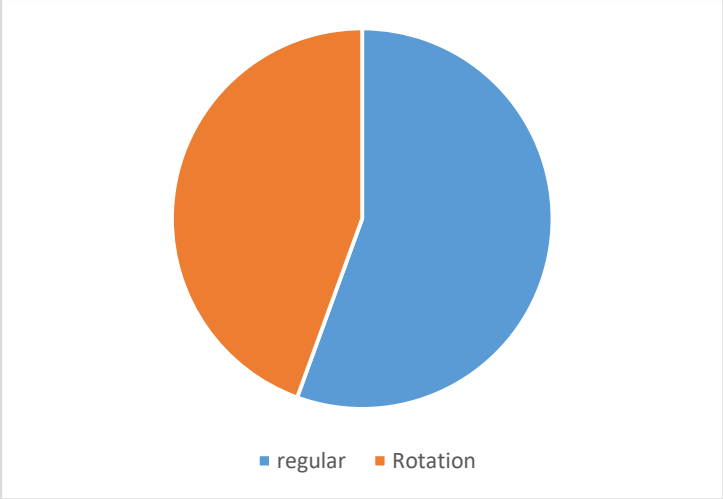

Figure 5. Work Status

RQ1: Infection Prevention Practices in Place

Everyone has a part to play in upholding Infection Prevention Control practices for a significant positive impact. It was revealed through this study that indeed health workers, caretakers and hospital authorities greatly influence the occurrence and spread of nosocomial infections. It was reiterated several times that caretakers are crucial players in achieving a nosocomial infection-free ward as they spend most of their time caring for vulnerable, sick children.

Caretakers are in physical contact with the patients the longest. They also carryout sensitive tasks such as feeding the patients, catering to their hygiene and the cleanliness of their utensils. These tasks could directly cause an infection to the patient if not well executed and the opposite is true. Health workers carry out vital Infection Prevention Control like carrying outward rounds, wound care, proper hand washing and education of the caretakers. Hospital authorities take on the burden of providing a reliable supply of Infection Prevention Control supplies and tools like gloves, hand hygiene equipment, and medications as well as provide the infrastructure

for wards and other structures required for the smooth running of the facility as is in all healthcare facilities.

Table 5. Codes and Development of Categories and Themes

Codes	Categories	Themes
Must use gloves to examine patients, gloves are changed for every patient during treatment, wound care consumes many gloves, sanitize while wearing gloves, enough supply of gloves, avoid handling patients without proper equipment	Gloves	Proper use of PPE
Visitors hardly use nose masks, Nose masks are uncomfortable, we use them in the wards to protect the patients and ourselves, Single-use masks are repeatedly worn, used sometimes, the hospital does not provide them, observe the wearing of masks	Nose masks	
Hand washing facilities at entrances, soap is provided for washing hands, teach mothers the importance of hand washing, we wash hands before seeing patients, hand washing is important to stop the spread of diseases, everyone is supposed to wash hands, hand washing sinks are separate from utensil washing sinks, by sanitizing	Hand hygiene	Proper hygiene
Caretakers are instructed to keep patients clean at all times and change soiled beddings immediately, sometimes soap is given, and water is available for bathing of care takers and washing their clothes, some patients require special bathing	Personal hygiene (patients, caretakers)	
No teats, straws are allowed to use for feeding, open cup and spoon feeding only, teach these mothers how to properly wash the utensils, utensils with straws, nozzles and teats are confiscated, only open cup feeding is allowed	Open cup feeding	
Clean wards daily, a clean environment, clean around the beds, to clean after patients, soap and water is used for cleaning	Ward hygiene	
Teach mothers how to wash their utensils, rarely use wall sanitisers, access the wards without washing hands, refresher courses for health workers, and orient visitors on how to behave on the ward	Safety culture/ significance of IPC	Health education
Caretakers to ensure the hygiene of patients, clean utensils, and follow instructions, Health workers to follow IPC guidelines, and teach about IPC	Each party's role in IPC	
Stool charts attached to each bed, charts written don't enter isolation rooms, reminders to wash hands before entering the ward, reminders to flush toilets	Visual cues	Presence of environmental cues
Patients are crowded, the bed spaces are not enough, the wards are small, need more space	Bed spacing	
Doctors and nutritionists see the patients daily, patient charts are filled, and try and see all of them, very sick patients are always given priority, to review as many patients as possible, taking notes throughout the check-ups	Daily patient check-ups	Routine surveillance
Surveillance of IPC, offering guidance in good times needed, accountability for practices, assessing the individual contribution	IPC audit	

Theme 1: Proper Use of PPE: Gloves and Nose Masks

Gloves and nose masks were the most mentioned personal protective equipment by respondents as a way of preventing the spread of nosocomial infections. Gloves prevent physical contamination where disease-causing microbes are transferred from patient to patient or from carer to patient. Nose masks on the other hand reduce the risk of exposure to respiratory infections by reducing the spread of airborne disease-causing microbes. According to our observation, gloves were worn by healthcare workers during physical examination and treatment of patients, especially during wound care. Gloves were not changed between examinations except where they involved bodily fluid.

While healthcare workers wore nose masks during all interactions with patients, the caretakers and visitors on the ward were not required to do so hence the risk of introducing respiratory infections to the vulnerable SAM children. Respondent D01 mentioned that visitors access the ward without nose masks which poses a threat to the patients. Our observations further revealed that there weren't any activities that confirmed that visitors were being screened for airborne and droplet-spread infections or any kind of infectious diseases before entry into the wards at all the entrances. Correct use of personal protective equipment like nose masks and gloves is key to the success of the endeavour to fight nosocomial diseases.

Theme 2: Proper Hygiene

Hand hygiene. Hand hygiene was a common response. Many respondents acknowledge the fact that hand hygiene greatly limits the spread of nosocomial infection, especially diarrhoea-related illnesses. Everyone accessing the ward is advised to wash their hands before entry. The ward is mounted with a wall sanitiser at

every entrance and a hand washing facility at two out of three entrances according to observation. There are reminders to wash one's hands before accessing the ward. Nut01 explained that the facility has sinks to wash hands and a separate sink to wash utensils and that utensils are not to be washed in the hand-washing sink and likewise. She further emphasized hand washing practice as an Infection Prevention Control method by saying "*availability of the sanitiser in easy and quick access is important"*.

Five random observations were carried out on five different occasions on the ward. Healthcare workers who performed hand hygiene either by washing hands or using a hand sanitiser were observed keenly to ascertain whether they followed the steps by step process for hand hygiene as stipulated in the WHO guidelines for hand hygiene. Our observations revealed that none of the observed healthcare workers performed all the steps of the hand hygiene technique. Whereas WHO stipulates that a step-by-step hand hygiene process be followed during the performance of hand hygiene, this wasn't the case among the healthcare workers that were observed. This kind of behaviour can be said of individuals in the preparation stage of change. In this stage, an individual starts to take some steps towards behaviour change as observed among the healthcare workers who engage in handwashing activities.

Personal hygiene. As much as there was an obvious emphasis on hand hygiene, other infection prevention practices such as the good personal hygiene of the mother or caretaker and that of the patient were also presented by several respondents. The key informant pointed out that caretakers are carriers of disease-causing microbes and therefore have to keep clean to better care for the sick children. The facility had bathrooms with clean running water for the caretakers to use. On admission, Nur07 mentioned that a piece of soap is given to caretakers for their personal use to

encourage good personal hygiene and eventually keep the patients safe from nosocomial infections.

Patient personal hygiene is just as important. Caretakers are expected to immediately change and clean soiled clothing weather with urine, poop or blood. To quote her verbatim, D04 said "*...and we encourage them, like to those dirty things, meaning soiled beddings away from their children."* However, from the responses given during the interviews, there was concern that the patient attendants were adamantly not heeding the advice given to them regarding hygiene. It was observed that some caretakers did not change and clean up soiled bedding immediately. Postponing cleaning poses the threat of reinfection to the patient and those closest to them.

The caretakers that cleaned right away are in the action and maintenance phase while those that delayed are in the preparation phase where they realise the need for the act of cleaning and therefore are planning to take action. Those that postponed cleaning up after the patients could either be in the preparation or relapse phases where they have been cleaning up on time but for some reason now have to postpone the act hence breaking progress.

When available, patients are offered diapers and a bar of soap by the facility to aim to maintain patient personal hygiene. This was observed during admissions at the nutrition unit. Care of oedema-caused wounds is one of the common causes of nosocomial bacterial infections and therefore special, hygienic care should be accorded is to be accorded these patients to prevent their occurrence and spread. The IMAM guidelines explicitly state that in cases where patients have oedema, caretakers are advised to gently wash the affected area with only water and apply zinc oxide cream on areas with broken skin as the only safe treatment for oedema-caused sores.

> Nut09 stated that some parents are unable to afford the zinc oxide cream for the treatment of oedema wounds and therefore resort to herbal medicine which may instead infect the wound causing sepsis.

Ward hygiene. Maintenance of ward hygiene was also mentioned as a preventive measure for nosocomial infections.

> Keeping the ward clean is also important, every caretaker is responsible for the cleanliness of their immediate surrounds and should clean up immediately when their patient makes a mess stated Nur07.

Also, the cleaners mop the wards twice daily with soapy water. They stay around to help in case there is a need for an emergency cleaning for example when a patient vomits especially in the triage area. According to observation, the caretakers and patients and visitors are not allowed to enter the ward with their shoes so as not to bring in dirt from outside. This is a measure that the nutrition unit came up with to maintain ward hygiene.

According to the Trans-theoretical model, all stake holders are knowledgeable about the importance of ward hygiene and are indeed doing their best to maintain it. Hence are in the action and maintenance phases of behaviour change. According to the theory of domains framework, the stake holders have the capability, opportunity and motivation to maintain ward hygiene and therefore is a successful prevention measure. It is commendable how clean the wards of the nutrition unit are.

Open cup feeding. As far as the use of open cups for feeding is concerned, one of the nurses mentioned the fact that the mothers are encouraged to use open feeding cups to administer feeds to the children. *If one is found with a cup with a feeding nipple or a feeding bottle with a nipple, these items are confiscated, never to be given back to the owner*. These are comments made by a ward nurse during one of the observation sessions. Some respondents also emphasized the use of clean utensils when feeding the children and the use of clean boiled drinking water to prepare feeds.

"Teach mother how to wash feeding utensils." and *"We also have boiled water in the kitchen to sterilize cups, and other utensils used to feed the baby"* were both responses from a nutritionist Nut01. Also, D01 made a statement saying "*Each mum is given separate milk in their cup which they are supposed to use and clean regularly. They are not supposed to share them but sometimes they do.*" Not sharing food or utensils is beneficial to limiting the spread of nosocomial infections.

The IMAM guidelines strongly recommend that children with severe acute malnutrition should be fed using open cups to prevent infection from the use of contaminated feeding nipples that are often difficult to sterilize and keep clean in low-resource settings. By doing away with nipples, straws and teats, the risk of exposure to disease-causing microbes is eliminated. This is a standard well known to both care givers and health workers and is continually enforced in the endeavour to prevent nosocomial infections. According to observation, hot water is provided by the kitchen throughout the day for caretakers to disinfect the patient's utensils before every feed. Also, clean drinking water is provided to caretakers for their use and that of the patients.

Theme 3: Health Education

Respondents made mentioned of the fact that health education aimed at imparting Infection Prevention Control skills was one way of empowering the people to participate in Infection Prevention Control activities. There are scheduled health education sessions for attendants on select evenings. There are dedicated personnel to conduct these sessions, either a nurse, social worker or sometimes a nutritionist. Matters concerning hygiene and other infection prevention and control practice are always discussed in these sessions. In response to how caretakers are empowered to take part in the prevention of NIs, Nut01's response was "*The mother has to be taught*

on the importance of their good personal hygiene. Also, to make sure that she does not share the patient's feeding utensils with anybody else." This response was corroborated by a ward nurse, Nur01 who in reiteration said ".... teach *the mother how to wash patients' utensils*)*..."*

Nur03 further affirmed this by stating that "*sensitizing the caretakers around the ward about hand washing and providing the sanitisers and teaching them how to use them"* is key as it encourages the washing of hands as a measure used to prevent the occurrence of NIs. While health education as a means of promoting Infection Prevention Control activities was mostly mentioned regarding the patients' caretakers. A few of the responses suggested that new staff and staff on rotation especially the interns need and are also given Infection Prevention Control training sessions.

Hospital management carries the burden of educating more patients to know of the dangers of these infections. They need to put in place measures and steps that will see both patients and Unit Staff act cautiously, wear face masks and gloves, treat and prescribe as and when needed, timely change urinary catheters in, and ensure that all wash their hands regularly. Educating patient caretakers on the likelihood of these infections and their dangers and how to effectively avoid them reduces percentages of both morbidity and mortality resulting from these infections.

Indeed, this is in tandem with the multi-modal approach that is recommended by WHO to promote Infection Prevention Control practices. This approach encompasses education and training also dubbed "teach it" as part of the core elements in encouraging people to engage in Infection Prevention Control activities. As far as the Trans-theoretical model of health behavioural change, such promotional activities are encompassed in the conscious raising process of change. This process consists of efforts that are aimed at increasing awareness about healthy behaviour. As

a process of change, conscious raising is important in the pre-contemplation and contemplation stages of change. In these stages, the individual has not yet started changing their behaviour. Therefore, making them aware of the need to change to good healthy behaviour starts with giving them information about the pros of changing to healthy behaviour and the cons of not engaging in healthy behaviour.

Safety culture and significance of infection prevention control. With specific regard to this study, the participants exhibited an awareness of the current practices that were being implemented to prevent nosocomial infections at the Nutrition Unit and that there is a negative implication to not observing Infection Prevention Control practices. Some of the Infection Prevention Control practices talked about by the respondents and key informants as well as collected through observation were hand hygiene, correct use of gloves and nose masks, use of isolation rooms, maintenance of clean wards and patient cleanliness In addition to these, use of open cup feeding, using zinc oxide cream to treat oedema sores, not giving any other feeds from the canteen or at home to patients in the stabilization and transition stages of recovery and only give hospital provided patients' therapeutic feeds namely F75, F100 and RUTF. All these are sensitive as they directly affect the exposure of vulnerable SAM children to disease-causing germs and therefore nosocomial infections.

The Trans-theoretical model of health behaviour change is largely a model of intentional change and focuses on the decision-making of the individual. A decision to engage in an activity can be influenced by an individual's knowledge of the consequences of not engaging in that activity. This study revealed that the participants were aware of the activities that were being implemented to prevent nosocomial infections in their unit of operation. Knowing a specific health behaviour and its pros

and cons is an important aspect that transcends all the six stages of change. It is particularly important in the second (contemplation) stage where an individual gives consideration to changing their current behaviour and to engage in healthy behaviour based on the pros and cons of engaging in the healthy behaviour.

Theme 4: Presence of Environmental Cues

Visual cues. Short messages that remind and show how to carryout healthy practices on public display are strong environmental cues. They could be charts, images or wall writings. They are indirect preventive measures against the spread of nosocomial infections as they continually reinforce positive action. It was evident from direct observation, that there were posters pinned up at the entrances to the wards with written reminders about washing hands, wearing masks and keeping a social distance. Others were writings on the wall reminding people not to enter isolation rooms and the Intensive Care Unit without authorization. As per the multi-modal approach that WHO recommends, communications and reminders are essential aspects in promoting Infection Prevention Control activities. However, contrary to this recommendation, Infection Prevention Control messages were not seen on the walls beside the patient beds in the ward.

Bed spacing. It was mentioned by Nur05 that the ward is at times too full and overcrowded. This makes it difficult to maintain proper bed spacing. Information from the direct observation of bed spacing on the ward showed that the average space between the patients' beds was generally below 0.5 metres apart as opposed to the WHO recommended distance of at least 1 metre apart.

Theme 5: Routine Surveillance

Daily patient check-ups. However, the healthcare team endeavours to conduct ward rounds to identify patients who have developed new infections while on

the ward and quickly put them on treatment. ***"****Every morning, they carry out ward rounds and they make sure they record****"*** was a comment made by respondent D01, one of the doctors. During ward rounds, patients were assessed for progress and appropriate recommendations were made on the patient's charts. Treatment is given daily as well as wound care which involves cleaning, treatment and dressing where necessary.

Wound care. Wound care is also done daily. This is paramount as it is the main contributor to sepsis, a common nosocomial infection. On observation, it was noted that whereas most of the time, all the patients on the ward were reviewed by the doctors, sometimes, some patients missed being reviewed.

Infection prevention control audit. Surveillance for nosocomial infections is constrained by a lack of funds to facilitate routine patient laboratory investigations, especially in cases where nosocomial infections are suspected. So, this is rarely done. However, "*blanket antibiotics are given to all patients on the ward*" to prevent the occurrence and spread of nosocomial infections stated the key informant. According to observation, no audit was done on infection prevention practices. Therefore, no tracking of mistakes is done to encourage a change of practices and no positive reinforcement for practices well done to encourage maintenance.

Throughout the study, a lack of accountability was noted. From the observations made, it was evident that there weren't any checklists to remind the cleaners about what to clean and what disinfectant solutions to use when cleaning surfaces and how to clean. Indeed, further observations revealed that cleaning of the wards is done using liquid soap and over the observation period, disinfectants were not used by the cleaners to clean surfaces. Additionally, according to observation, none of the observed healthcare workers performed all the steps of the hand hygiene

technique according to the step-by-step recommendations stipulated in the WHO guidelines for hand hygiene. There wasn't any real-time feedback and consequently, no real-time corrective, remedial, or punitive action was taken.

RQ2: Predisposing Factors

Table 6. Codes and Development of Categories, Themes

Codes	Categories	Themes
When they share utensils, sharing beddings, feeds and utensils must not be shared, visitors access wards without masks, and poor care for oedema wounds	Consequences of not practising IPC	Poor knowledge
Healthcare workers did not know the sets of guidelines followed by the facility but rather the components of the guidelines such as washing hands, not crowing and maintaining hygiene	IPC guidelines used	
Washing hands was repeatedly mentioned but not the correct way of washing them	5 moments of hand washing	Skills gap
Caretakers don't know how to use all sanitisers, teach mothers how to properly wash utensils, how to care for wounds and catheter and NG tube	Use hand hygiene equipment.	

Theme 6: Poor Knowledge

Consequences of not practising infection prevention control. A knowledge gap on the importance of hand hygiene and proper hand washing was observed among caretakers, health workers and ward visitors in different ways. When asked about what they thought were the factors that predispose to nosocomial infections, the key informant expressed that **"***the hand hygiene equipment is available although I think that these caretakers aren't informed enough about their use so they barely use them***"** These claims were corroborated by the observation on the ward which revealed that

despite the presence of hand hygiene equipment at the entrances, some healthcare workers and attendants were observed to enter the wards without washing hands.

Others were seen to have washed their hands but not according to the 5 moments of hand washing the WHO recommends. As much as there might be other factors to explain such behaviour, the factor of knowledge deficit on the consequences of not washing hands, especially by the caretakers and visitors cannot be overlooked. ***"...sometimes the caretakers don't know why hand hygiene equipment is in place."*** Without knowledge, one may never develop the intentionality needed to engage in a new practice.

Regarding the Trans-theoretical model of health behaviour change, the observed behaviour in corroboration with the responses from the interviewed individuals was suggestive of a group of individuals in the stages of either pre-contemplation for mostly caretakers. Contemplation (practising it but not consistently) and action stage (practising it but not according to WHO guidelines) for mostly healthcare providers.

Ignorance about infection prevention control guidelines. However, when asked about specific Infection Prevention Practice guidelines and protocols, most of the respondents did not mention these guidelines. Instead, they mentioned general statements about infection control practices. For instance, in response to the question, **"**what guidelines are followed to prevent Nosocomial Infections?**"** several nonspecific responses included Sanitizing, washing hands, wearing masks and cleaning the hands, and only 2 respondents pointed out the IMAM Guidelines. Guidelines are a set of specific policies or standards of operation that guide practice such as the WHO guidelines on hand hygiene, the IMAMA and MYCAN guidelines under the Ministry

of Health of Uganda. From the responses, it was evident that the respondents only re-echoed the aspects of the guidelines but not the specific guidelines themselves.

Theme 7: Skills Gap

How to use hand hygiene equipment. From our observations, there wasn't any dedicated personnel to offer hands-on technical guidance to visitors entering the ward on how to operate the hand washing facilities located at the entrances to the wards. Indeed, some caretakers and visitors don't know how to operate wall sanitisers. Nut01 illustrated this in the statement ***"****by teaching caretakers how to use the hand sanitizing equipment****"***, the skills gap can be filled. Health education on the importance of hand washing and how to properly carry this task out is of great importance to the occurrence and spread of nosocomial infections.

5 moments of hand washing. Knowing something and doing it right are independent of each other. Healthcare workers know the advantages of washing hands and know how to use hand hygiene equipment. However, it was observed that while some healthcare workers washed their hands, they did not wash their hands the right way, by using the 5 moments of hand hygiene recommended by the WHO. This is a skill that all people on the ward should be educated about and learn to do practically. Effective hand washing greatly limits the occurrence and spread of nosocomial infections.

RQ3: Barriers to Compliance

Table 7. Codes and Development of Categories and Themes

Codes	Categories	Themes
Not enough sanitisers, sometimes there is no soap, we have to go outside the ward to access them, limited access to zinc oxide, sometimes sanitize over the gloves, not enough nurses on the shift, rotation of interns and SHO	Finances Human resource	Limited resources
have only 2 rooms, sometimes no space for isolation, one isolation room no windows, need more isolation rooms we could use more space, crowding of patients, need to expand the wards, bed spacing is not good	Isolation rooms Ward size	Infrastructural setup

Theme 8: Limited Resources

Financial limitation. WHO recommends that healthcare administrators should ensure that conditions are conducive to the promote Infection Prevention Control practices. Provision of necessary supplies to not only facilitate, but also maintain Infection Prevention Control activities. On observation, it was found that there were hand-washing facilities at only two of the three entrances to the wards. According to the 2020 hand washing summary by the Global Handwashing Partnership, there is evidence that suggests that one of the greatest opportunities to improve handwashing with soap includes the establishment of handwashing facilities and supplies.

These can act as a cue or reminder for handwashing and can work to overcome some of the perceived effort and other psychological trade-offs that may prevent handwashing. Therefore, availing hand hygiene equipment at all needed stations always is needed. It was observed that some hand washing stations did not have soap or sanitizing equipment and even when sanitizing equipment was available. There

were instances when there wasn't any sanitiser inside the equipment. This observation finding corroborated the claims by the respondents about what they perceived to be barriers to being compliant with Infection Prevention Control recommendations.

When asked to comment about the availability and accessibility of sanitisers on the ward, one of the respondents made mentioned the fact that one has to sometimes make extra efforts to make sure they access the sanitisers. This is an illustration of an individual's resolve to make sure they perform hand hygiene on the ward. The quote below gives an insight into intentional behaviour by D01 *"…..sometimes you have to go outside the ward to look for them (sanitisers)."* For one who is not highly motivated to take part in hand hygiene, this would be a hindrance and therefore access the wards without carrying out hand hygiene. Regarding the Trans-theoretical model of health behavioural change, the absence of cues that motivate healthy behaviour can foster relapses from an advanced stage of change and encourage retrogression to an earlier stage by creating an environment that fosters complacency.

Lack of funds to facilitate routine patient laboratory investigations at least in cases where nosocomial infections are suspected. This is an expensive intervention, and the financial burden is at times too heavy for some patient's families which limits effective follow-up and treatment in case of nosocomial infections. It was observed that some caretakers could not afford Zinc oxide cream to apply on the patient's oedema sore. This cream costs about $1.

Human resource shortage. Only 2 nurses are allocated to a shift to attend to an average of 35 patients on the ward for the transition and rehabilitation wards. 3 nurses were allocated to the stabilization ward. This can be overwhelming in that some Infection Prevention Control activities will end up being ignored. The staff is

already not enough therefore there is no dedicated Infection Prevention Control personnel to carry out daily infection control audits. This is in contrast to WHO recommendations that require that compliance to Infection Prevention Control practices is monitored objectively, and feedback given to stakeholders. This aspect of the multi-modal approach to promoting Infection Prevention Control activities is referred to as monitoring and feedback also dubbed **"**check it.**"**

Rotations. High turnover of staff especially medical interns who are allocated to the ward for only a month and a new team is deployed thereafter. This requires the orientation of new staff on Infection Prevention Control activities every month. A very important yet tiresome process.

Theme 9: Infrastructural Setup

Insufficient isolation rooms. When asked to comment on isolation space, one respondent had this to say, *"....the number of children coming in need more space. We cannot have only 2 rooms."* With a further comment *".....we could need more rooms."* This claim was indeed confirmed by observation. There were only 2 patient isolation rooms for all 3 of the wards. One of the isolation rooms has no windows and this limits proper ventilation.

This suggests that even if people are willing to follow and comply with the Infection Prevention Control guidelines for instance concerning the isolation of patients, or proper ventilation of the ward, the current infrastructural design of the ward wouldn't favour this particular Infection Prevention Control practice and would thus indirectly predispose the admitted children to nosocomial infections. *"....maybe to expand on these wards to avoid overcrowding"* was a response by D03. This response is reflective of the need for infrastructural adjustments in favour of promoting Infection Prevention Control activities

Ward size. *"Given the number of patients coming in, we need more space."* This was a comment given by the key informant, a nutritionist, about the ward size in comparison with patient numbers. D03 further affirmed this by stating that *"....maybe to expand on these wards to avoid overcrowding."* This response is reflective of the need for infrastructural adjustments in favour of promoting Infection Prevention Control activities. Overcrowding encourages the spread of nosocomial infections and is a barrier to compliance with Infection Prevention Control practices.

Discussion

The nosocomial infection situation is worse in sub-Saharan Africa and developing countries where the figure of hospitalized patients with these infections rises to 10 in every 100 people (Ujjwala et al., 2018). This is because there is a lack of sufficient resources as well as poor compliance with evidence-based infection prevention and control guidelines (Iliyasu et al., 2016). The occurrence of these infections is significant in inpatient wards, who have critical illnesses. Severe Acute Malnutrition is a critical illness at any age but is even more sensitive and life-threatening in children.

According to Ujjwala et al. (2018), the increase in the prevalence of nosocomial infections in subacute care settings, especially in developing countries, is an alarming threat to health providers as well as patients. This warranted a study on the prevention of nosocomial infections and barriers to compliance. A study of great importance to shine a light on the areas of concern in the nutrient rehabilitation unit and therefore a call to action to effectively overcome nosocomial infections. The image below shows seven strategies to prevent healthcare-associated infections or nosocomial infections adopted from the global alliance of infections in surgery. All these strategies cut across to nosocomial prevention in treatment of patients with

malnutrition. A tool like this one when adopted by bodies in authority for nutrition rehabilitation is a great environmental cue for health workers to continually and consistently take part in infection prevention practices. It can also be used as a tool or IPC audits and the basis for an IPC surveillance system.

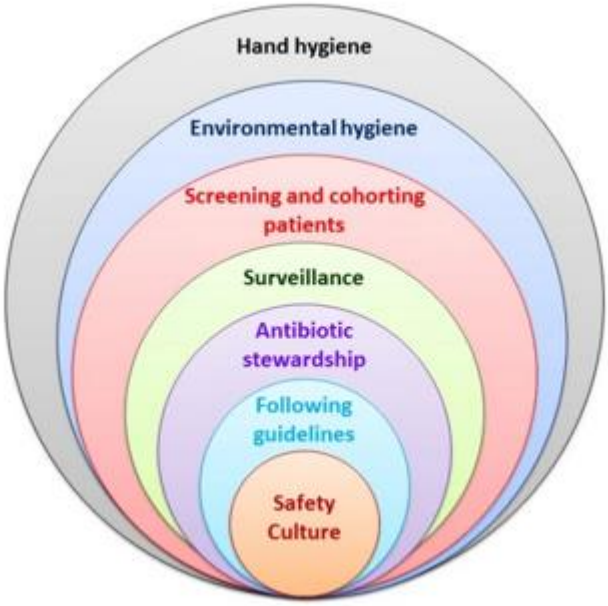

Figure 6. 7 Strategies to Prevent Healthcare-Associated Infections
Adopted from Global Alliance for Infections in Surgery.

Theme 1: Proper use of PPE

Proper use of personal protective equipment by health care workers is vital in preventing the spread of infection. Personal protective wear is specialized clothing or equipment worn by persons in a healthcare setting to protect themselves and their patients against infectious diseases (Jenkins, 2017). Protective equipment puts barriers between colonized surfaces coming into contact with patients and if used properly can well prevent the spread of nosocomial infections.

In some cases, even when protective wear is available, it may not be used in the right manner especially nose masks and head coverings. Study findings indicate

that some healthcare workers wore their nose masks on the chin and some didn’t wear them at all despite being present. A study done by Ong et al. (2020) on headaches associated with wearing protective equipment showed that indeed healthcare workers confirmed that wearing nose masks, head wraps and goggles for extended periods resulted in headaches and face pain. Some healthcare providers at this nutrition unit where observed wearing nose masks on their chins.

Changing gloves from patient to patient was found adequate in our study, especially in cases where healthcare workers' hands were not physically soiled. Is could be due to several factors including limited access to supplies among others. A study done by Honda and Iwata (2016) on personal protective equipment and improving compliance among healthcare workers in high-risk settings revealed that in cases of financial constraints, it is indeed difficult to comply with recommendations about the proper use of protective wear hence exposing both the patients and healthcare workers which is a similar case according to our research finding in this study. Reliable access to personal protective wear is related to reliable financing while proper use of the personal protective wear is related to knowledge on belief about consequences, a domain under Motivation, a component of the theory of domains framework.

Theme 2: Proper Hygiene

Hygiene in a clinical setting encompasses the hand hygiene of caretakers, visitors, and especially healthcare workers. In this study, environmental hygiene as well as personal hygiene of the patient and caretakers continually surfaced. How figure below shows how transmission occurs if hygiene is not critically taken into account. A surface is contaminated by touching body fluids or waste, diaper changes, and respiratory care. The surface can be an environment of patients' hands of

caretakers and health workers. With cleaning and disinfections, the cycle is broken. When cleaning and disinfection do not take place, healthcare workers will transmit the pathogenic microbes to another susceptible patient through touch hence a new infection as shown in the illustration below.

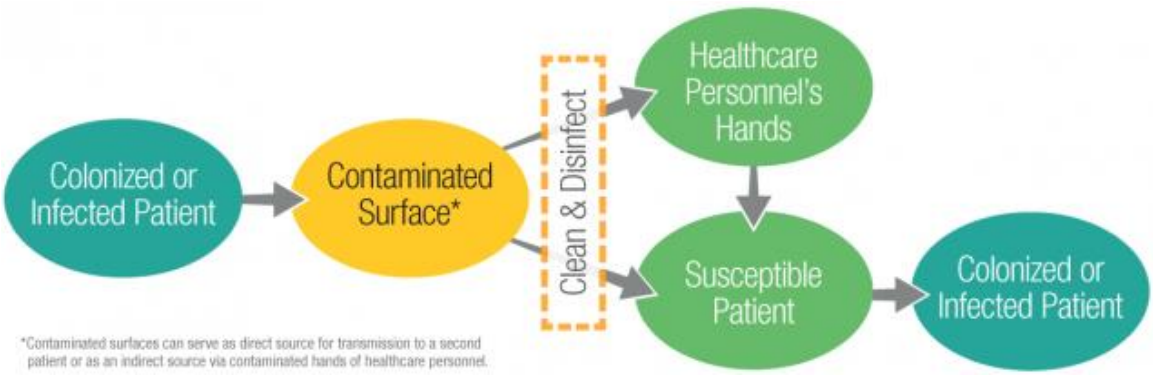

Figure 7. Transmission of Microorganisms through Contaminated Surfaces

Hand hygiene. Proper hand hygiene is the most important, simplest, and least expensive means of reducing the prevalence of nosocomial infections. Cleaning the hands of healthcare workers can prevent the spread of microorganisms, including those that are resistant to antibiotics and are therefore becoming difficult or impossible to treat. The hands of healthcare workers play a crucial role in the transmission of microorganisms during the sequence of care and contact with environmental surfaces and patients' skin. The most common modes of transmission of pathogens in hospitals are via the hands of health care workers even when with gloves on confirms (Giuffré and Kilpatrick, 2016).

Despite the acknowledgement of the critically important role of hand hygiene in reducing the transmission of pathogenic microorganisms, overall compliance with hand hygiene and recommended hand-washing practices remains unacceptably low in many healthcare settings worldwide, especially in a country like Uganda (Carling, 2016). This is in agreement with our research findings where hand hygiene was

neither not done consistently nor as recommended but by guidelines by all healthcare workers, caretakers and visitors. Proper and consistent hand hygiene reflects awareness, attitudes and behaviours towards infection prevention and control.

Proper hand washing and maintaining the consistence of this practice requires easy accessibility to hand washing facilities, environmental cues, and knowledge through training and retraining of healthcare workers. These strategies build capability among healthcare workers, provide opportunities and boost motivation to take part continually and consistently in hand washing. While low compliance and a high relapse rate have been recorded as per prior studies explained above, using these strategies, it is possible to have a great positive impact on hand washing at this nutrition rehabilitation facility.

Environmental hygiene, Environmental hygiene is a basic principle of infection prevention control in healthcare facilities. Contaminated hospital surfaces such as floors, walls, windows, doors, and toilets among others play an important role in the transmission of micro-organisms, Therefore, appropriate hygiene of surfaces and equipment which patients and healthcare personnel use is necessary to reduce exposure. For patient safety, hospitals must strive to maintain a hygienic environment and minimize the presence of pathogens on all surfaces. The role of environmental hygiene is to reduce the number of infectious agents that may be present on surfaces and minimize the risk of the transfer of microorganisms from one person/object to another, thereby reducing the risk of cross-infection.

There are several foundational elements, or Core Components, that help establish and sustain a clean, safe environment that supports the safety of patients, healthcare personnel and visitors. A study done in Burkina Faso recommends the use of Sodium hypochlorite (NaOCl) commonly known by the brand name Jik. This is an

important chemical disinfectant that is widely used in health care that exhibits action against a broad spectrum of antimicrobial activity (Duvernay et al., 2020). It is one of the relatively affordable yet effective options. According to the research findings of this study, cleaning was done with only soap and no disinfectant. Using a disinfectant greatly reduces the spread of nosocomial infections (Alfa, Lo, Olson, MacRae, and Buelow-Smith, 2015). This needs to change for effective cleaning at the nutrition rehabilitation centre. Effective cleaning directly affects the spread of nosocomial infections.

Theme 3: Health Education

Knowledge, a domain under capability is at the core of behavioural change or any kind of behaviour influence. The role of health education in the prevention of nosocomial infections is significant. The health care workers that participated in this study know about the importance of hand washing but were seen to not perform it correctly as recommended by the WHO or at the appropriate times according to the 5 moments of hand hygiene. The education of nurses by educational guidelines has been shown to have a positive outcome in improving nurses' knowledge and practice. Therefor the role of education in the prevention of nosocomial infections is significant (Zeigheimat, Ebadi, Rahmati-Najarkolaei, and Ghadamgahi, 2016).

Patients, care givers and visitors should be educated on the same as well. The importance of hand hygiene and how to effectively wash one's hands to prevent transmission of disease-causing microbes. An investigation done at an Iranian hospital on hand hygiene showed that overall hand hygiene compliance was 6.4%. As such, the adherence to hand-hygiene among healthcare workers is low (Zeigheimat et al., 2016).

Health education through refresher courses for health workers on the current advancements in the prevention of nosocomial infections is paramount. According to the research findings of this study, healthcare workers were unaware of the guidelines used by the nutrition facility. This is indicative of a knowledge deficiency that can be solved through nutrition education. A study on nosocomial infections and the challenges of control in developing countries, stresses the need for health education for all stake holders involves in healthcare to effectively prevent the spread the nosocomial infections (Samuel et al., 2010). This study revealed that healthcare workers did not wash their hands effectively as per the recommendations and were unaware of what guidelines are used by the facility for infection prevention. This can be changed with health education.

Theme 4: Presence of Environmental Cues

Physical environmental cues constantly remind persons about infection prevention practices. Signage of how to effectively wash one's hands at the hand hygiene point is necessary to encourage positive action (Wang et al., 2020). A chart with the 5 moments of hand hygiene on the wall of the healthcare lounge as well as the treatment station is vital to prevent contamination from surfaces or healthcare givers' hands. Evidence shows that picture signage when accompanied by words is more effective than just words as it helps overcome the language barrier. Also, people are more captivated by pictorials than they are by text (Mugambe et al., 2021).

According to research findings, physical environmental cues are insufficient for the effective prevention of nosocomial infections. Environmental cues stimulate memory, capture attention and guide decision-making to take part in a particular infection prevention control practice. Memory, attention and decision are domains under capability, a core component of the theory of domains framework. More

environmental cues are needed at respective points on the ward and its surroundings to encourage healthcare workers and all people to take part in infection prevention control practices.

Theme 5: Routine Surveillance

Surveillance is done by daily check-ups of all inpatient persons by the doctor and appropriate treatment and laboratory testing is done following the doctor's recommendation. Early detection is an important component of a successful infection prevention program. When a positive result is obtained, isolation to avoid patient-to-patient spread is stopped by isolation and treatment follows (Alfa et al., 2015). This is also the recommendation of the IMAM and MIYCAN guidelines. Please note that early detection requires laboratory tests which are relatively expensive and therefore not accessible to most patients at this facility.

There is evidence that laboratory testing is fundamental to determining continually occurring pathogens, especially in the case of antibiotic resistance to therefore find appropriate measures to combat them (Suzuki, 2021). An audit of the infection prevention program or daily activities aimed at preventing nosocomial infections is key. This allows overseeing all stakeholders and providing health education were needed, reinforcement for well-done activities and constructive criticism in areas where improvement is a possibility (Kajihara, Yahara, Hirabayashi, Shibayama, and Sugai, 2021).

According to the research finding of this study, no IPC audit is done and laboratory testing for the sole aim of surveillance for the nosocomial situation among patients is non-existent at this facility. A call for intervention to put IPC audits and an IPC surveillance system in place at this nutrition rehabilitation is ideal to provide an enabling environment for healthcare workers to take part in infection prevention

control. Audits and surveillance make healthcare workers feel capable and also provide the opportunity for them to take part in IPC as well as give motivation for the same. Capability, opportunity and motivation are core components of the theory of domains framework.

Theme 6: Poor Knowledge

Keeping abreast of the latest findings regarding the spread of nosocomial infections and strategies for prevention is paramount for a successful infection prevention program. Several infection control interventions focus on reducing the transmission of organisms which is the basic for breaking the cycle of pathogenic microbes spread.

Additionally, it is important to identify a multidimensional approach to measures that are aimed at reducing the risk of infection. Both the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) have published and continue to update guidelines for the prevention of nosocomial infections. These guidelines have greatly contributed to the Ministry of Medical Services & Ministry of Public Health and Sanitation (2020) and Ministry of Health (2020) currently used by the Ministry of Health of Uganda at all government health institutions such as the nutrition unit where this study was carried out.

However, knowledge, attitude, and awareness of infection prevention and control measures are often inadequate and a great gap exists between the best evidence and clinical practice against such infections (Ashu, 2023). Despite evidence supporting the effectiveness of best practices, many clinicians fail to implement them. The evidence-based processes and practices that are known to reduce the incidence of nosocomial infection tend to be underused in routine practice (Alvina, Afzal, and Ali, 2023). Therefore, it is paramount to re-echo the need for training and retaining

healthcare workers availing the latest on IPC to keep them updated. This provides motivate and the capability that healthcare workers need to feel to effectively take part in infection prevention according to the theory of domains framework.

Theme 7: The Skills Gap

Having established the importance of health education to provide knowledge, it is important to note that skills too are vital. The first phase of health education should be theory and followed by a practical session. Practical sessions are more engaging and therefore make an impression on one's memory making it easier to remember (Ashu, 2023). This improves the chances of compliance. According to the findings of this study, caretakers, visitors and healthcare workers did not know how to properly wash their hands despite knowing the importance of hand washing. Some caregivers could not operate wall sanitisers.

Skills training is not a one-time engagement, refresher trainings are very beneficial to maintain good practices (Samuel et al., 2010). In the theory of domains framework, skills is a domain under capability. Healthcare workers being availed with the skills of washing hands the right way like the WHO recommends, is empowering. It makes them fill capable of carrying out handwashing effectively and consistently to prevent nosocomial infections. The skill on how to wash hands following WHO recommendations as well as the 5 moments of hand hygiene should be trained or retained to health workers at this nutrition unit.

Theme 8: Limited Funds

Insufficient funds is a great limiting factor as it fuels operations, and avails supplies as well as human labour to work in the healthcare centres. When financial resources are a miss like in the case of this nutrition facility, the opportunity as reflected from the theory of domains framework, for healthcare workers to prevent

nosocomial infections is hindered and, in some cases, completely removed. When there is a shortage of healthcare workers, the few at work are often overwhelmed and therefore it is difficult to follow infection prevention measures. Employing adequate staff to avoid employee burnout is a recommendation by the IMAM and MIYCAN guidelines that are lacking at this facility. Nurses expressed that they work long shifts and are at times very tired which makes it challenging to carefully and consistently follow infection prevention protocols. More staff need to be assigned to work on the wards to reduce employee burnout. This motivates staff to take part in infection prevention. Motivation is a core component of the theory of domains framework.

Funding limitations will restrict the expansion of the wards even when the patient numbers increase and lead to overcrowding which encourages the spread of nosocomial infections. Which is the case in this study. Respondents report overcrowding of patients during high pick seasons. Observation showed insufficient bed spacing due to space constraints. Also cleaning of the ward floors was done with only soap and no disinfectant. A study carried out in Burkina Faso on the prevention of nosocomial infections in resource-restricted settings agrees with the research finding of this study that suggest the necessity of the use of chemical disinfectants as a means of disinfecting surfaces such as Sodium Hypochlorite, a relatively cheap but effective disinfectant (Duvernay et al., 2020).

Laboratory testing and surveillance of nosocomial infections is an expensive endeavour and due to financial constraints, the parents and caregivers of the SAM children at this nutrition unit are unable to afford it. This makes the occurrence of nosocomial infections more frequent increasing its prevalence. A study by Demirhan and Aldrich (2022) is in agreement with the research findings of this study and affirms that understanding the great importance of early pathogen identification paves

the way to breaking the cycle of the dangerous microbes that cause nosocomial infections. The study goes on to show the challenges such as increased mortality and financial loses that go into slowing down the spread of an infectious disease is not detected and managed early. Testing and early detection of nosocomial infections is a recommendation for prevent of spread. However, limited funds make this unrealistic at a national referral nutrition unit like the one where this study was carried out. Due to financial resources limitation, healthcare workers do not have the opportunity to put into practice their knowledge and skills in the prevention of nosocomial infections according to the theory of domains frame work. This then stirs-up the spread of nosocomial infections in this facility.

Few isolation rooms were a concern raised during this study. Isolating a patient infected patients is beneficial in stopping the patient-to-patient spread. It is ideal to practice isolation as a core part of any infection prevention and control program. However, it is not done often or consistently and rigorously, because they are expensive, time-consuming and often uncomfortable for patients. There is a financial implication as it is expensive to build or expand facility premises and yet it is of utmost importance in the endeavour to prevent the spread of nosocomial infections. The decision to adopt temporary isolation rooms that are effective at isolating patients within the general ward environment reduces health service costs and increases health benefits (Graves et al., 2022). The nutrition unit where the study was carried out needs to make provision for more isolation spaces the healthcare workers expressed during interviews. According to the theory of domains framework, the environmental context and resources at this facility are a limitation to healthcare workers as they are not availed the opportunity to effectively prevent the spread of nosocomial infections.

Theme 9: Infrastructural Setup

Hospital beds on the nutrition unit wards where research was carried out were insufficiently spaced according to research findings. The minimum spacing between two beds is one to two meters at least. Compliance with these recommendations is hindered by the over-low of patients and yet the ward size remains the same. Increasing ward size or finding more space in the facility to make this possible greatly impacts the patient-to-patient spread of nosocomial infections positively (Carling, 2016). When finances are strained, it is challenging to therefore comply with guidelines (Samuel et al., 2010).

In addition to bed spacing, the wards should be well-ventilated with sufficient natural or white lighting to ensure proper hygiene is maintained In this study, the environment context as reflected from the theory of domains framework needs to be adjusted. An enabling environment by availing more ward space to cater to the patient population enables healthcare workers to comply with the recommended bed spacing and therefore prevent the spread of nosocomial infections. One of the two isolation rooms at this facility lacks proper ventilation and this too is an infrastructural limitation that encourages the spread of airborne nosocomial infections.

Conclusion

As rightly noted by Zaragoza et al. (2014), nosocomial challenges are global and the nutrition rehabilitation unit is no exception. Healthcare workers are direct influencers of nosocomial infections. Healthcare workers showed a degree of knowledge and action against nosocomial diseases. At the same time, could improve on a few aspects for effective prevention of nosocomial infections.

It was observed that the Unit is operating above the capacity for which it was originally established. There are overwhelming numbers of patients and that

makes it hard to adhere to standards of bed spacing and consequentially hygiene. With strict hygiene instance and regularity in washing hands, infections can be largely kept in check. As guided by Shoemaker et al. (2012) hygiene of both Healthcare givers, visitors and patients has to be guaranteed.

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter comprises a summary of findings, a conclusion, and recommendations for further research and interventions. The summary of findings shows how they can contribute to the body of knowledge, and how different stakeholders contribute and can benefit. Each research question is discussed and its connection to the Trans-theoretical model theory and the Theoretical Domains Framework accordingly.

Summary

This qualitative, exploratory, case study was done to find out practices and barriers to the prevention of nosocomial infections among severely acutely malnourished children at a national referral nutrition unit in Uganda. Respondents were recruited using critical case sampling. This is a type of purposive sampling where the respondent chosen have rich information about the phenomena of interest. This method was used since a big percentage of the workers are not regular and are on rotation, gathering information from a worker that has been at the unit for a limited time would not yield rich information. To combat this, priority was given to longer-serving health workers, preferably over six months.

Also, all 18 respondents, the upper limit of the sample size population were interviewed to ably gather good-quality data. With the help of the head nurse, using the workers' register, priority was given to regular workers that have spent a minimum period of 6 months as they were more acquainted with the practices used at the

nutrition unit. A total of eighteen people were interviewed including 4 doctors, 4 nutritionists, nine nurses and one social worker. The respondents shared information to answer the three research questions outlined below.

1. What are the prevention measures currently implemented by healthcare workers against nosocomial infections?
2. What factors or circumstances predispose SAM children to nosocomial infections in this facility?
3. What barriers hinder healthcare workers from complying with health guidelines provided against nosocomial infections?

During each interview, field notes were taken, and the interview audio was recorded and transcribed afterwards for analysis. An observation schedule checklist was also filled out as well as information gathered from document analysis of the guidelines. Upon completion of the research, an interactive model of data analysis was used to facilitate easier interpretation of the study findings for interviews and data analysis while reading the Likert scale was used for observation data. A total of nine themes and twenty categories emerged. The themes and categories aided the researcher to answer the research questions more comprehensively. The themes highlighted are the contributions of the respondents, information from the observation checklist and the guidelines used by the nutrition unit. The data that was collected, in the manner that it was obtained, influenced the development of the themes and the subsequent findings and conclusions and recommendations.

Conclusion

The study achieved its purpose by having each of the research participants give their opinions through interviews, obtain useful information from the observation sessions and document analysis of the guidelines. They equally addressed the topic of the research in finding out the practices and barriers to the prevention of nosocomial

infections among severely acutely malnourished children. Each research question is discussed below.

Research Question One

The findings of Research Question One which addressed what prevention measures are currently implemented by healthcare workers against nosocomial infections revealed five themes: 1) Proper use of PPE 2) Proper hygiene 3) Health education. 4) Presence of environmental cues and routine surveillance. 5) Routine surveillance.

It was found that all the prevention practices against nosocomial infections that came up through data collection were either known to the respondents like use of proper use of PPE, proper hygiene and health education while others have been implemented by the facility like environmental cues such as charts that remind everyone to take part in infection prevention. However, there is room for improvement in all of them except for ward hygiene, a category under the theme, of proper hygiene.

Proper use of PPE. In some instances, like proper use of nose masks and gloves, the practice is known but not being carried out by all stakeholders. While healthcare workers often used nose masks, caretakers accessed the wards without nose masks. Gloves were changed for every patient during treatments, procedures like infections, catheterization, and wound treatment among others but this was not the case when it came to physical examinations.

Proper hygiene. Under this theme, patient and caretakers' hygiene could be improved by following up to ensure caretakers take it upon themselves to actively maintain personal hygiene especially immediate cleaning of soiled beddings and clothing of the patients.

Health education. This is a strong prevention measure that was reflected by all three methods of data collection and mentioned by a big number of respondents, however, during the observation period, no Health education session was done for the inpatient wards which usually have a higher number nosocomial cases as the patients in these wards are more vulnerable.

Environmental cues were present but not enough to meet the goal of preventing nosocomial infections. A reminder to wash hands was available for not one of how to properly carry out a step-by-step hand washing as recommended by the WHO. More relevant messages could be hung on walls that remind parents to not share utensils, immediately clean up after their children, to wash their hands after every diaper change among others.

Lastly for routine checkups, while almost all patients are checked and reviewed daily by a doctor and nutritionists, sometimes not all patients get reviewed by the doctor due to various factors. Ideally, all patients are reviewed daily to effectively fight against nosocomial infections. Also, an Infection Prevention Control audit needs to be put in place to track prevention practices set to be followed by encouraging and rewarding positive actions while providing constructive criticism where necessary. This is to be followed by all stakeholders in the quest against nosocomial infections.

Research Question Two

The findings of Research Question Two which addressed factors or circumstances that predispose SAM children to nosocomial infections in this facility revealed two themes: 1) Poor knowledge and 2) Skills gap. It was found that lack of knowledge by some caretakers of the significance, urgency and consequence of not carrying out prevention measures like washing hands, maintaining personal hygiene

and use of nose masks was a great predisposing factor. Knowledge is the basis for skills and therefore action. Also, the healthcare workers did not know what guidelines are set for use by the nutrient unit in the quest to fight against nosocomial infections.

They did some know the practices recommended by not the guidelines from which they are drawn. A skills gap especially in the step-by-step hand-washing procedure recommended by the WHO was observed among both caretakers and health workers. How to operate wall hand sanitisers was a skills gap among most caretakers despite having the sanitiser available for use.

Research Question Three

The findings of research question three which addresses barriers that hinder healthcare workers from complying with health guidelines provided against nosocomial infections revealed two themes. 1) limited resources and 2) infrastructural setup. These are things that are out of control for the health workers, caretakers and patients.

Limited resources. Funds allocated to procure gloves, nose masks, and sanitisers could be increased to ensure that all equipment and supplies required to maintain practices that enable the prevention of nosocomial infections continue. Funds to employ more regular staff that will be educated on the guidelines and practices to implement in the wards long enough to enable maintenance of prevention practices.

Infrastructural setup. The wards were found to be small to accommodate all the patients which make it difficult to follow the bed spacing recommendation of 1 meter. There are only 2 isolation rooms and one of them does not have a window hence poor ventilation. This is a barrier to compliance in a way that there is no

opportunity to carry out prevention practices even when one has the capability and is motivated to do so.

Recommendations

This study has revealed the practices currently carried out by healthcare workers at the nutrition rehabilitation centre in the endeavour to prevent nosocomial diseases. This brings to light what is lacking according to recommendations by the IMAM and MIYCAN guidelines. Cohorting of patients depending on the time of admission is an infection prevention guideline in the IMAM guidelines that was not mentioned during interviews and not observed.

The IMAM guidelines go on to recommend treatment of all admitted patients to the nutrition ward be treated with systemic antibiotics, a prevention practice that was not mentioned by any of the respondents. This shows a deficit in knowledge to do with all prevention practices recommended for use in the SAM children's ward and could translate into the spread of nosocomial infections. Therefore, this is a point for action to enable healthcare workers successfully prevent nosocomial infections.

It was found in this study that healthcare had poor knowledge of how to effectively wash hands and no knowledge about some infection prevention control practices or the guidelines the nutrition unit uses. This creates a gap in the quest to prevent nosocomial infections and could successfully be remedied by health education and training on infection prevention in SAM children's wards. Also, a skills gap in how to effectively wash hands according to WHO recommendations makes this practice unsuccessful and therefore ineffective in the prevention of nosocomial infections. Poor knowledge and skills gaps predispose SAM children to nosocomial infections.

The barriers that hinder healthcare workers from complying with the IMAM and MIYCAN guidelines are those out of their control. Financial limitations to provide reliable access to equipment and tool used in infection prevention such as gloves, soap, disinfectant and running water in addition to understaffing makes it difficult for healthcare workers to comply with recommendations as seen in this study.

Also, the infrastructure setup of the nutrition units' wards where the wards are too small for the patient population, few isolation rooms and poor ventilation in one of the isolation rooms. Even when knowledge, skills, supplies and motivation to take part in infection prevention is present, infrastructure is a limitation healthcare workers cannot change without help from hospital authorities and the Ministry of Health who are responsible for overseeing the operations of the facility.

Recommendations to Caretakers

1. Caretakers should heed the advice and recommendations given to them at the point of admission and during health education sessions, especially about maintaining proper hygiene and patient feeding sessions.
2. Caretakers should ask for help whenever they need guidance on how to use any equipment on the ward such as wall hand sanitisers.

Recommendations to Healthcare Workers

1. Health education sessions for the attendants should incorporate skills sessions to impart Infection Prevention Control skills among this particular group of people while emphasising the urgency of engaging in Infection Prevention Control
2. Healthcare workers should acquaint themselves with the guidelines used by the nutrition unit and other vetted material from reputable sources like the World Health Organisation about Infection Prevention Control practices.

Recommendations to Hospital Authorities

1. The hospital administration and the local unit administration together with the quality improvement team should prioritize the facilitation, implementation and monitoring of Infection Prevention Control activities in the unit.

2. Regular Infection Prevention Control audits to continue the safety culture while on the ward to encourage positive

3. Invest in Infection Prevention Control training for health workers on rotation before they can start working on the ward.

4. Refresher IPC training for all healthcare givers as well as provide and go through the guidelines used by the nutrition facility.

5. The hospital administration funds laboratory tests to investigate what infections are prevalent to find appropriate mitigation actions to limit the spread of nosocomial infections.

6. The hospital administration should ensure reliable availability and accessibility of supplies used in Infection Prevention Control such as hand sanitisers, soap for handwashing, gloves and disinfectant to use during every ward cleaning as well as the toilet facilities.

7. Hospital administration should widen the wards or find more room to avoid overcrowding in seasons with the patient influx and ably comply with the bed spacing recommendation that therefore curbs the spread of nosocomial infections.

8. Hospital administration should avail environmental cues such as carts with appropriate sort pieces of information on the walls in strategic locations to remind people to continually engage in IPC.

Recommendations for Future Research

1. A follow-up study design should be considered in further research to explore Infection Prevention Control behaviour change over time among healthcare workers.

2. The findings of this study can be used to plan interventions in the areas where more vigilance is required to reduce the prevalence of nosocomial infections in the long run.

Table 8. Summary of Recommendations

Caretakers	Health workers	Hospital authorities	Future research
• Heed to health education • ask for help where needed	• Carry out health education for the patients and caretakers • Acquaint themselves with the guidelines	• Avail environmental cues • More space ward space • Improve ventilation in an isolation room • Ensure reliable access to supplies used in IPC • Carryout laboratory tests for NIs • Carryout IPC audits • Refresher IPC training to old staff. • IPC training for workers on rotation	• Follow-up investigation of IPC behaviour change • Plan interventions

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