2023

Preventing Nosocomial Infections in West Central Africa Through Nurse Education

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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Walden University
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Abstract

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MS, Walden University, 2017

BSN, Arizona State University, 2011

Project Submitted in Partial Fulfillment

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Abstract

Nosocomial infections are acquired after being hospitalized. Lack of nurses' education pertaining to nosocomial infections increase the risk of infections. Nurses working in the target facility in West Central Africa were not knowledgeable about current evidence-based infection control practices. The purpose of this project was to educate nurses on how to reduce the rate of nosocomial infections. The analysis, design, develop, implement, and evaluate model was used to guide the development of this project. Three experts evaluated the education program for content validity and usability. The program was presented as a PowerPoint to 40 health care workers via Zoom. The participants completed a pretest before participating in the program and a posttest after participating in the program. Descriptive and inferential statistics were analyzed to assess the difference between the pre- and posttest scores (t=4.95, $p < .05$). Results showed post test scores were significantly increased. Finding validated the need to educate nurses working in a health care setting in West Central Africa about nosocomial infections and provide them with the skills to identify the risk factors and implement preventive measures to reduce these risks.

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Acknowledgments

Firstly, I want to thank God Almighty for making me come this far and for giving me the strength to overcome the ups and downs encountered during this project. Secondly, I would like to give special thanks to my committee chair, Dr Cynthia Fletcher, who through her earnest and relentless contributions made this project a huge success. Also, I would like to thank my committee members for letting my project be an enjoyable moment, and for your brilliant questions and suggestions, thank you. I would like to thank my team at the Tiko General Hospital in Cameroon, especially the directors, doctors, supervisors, infection control department staff, and nurses for the big role they played and for the opportunity they gave me in carrying out my project. Lastly, I would like to thank my family and friends for their continuous support and understanding when writing my project; your prayer and good wish for me was what brought me this far.

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Section 1: Nature of the Project

In subacute care settings, nosocomial infections remain prevalent health-related illnesses that require urgent intervention from medical experts. These types of illnesses are also known as health-care-associated infections (HAIs) and are spread to people operating within a health facility. Nosocomial ailments tend to occur in different areas of health care delivery, such as hospitals, long-term care facilities, and ambulatory settings, as well as after discharge (Sikora, 2021). According to the estimate statistics provided by the World Health Organization (2021), there was a revelation that 7 in every 100 hospitalized patients in developed countries are diagnosed with one or more nosocomial infections. The situation is worse in developing countries where the figure of hospitalized patients having these infections rises to 10 in every 100 people (Gaikwad et al., 2018). The occurrence of these infections mostly affects inpatients who have critical illnesses because these infections commonly occur in acute and subacute care settings. According to Gaikwad 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. The situation is worse in sub-Saharan Africa because there is a lack of sufficient resources as well poor compliance with evidence-based infection prevention and control guidelines (Iliyasu et al., 2016). This warranted the creation of an education program for nurses that helps them accumulate knowledge on compliance with evidence-based control practices that assist with the prevention of infections and decrease the rate of nosocomial illnesses acquired from hospitals in West Central Africa.

Problem Statement

Failure to adhere to evidence-based infection control practices in the health care setting can lead to the spread of infections. Nosocomial illnesses are prevalent in many health care environments around the world (See Sikora and Zahra, 202). These outcomes arise when there is improper follow-up of control measures by health experts (Khan et al., 2017). These infections are typically absent at the time of admission and occur during health care delivery or long after the patient's discharge. The population that is most at risk of getting these infections is patients in burn, subacute, and intensive care units. Patients who go through organ transplantation are also at risk (Revelas, 2012). The burden of nosocomial infections is significant because of the prolonged hospital stay, the possibility of long-term disability, enhanced antimicrobial resistance, socioeconomic interruption, and increased mortality rate (Revelas, 2012). A study conducted by Bouza et al. (2019) indicated that up to 10% of hospitalized patients around the world have the risk of developing nosocomial infections. HAIs are associated with about 1% mortality rate of hospitalized patients around the world. There are 190 million patients admitted to hospitals around the world annually. Therefore, 1% of 19 million infections represents 190,000 deaths (Nouetchognou et al., 2016). These data are alarming because nosocomial infections are preventable; therefore, these deaths are avoidable.

Nosocomial infections are reported in hospitals of both developed and developing countries. However, the high percentage of prevalence of the illnesses is noted in developing nations. Countries such France and the United States have an estimated 7% and 5% occurrence rate of HAIs compared to a 25% rate that has been reported in most

African countries (Nouetchognou et al., 2016). Nouetchognou et al. (2016) conducted a study with 307 patients over a 6-month period in a university hospital in West Central Africa. Nouetchognou et al. identified a cumulative infection rate of 19.21%, with a variance of 16.9%–21.5%. A national policy on surveillance, prevention, and management of nosocomial infections had not been adopted in the West Central African country. Therefore, effective infection prevention and control practices are needed in the West Central African country. Inadequate compliance of nurses with infection prevention measures has increased the risk of infections (Revelas, 2012). In a cross-sectional study conducted in Northwest Nigeria on nurses' knowledge of and attitudes toward infection prevention, approximately 52% of doctors and 76% of nurses ($p = 0.002$) always practice hand hygiene while offering patient care. Similar findings were reported by Alrubaiee et al. (2017) in a cross-sectional study. Nurses demonstrated limited knowledge about effective measures to prevent infections.

If nurses are educated on infection control prevention measures, they may have the information necessary to improve their knowledge and practices to reduce nosocomial infections. Peter et al. (2018) concluded that adherence to infection control guidelines improved with appropriate nurse education. Education is essential to the nursing profession and provides unique opportunities for the reduction of infections and the promotion of patient safety in clinical settings.

When patients enter the health care facility, they expect to recover from their illness without additional trauma. Compliance with infection prevention programs can reduce the prevalence of nosocomial infections by 55% (Jenkins, 2017). Nurses learn

about infection prevention, and they are significant health care providers in prevention efforts (Faraji et al., 2016). The continued occurrence of nosocomial infections in a large subacute facility in West Central Africa suggests poor compliance with infection control measures. The administrator confirmed that this facility has yet to implement surveillance programs and prevention measures. Nurses contribute to reducing infections because they take care of patients and spend considerable time with them. For example, they provide medications, dress patients' wounds, and sterilize working areas, and disinfect working apparatuses in clinical settings to prevent infections (Alrubaiee et al., 2017; Burnett, 2018). Mistakes with the drug administration process can result in a sharp increase in the rate of infections; for example, if the skin is not disinfected before injecting medication into the patient, infecting organisms may be introduced during the process. Additionally, when nurses begin working without sterilizing trolleys, they can transfer infections from one patient to another (Reddy et al., 2019).

Nurses are best suited to recognize the risks of infections and prevent them. According to Gruda and Sopjani (2017), many nurses do not understand or implement infection prevention measures as required. In West Central Africa, the increased infection rates are attributed to insufficient resources, congregate environment and inadequate knowledge of infection control practices by the hospital staff (Nouetchognou et al., 2016). In the current project, I sought to fill this gap by developing an education program to increase nurses' knowledge of infection control practices. Educating health care providers in this West Central Africa subacute facility may provide them with information about infection

control and empower them to implement these practices that may decrease the facility's infection rate.

Purpose Statement

The nursing profession can reduce the rate of nosocomial infections in this region in West Central Africa, but knowledge and resource barriers exist. This doctor of nursing practice project addressed the gap in practice relating to nurses' lack of knowledge about strategies to prevent and control nosocomial infections in the identified health care setting in West Central Africa. The purpose of the DNP project was to develop an evidence-based education program to educate nurses about infection control practices they could implement to decrease the incidence of nosocomial infection in a subacute facility in West Central Africa. The practice-focused question was the following: Will an education program about infection control principles increase nurses' knowledge about infection control practices needed to decrease nosocomial infections in hospitalized patients in health institutions located in West Central Africa?

Nature of the Doctoral Project

Evidence for this project was obtained from multiple sources including a literature review and informal communication with the clinic staff. I used search engines such as CINAHL, MEDLINE, and EMBASE for the literature review. The search strategies were formulated using a combination of medical subject headings such as infection control/ methods hand disinfection standards, cross infection/ prevention and control, health personnel, CDC Basic Infection Prevention and Control guideline, and West Africa. The source types were scholarly journals, dissertations and theses, and trade journals

published between 2015 and 2020. The key words used were *knowledge*, *healthcare workers*, *hospital acquired infections*, *infection control*, *intensive care unit*, and *practice*. The literature I used focused on nosocomial infection control in health care personnel in West Central Africa. The information obtained from the literature and my personal communication with the administrator at the facility revealed the need for further interventions to prevent nosocomial infections in the health care system in a country in West Central Africa. The level of infection in the health care setting in West Central Africa was high (Jenkins, 2017). I discussed the purpose of the project with the administrator and obtained permission to present the education program to the nurses in the hospital.

After obtaining approval of Walden University Institutional Review Board (IRB 05-04-22-0444852), I developed the program using the Walden staff education manual and the analysis, design, develop, implement, and evaluate (ADDIE) model as a guide. I also completed the PowerPoint presentation and the pre- and posttest. The Centers for Disease Control and Prevention (CDC) Basic Infection Prevention and Control guideline was used as a guide to develop the educational content. I obtained formative evaluation from the content experts and revised the content based on their recommendations. Finally, I presented the completed program to the administrator and key stakeholders in the facility.

Significance

Health-care-associated infections and antimicrobial immunity represent essential threats to national health. Nosocomial infections are preventable with appropriate

interventions. A study on the efficacy of nosocomial infection control showed 32% of infections were preventable when a well-organized infection surveillance and control program is in place (Reed & Kemmerly, 2009). Jenkins (2017) noted that the prevalence of nosocomial infections can be significantly reduced when infection prevention programs are followed. However, the infection rate was 19.21% in a university hospital in West Central Africa (Nouetchognou et al., 2016).

The current project had the potential to support Walden University's mission to promote positive social change by improving health outcomes for patients admitted to the university hospital in the West Central region of Africa. More specifically, the results of this staff education program had the potential for positive social change for patients, nurses, the hospital, and the community. The knowledge obtained from the education program may be used by nurses to develop plans of care for patients to reduce the frequency of nosocomial infections in their clinical settings (see Khan et al., 2017). Health care professionals may have the information needed to develop infection prevention policies and procedures with the potential to reduce nosocomial infections. Implementation of infection control strategies in the project site hospital has the potential to decrease the length of hospitalization for the patients, decrease the cost to the hospital, and increase the overall health of the community.

Summary

Nosocomial infections are prevalent worldwide; however, developing regions such as West Central Africa are affected at a higher rate. In a subacute facility in West Central Africa, the infection rate was higher (25%) than in countries such as the United

States and France (7% and 5%, respectively; Nouetchognou et al., 2016). The nurses in the subacute facility I volunteered at were not practicing proper infection control actions. Communication with the nurses at the facility indicated that they are knowledgeable about the most recent evidence-based infection control policies, but they did not receive periodic infection control training. The purpose of the DNP project was to fill this gap in practice by developing an evidence-based education program to increase nurses' knowledge about infection control practices they could implement to decrease the incidence of nosocomial infection in a subacute facility in West Central Africa. I obtained information from the literature using search engines such as CINAHL, MEDLINE, and EMBASE, as well as informal communication with hospital personnel to validate the gap in practice. I used the Walden Staff Education Manual, the ADDIE model, and CDC Basic Infection Prevention and Control guideline to develop the education program. Experts provided formative evaluation of the educational content and the pre- and posttest. They agreed that the teaching content and the test questions had content validity and usability. Increasing the nurses' knowledge about the most recent evidence-based infection control practices has the potential to decrease the rate of infection in the facility. In Section 2, I discuss the model that informed the project, the relevance to nursing practice, the local background and context, and the role of the DNP student and the project team.

Section 2: Background and Context

Nosocomial infections pose safety concerns for hospitalized patients in West Central Africa. The problem's magnitude is underestimated and in some cases unknown due to the complexity of the diagnosis, and surveillance activities of these infections and guiding interventions require resources and expertise (Rajakaruna et al., 2017). Nosocomial infections in these nations stem from multiresistant pathogens, which have adverse effects on many patients and their families resulting in prolonged hospital stays, illness, excess costs, potential disability, and sometimes death (Rajakaruna et al., 2017). The practice-focused question in the current project was the following: Will an education program about infection control principles increase nurses' knowledge about infection control practices needed to decrease nosocomial infections in hospitalized patients in health institutions located in West Central Africa? The purpose of the DNP project was to develop an evidence-based education program to educate nurses about infection control practices they could implement to decrease the incidence of nosocomial infection in a subacute facility in West Central Africa. In this section, I discuss the model that informed the project, the relevance to nursing practice, the local background and context, and the role of the DNP student and the project team.

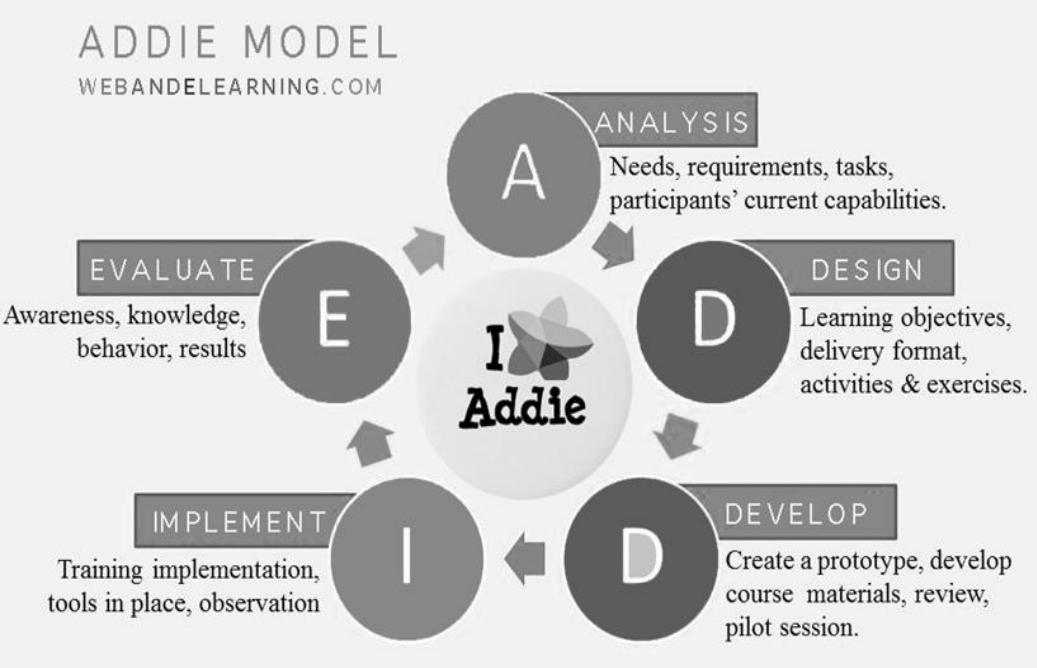
Concepts, Models, and Theories

I used the ADDIE model as a guide to develop the program. This model was designed in 1975 for the U.S. Army by the Centre for Educational Technology at Florida State University (Kurt, 2017). This model refers to a generic process that instructional

designers use to organize and streamline the course content (Fernandes et al., 2020; see Figure 1).

Figure 1

ADDIE Model



The ADDIE model has five phases: analysis, design, development, evaluation, and implementation. The phases are defined as follows:

1. The analysis phase involves clarifying the instructional problem. The instructional designer can create goals and objectives and identify the learners and the learning environment. Several questions focusing on who, what, when, how, why, and where can be used to recognize audience characteristics, behavioral outcomes, existing constraints, and course delivery options. This step involves identifying training needs and developing a plan.

2. The second phase is the design stage. This stage involves making practical decisions about the learning process. Educators should consider the teaching method, course structure, assessment, and feedback when developing a course design.
3. The third phase is the development stage, which involves creating the courses guided by the objectives. This process is significant for devising the course content.
4. The fourth phase is the implementation stage. In this stage, the course is presented to learners. The process should entail learning outcomes, delivery methods, and testing procedures.
5. Finally, the evaluation phase involves getting feedback about the course. The evaluation can be either summative or formative, and it is significant in determining whether the training process was a success.

I used this framework to plan, develop, implement, and evaluate the outcome of the course as it relates to educating nurses about preventing nosocomial infections. The health belief model was the most applicable theoretical framework with high relevance to the training and inspiration of nurses to comply with evidence-based nosocomial infection prevention protocols. This is a value-expectancy theory and assumes that people's behaviors are affected mainly by the consequences of adopting new practices (Jeihooni et al., 2018). In the current project, nurses practicing in the subacute care setting were likely to comply with infection prevention standards and guidelines if they perceived a potential reduction in HAIs and the subsequent adverse outcomes. The health

belief model has been implemented in previous studies to inspire nurses to embrace health education and adopt infection prevention measures to decrease the risk of nosocomial infection. For instance, Jeihooni et al. (2018) determined the consequences of education based on the health belief model in promoting nosocomial infection preventive behaviors through training interventions. This theoretical framework was influential in planning and evaluating nurse training programs in which nurses were empowered and motivated to adopt infection control and prevention practices.

Relevance to Nursing Practice

Haque et al. (2018) explained that in high-income nations, about 5% to 15% of all hospitalized patients acquired nosocomial infections; however, the prevalence of these infections in some parts of West Central Africa is greater than 40% in subacute care settings. I volunteered at a subacute ward in West Central Africa and observed that some of the nurses were not adhering to basic infection control practices. Nurses went from one room to another without sanitizing or washing their hands and at times did not change their gloves between patients. For patients and the rest of the health care system, nosocomial infections are a threat to the achievement of better health outcomes and the reduction of health care costs (Friedman, 2016). Although the adverse effects of these infections are worse in developing countries, underreporting makes it challenging to understand the magnitude and frequency of associated adverse effects. Significant costs related to nosocomial infections include increased morbidity and mortality, increased hospital expenses related to the impact of blocked beds, and financial losses in direct and indirect medical care expenses (Friedman, 2016).

Nurses' primary function is to provide quality health care services while undertaking or executing a series of nursing activities (Arison et al., 2020). However, Haque et al. (2018) stated that nosocomial infections occur at a time of patient recovery from illness. Alteration in care practice may contribute to the transmission of the microorganisms to and from patients leading to HAIs. These infections are among the leading causes of patient mortality and morbidity. Arison et al. (2020) proposed that nosocomial infection rates are an indicator of the safety and quality of nursing services. An increase in nosocomial infection translates to low-quality care attributed to ineffective practices associated with the failure to uphold evidence-based standards of practices (Arison et al., 2020).

Nurses must understand the magnitude of the problem, the importance of prevention, and measures they can take to reduce the prevalence of infection in their work setting. It is important that nurses know the methods for preventing the spread of infection, such as hand and environmental hygiene and patients' screening (Wolkewitz et al., 2019). The current educational program provided information that empowered nurses to implement evidence-based infection control practices to reduce the rates of infections in the project facility.

Local Background and Context

History of the Broader Problem in Nursing Practice

Lack of guidelines, infection control policies, and trained professions are factors that are attributed to the increased rate of infection in the subacute facility in West Central Africa (Nejad et al., 2011). I volunteered for 1 month at this subacute facility.

During that time, I noticed several patients who developed a nosocomial infection during their stay at the facility. Informal conversations with nursing staff at the facility revealed their belief that there are insufficient resources, such as gloves, and low compliance with evidence-based practice infection prevention and control guidelines. Staff further identified their belief that factors related to noncompliance included being understaffed, having limited staff resources, and having limited access to infection prevention and control infrastructure (see Egbe et al., 2020). These factors make the prevention and control of infections in the facility challenging for the nursing staff. The current project contributed to filling this practice gap.

Institutional Context

Patients admitted to this health care facility had compromised health due to the lack of adherence or enforcement of the government health policies. The Ministry of Health in West Central Africa is responsible for supervising hospitals' adherence to infection control policies. However, based on the infection rate in the facility, the extent of surveillance of the hospital's adherence to the Ministry's infection control policy was not clear. Therefore, implementing infection control policies for the hospitalized patients was paramount. However, the implementation of these policies in the facility in West Africa was lacking. The nurses identified that they were not knowledgeable of the most recent evidence-based guidelines.

Definitions of Locally Used Terms or Operational Processes

Defined terms for this project included the following:

American English: The variant of the English language used mostly in the United States (Oxford Advanced American Dictionary, 2021).

Descriptive concepts: Items that are helpful to monitor the decrease and increase in nosocomial infections (Department of Health, n.d.).

Infection control: A practical, evidence-based approach preventing patients and health workers from being harmed by avoidable infections (World Health Organization, 2021).

Hospital-acquired infections (HAIs): Health care facility-acquired infections that are not present or incubating at the time of admission to a hospital (Monegro et al., 2020).

Incidence: The measure of disease that determines a person's probability of being diagnosed with a disease (Department of Health, n.d.).

Mortality: The number of deaths due to a disease divided by the total population (Department of Health, n.d.).

Nosocomial infections: Infections occurring during the process of care when the patient is in the hospital or any other health care facility (Iliyasu et al. 2016). These infections do not incubate or occur at the time of admission; instead, they are acquired when the patient is in the health care setting and manifest either during the period of admission or after discharge. Haque et al. (2018) noted that these infections appear in the first 48 hours later after the admission of a patient or within the first month of a hospital discharge after receiving health care.

Pidgin English: A language containing lexical and other features from two or more languages, characteristically with simplified grammar and a smaller vocabulary

than the languages from which it is derived. Pidgin English is used for communication between people not having a common language (Oxford Advanced American Dictionary, 2021).

Prevalence: A measure of disease used to determine the likelihood of having a disease (Department of Health, n.d.).

West Africa: The region that stretches from the westernmost point of Africa, across the equator, and partly along the Atlantic Ocean (World Bank, 2020).

Role of the DNP Student

In this DNP project, I functioned as a leader, educator, resource person, and evaluator. These roles aligned with the American Association of Colleges of Nursing (AACN) Essential II, Organizational and Systems Leadership for Quality Improvement and Systems Thinking. I was actively engaged in planning the content to inform nurses about the most recent evidence-based infection control policies. Nursing leadership is about influence (Al-Dossary, 2017). Therefore, focusing on nurses and seeking to influence them demonstrated my leadership role. The AACN (2006) indicated that nurses should develop their leadership roles through planning and influencing. My organizing content included critical thinking principles related to this AACN requirement. In addition, I educated nurses with information that had the potential to empower them to implement evidence-based infection control practices. The AACN supported the idea of continued education through self-development. My educator, research, and critical thinking skills in developing and delivering the content related to AACN requirements. Finally, I evaluated nursing activities. According to the AACN, nurses should evaluate

their progress and seek continuous improvement to enhance health care delivery. My summative and formative evaluation activities were related to the AACN evaluator roles.

This topic was personal to me because I had read many reports about insufficiencies in achieving positive patient care outcomes in health care facilities in West Central Africa. Advanced practice nurses have advanced skills and should coach and mentor other nurses to deliver better care (AACN, 2006). I sought to use my skills to teach other nurses to improve nursing care by preventing infections. The project was about educating nurses and related to my professional mandate.

Motivation and Perspectives

My motivation for the project was to reduce the nosocomial infection rates in West Central Africa. Mbim et al. (2016) indicated that the current prevalence of nosocomial infection in sub-Saharan Africa was 35.5%. Having experienced the impact of nosocomial infections within this community, I was inspired to find data to justify solutions that could be implemented. This led me to realize my professional mandate to mentor nurses and to improve their practice as it related to preventing nosocomial infections in the facility in West Central Africa. It was challenging to reduce the prevalence due to the underresourced settings and lack of evidence-base practice knowledge and guidelines in place. However, with evidence-based education and administration involvement, I was confident it could be achieved. My goal for pursuing this doctoral project was to make a noteworthy contribution to an area with scarce data and resources by identifying feasible solutions to a contemporary problem.

Potential Biases

I had potential bias in selecting the facility where I implemented my project. The facility I selected was easily accessible to me. I expected my learners to grasp the content faster because I simplified it. However, while reading a study by Almaiah et al. (2020), I realized that learners have different learning paces. I realized that my expectation that my learners would easily understand all that I teach was not realistic; because of my biased expectations, I realized that some nurses may be left behind. For this reason, I took time after every subtopic to obtain feedback from the participants about their understanding of the information presented. This helped me to identify learners who may have required additional reinforcement of the information and clarification before proceeding.

Role of the Project Team

The administrator of the facility assigned three nurses who work in the facility in administrative and clinical roles and have the expertise to review the educational information I develop and provide feedback relating to the content validity and usability of the objectives, PowerPoint presentation, and the questions. I made revisions based on the experts' recommendations.

Summary

The West-Central Africa region experiences numerous deficits within their healthcare facilities relating to infection control. There is a lack of training and consistent educational programs to prevent nosocomial infections and understand principals of hand hygiene precautions. This gap delays early intervention due to the lack of adherence to

safety measures and hand washing practices among nurses. Consequently, a surge in cases of nosocomial infections is experienced in this region of the world.

Nosocomial infection rates are a threat to patient safety, but they are preventable with implementation of evidence-based infection control policies and procedures. However, not all nurses in the local facility in West Africa are equipped with information on preventing infections. For this reason, the project was developed to educate nurses in the West Central Africa on preventing nosocomial infections. The geographical area was selected due to the high prevalence of the infections. My role in the project was to be actively engaged in the planning, execution of the program, and evaluation of the achievement of the learning outcomes. Overall, the project allowed me to implement my leadership, educator, and evaluator roles, in addition to being a resource person. Educating the nurses on evidence-based infection control practices, have the potential to empower them to implement strategies to decrease the rates of nosocomial infections within the hospital. In section 3, I discuss the practice-focused question, sources of evidence, and analysis and synthesis.

Section 3: Collection and Analysis of Evidence

Nosocomial infections are an issue of concern in many health facilities, especially in under resourced settings. Nouetchognou et al. (2016) stated that the rate of infection in West Central Africa in 2010 was 20.74%. While volunteering to deliver health services in facilities in West Central Africa, I noticed the increased rate of nosocomial infections compared to most facilities I had worked for in the United States. Though nurses provided good care, the nosocomial infection rates were high due to nurses' lack of current evidence-based infection control measures and adequate resources. In some cases, the nurses were not following basic hand hygiene, not using gloves, and not changing gloves after each patient care. Most of the nurses could not identify where to access evidence-based guidelines to help them with the prevention of infections.

According to Haque et al. (2018), nosocomial infections usually increase the length of stay and care costs. Many patients stayed in the project health facility longer than expected due to having acquired nosocomial infections. Nurses were better positioned to prevent these infections because they could initiate and sustain preventive measures. However, they could only achieve this goal if they understood guidelines and preventive measures. I realized that nurses in that subacute hospital in West Central Africa were unaware of evidence-based nosocomial infection prevention and control guideline practices. I concluded that the nurses should be educated regarding the best practices to prevent infections so that they could implement these measures in practice. This doctoral project was conducted to fill this gap. The purpose of the DNP project was to develop an evidence-based education program to educate nurses about infection

control practices they could implement to decrease the incidence of nosocomial infection in the subacute facility in West Africa.

Practice-Focused Question

The local problem in West Central Africa was the increased rate of nosocomial infections. According to Sahiledengle et al. (2020), some health facilities in West Africa prevent infections better than others; overall, the infection prevalence ranges from 2.5% to 14.8%. It was crucial to address this problem due to the increased risk for patients in subacute areas of the hospital who were undergoing invasive procedures that predisposed them to infections. Sahiledengle et al. argued that surgical setting prevalence ranges from 5.7% to 45.8%, especially in Ethiopia and Nigeria. The gap in practice was nurses' lack of knowledge, policies, and procedures to help them initiate and sustain infection prevention practices. Inadequate resources, such as gloves and masks, within health care settings exacerbated the problem. Many nurses needed to understand and adopt current infection prevention strategies to reduce infection rates.

The purpose of this DNP project was to develop an evidence-based education program to educate nurses about infection control practices they could implement to decrease the incidence of nosocomial infections in a subacute facility in West Central Africa. It was imperative that nurses in this subacute facility in West Africa have the knowledge and motivation to adopt current infection prevention strategies to reduce infection rates. The following practice-focused question guided this project: Will an education program about infection control principles increase nurses' knowledge about

infection control practices needed to decrease nosocomial infections in hospitalized patients in health institutions located in West Central Africa?

Operational Definitions

Descriptive concepts were useful to monitor the decrease and increase in nosocomial infections. The following operational definitions were used in this project:

Incidence: A measure of disease that determines a person's probability of being diagnosed with a disease (Department of Health, n.d.).

Mortality: The number of deaths due to a disease divided by the total population (Department of Health, n.d.).

Prevalence: A measure of disease used to determine the likelihood of having a disease (Department of Health, n.d.).

Sources of Evidence

The CDC Basic Infection Prevention and Control guidelines were used to design an evidence-based educational program that provided nurses with improved knowledge on preventing nosocomial infections. Evidence was retrieved from PubMed, MEDLINE, and CINAHL. I gathered peer-reviewed articles about how nurses' knowledge on nosocomial practices affects nosocomial infection rates. Confirmatory evidence was retrieved from the Cochrane Library using literature from 2016 to 2021. The key search terms included *knowledge*, *healthcare workers*, *hospital acquired infections*, *infection control*, *intensive care unit*, and *practice*.

My population was the nurses working in the subacute ward at the hospital. I conducted informal interviews with the nurses working in the subacute setting in the

hospital to substantiate their infection control practices. I developed the infection control education program using the ADDIE guideline. The nurses completed a pretest before the presentation to identify their knowledge before participating in the education program. The nurses completed a posttest after participating in the program to determine whether there was an increase in their knowledge relating to infection control from the presentation. I calculated the difference in the mean score between the tests to determine whether there was an increase in the nurses' knowledge about evidence-based strategies to prevent nosocomial infections after participating in the program.

Evidence Generated for the Doctoral Project

Participants

This project included 40 nurses who worked in the subacute medical surgical ward in the facility. Though the nurses were from the subacute medical surgical ward, the nurses were selected from the ward at random to reduce the possibility of biased selection. Nurses were my participants because they directly impacted the health of patients. Nurses can significantly influence the nosocomial infection rates in hospitals (Haque et al., 2018). Nurses provide care to patients more than other health care professionals. Nurses also interact with patients and implement patient-centered activities more than other health care providers. Therefore, nurses were the best group of professionals to participate in and benefit from this project.

Procedures

I discussed the plans to develop the program and the goals with the facility administrator who provided input. The administrator was supportive of my developing

and presenting this program to the staff. The administrator and the nursing staff identified the need to decrease the nosocomial rate in the facility. The administrator agreed to have flyers (see Appendix A) posted around the nursing stations to inform the nurses of the topic, date, and time of the presentation. The administrator also agreed to allow the nurses time to attend the educational presentations. In addition, the administrator assigned three nurses who work in the facility in administrative and clinical roles to review the educational information I developed and provide feedback to help in developing the program. The administrator provided me with a letter of commitment for me to present the program to the nurses in the facility as required by Walden IRB.

After approval of Walden University IRB 05-04-22-0444852 , I did the following:

1. I developed the education program guided by the CDC infection control guidelines using a PowerPoint presentation and the pre- and posttests (see Appendix B and C).
2. I present the PowerPoint presentation to the expert panel to provide formative evaluation of the validity and usability of the content using questions from the AGREE II Instrument (see Appendix D).
3. I revised the content based on the experts' recommendations.
4. I presented the revised education program to the experts to confirm the content and ensure its usability.
5. After receiving confirmation from the expert panel, I presented the PowerPoint presentation to the staff. At each session, I informed the participants of the following:

- the purpose of the program and who could participate,
- voluntary participation,
- completion of a pretest prior to the presentation and a posttest after the presentation in which the content would be the same,
- completion of the pretest providing consent to participate in the program,
- presentation length of approximately 30 minutes, and
- completion of an evaluation of the program at the end of the program (see Appendix E).

Learning Objectives

After completion of this program, the nurses would be able to do the following:

- identify the CDC definition of nosocomial infection
- identify pathogens associated with nosocomial infection.
- discuss conditions that increase the risk of nosocomial infection
- discuss groups that are susceptible to acquiring nosocomial infection
- identify sources of nosocomial infection and how they contribute to acquiring nosocomial infection
- discuss risky behaviors of individuals or conditions that increase the risk of acquiring nosocomial infection
- identify strategies that can be used to prevent nosocomial infection during admission to the hospital and in the hospital

Protections

The project was approved by Walden University IRB before implementation. The nurses were informed that by completing the pretest they would be providing consent to participate in the program. Their names would not appear on the tests or any data collected. Their names and the name of the organization would not appear on any report of the project. I kept all data collected during the project in my password-protected computer. I alone had the password. The data would be kept for 5 years as required by Walden University IRB.

Analysis and Synthesis

I analyzed the results of the questionnaires using descriptive analysis and a *t* test. The data from the questionnaires were placed in an Excel spreadsheet. I used the Excel statistical data analysis program to determine the mean difference between the pre- and posttest results. The results allowed me to assess whether the nurses' knowledge on nosocomial infection prevention measures had increased.

Summary

The adverse outcomes associated with nosocomial infections necessitated preventing the infections and improving patient outcomes. Patients experienced increased lengths of stay and higher health care costs due to this problem. Nurses could prevent these infections in clinical settings. However, in a subacute ward in West Central Africa, nurses experienced challenges preventing the infections due to lack of knowledge of basic hand hygiene such as hand washing, use of gloves, and changing of gloves from one patient to another. Nurses also had inadequate access to evidence-based guidelines.

Permission was obtained from the facility administrator to implement the education program to the nurses. The administrator identified key experts that provided formative evaluation to determine the congruence among the objectives, PowerPoint presentation, and pre and posttest questions. The education session would be presented over 30 minutes, and the participants would complete a pre- and posttest and a course evaluation. I adhered to Walden University IRB ethical guidelines when administrating the program. I used descriptive statistics with Microsoft's statistical analysis program to determine the level of change in the nurses' knowledge after participating in the program. In Section 4, I discuss the findings and implications, recommendations, contribution of the doctoral project, and the strengths and limitations of the project.

Section 4: Findings and Recommendations

Neglecting basic infection control practices in health care settings can lead to the spread of nosocomial infections. Nosocomial infections are present many health care environments around the world. Nosocomial infections have been reported in developing countries with a percentage range of 25% (Nouetchognou et al., 2016). In West Central Africa, the increased infection rates were attributed to insufficient resources and inadequate knowledge of infection control practices by the hospital staff (Nouetchognou et al., 2016). A national policy on surveillance, prevention, and management of nosocomial infections had not been adopted within the project site, a West Central African country. Inadequate compliance of practitioners with infection prevention measures had increased the risk of infections (see Revelas, 2012).

Resources to guide the nurses to identify and respond to infections were not available in this target facility. Resources included infection prevention committees, continuing education, and availability of infection prevention and control guidelines. Consequently, these nurses lacked information on the existence of these opportunities, which limited the likelihood of their adhering to infection control practices. Many nurses failed to adhere to practice guidelines and protocols on nosocomial infection prevention and control due to lack of education. Practitioners are best suited to recognize the risks of infections and implement practices to prevent them. According to Gruda and Sopjani (2017), many practitioners do not understand or implement infection prevention measures as required. Effective infection prevention and control practices were needed in the West Central Africa region. The purpose of this DNP project was to develop an evidence-based

education program to educate nurses about infection control practices they could implement to decrease the incidence of nosocomial infection in a subacute facility in West Central Africa. The practice-focused question was the following: Will an education program about infection control principles increase nurses' knowledge about infection control practices needed to decrease nosocomial infections in hospitalized patients in health institutions located in West Central Africa? Providing nurses with current evidence-based infection control information had the potential to decrease the infection rate in this facility and increase the quality of care provided to the patients.

Findings and Implications

Sources of Evidence

I discussed the purpose of the project with the director of the hospital in West Central Africa during one of my visits to the hospital. The director agreed that the nurses in the facility needed to be educated regarding current evidence-based information about infection control. The director agreed to assist in the recruitment of the nurses to participate in the project. I provided the director with a recruitment flyer to circulate among the nurses (see Appendix A). I presented the course information to three physicians at the facility who served as expert reviewers to determine the program's content validity and usability. The mean rating scale for the experts was 4.9 with a confidence interval of 81% (*strongly agree*) and 19% (*agree*; see Appendix D). The experts agreed that the teaching program had content validity and usability. They offered no additional comments.

While at the facility, I met with nurses who were interested in learning more about the project. I identified the purpose of the project, what nurses were required to do, and that there would be no financial benefits for participating in the project. However, by participating in the project, nurses would receive information to increase their knowledge about the most current evidence-based infection control practices. Nurses would also be informed that the information they provided would be kept confidential and would be known only to the facility administrator and me. I informed nurses that their names would not appear on the pre- or posttest and that their answers and scores on the test would be anonymous. Only the average test scores of the group would be published. I informed nurses that their names or the name of the facility would not appear in any publication about the results. I informed nurses that if they were interested in participating in the education project, they would need to read and sign the consent form that states they are participating under their own will with no outside coercion.

Forty nurses were recruited from the West Central Africa facility through the hospital. Participants signed the consent form and completed the pretest prior to participating in the presentation, posttest, and course evaluation after the posttest (see Appendix C, and E). The consent form and pretest were presented to the nurses on site and collected after completion by the hospital director before I presented the educational information via Zoom to the group. I answered any questions during and after the presentation prior to participants completing the posttest. The hospital director presented and collected the completed posttests and course evaluations from the group after the

presentation and scanned and emailed both documents to me. I analyzed the pre-and posttest results using descriptive statistics and a *t* test.

Findings

Of the 40 nurses who completed the study, 36 (90%) were women and 4 (10%) were men. The nurses' knowledge about infection control practices increased as indicated in the questions answered correctly for the pretest and posttest (see Table 1).

Table 1

Pre- and Posttest Results for Each Question

Question	Pretest	Posttest
Hospital acquired infection is also known as	5	37
What is the CDC definition of nosocomial infections?	7	35
What is a common characteristic of nosocomial illnesses?	7	37
Factors influencing the nosocomial infection are	7	38
The most likely agents to cause nosocomial infections include?	5	38
The priority option for the nurse to prevent the spread of nosocomial infection in hospitalized patients is to	8	36
Which list presents popular ailments that are acquired in health centers?	5	38
Chlorhexidine is an agent that is	5	35
What is the most appropriate finding that indicates the importance of the need to educate health care workers?	2	38
Effective hand washing requires that you wash your hands for at least	12	40
What are the examples of hospital acquired infection	8	38
Contaminated instruments, wards, beds, hospital staffs, are considered as	2	37
All of the following individuals are susceptible to nosocomial infection except	7	40

In addition, results indicated the difference between the pretest and posttest mean score increased significantly after participation in the educational presentation (see Table 2).

Table 2

T Statistics Pretest and Posttest

Test type	Mean	Standard deviation	*p* value
Pretest	1.62	6.55	7.7404E-26
Posttest	11.95	3.84	

Note. $p < 0.05$, pretest ($N = 40$), posttest ($N = 40$).

Table 2 revealed a *p* value of 7.7404E-26, which was less than.05. This DNP project that provided health education about infection control practices to nurses showed significant results related to an increase in nurses' knowledge and the subsequent desire and competence to uphold evidence-based infection prevention practices. A course evaluation consisting of five questionnaires was completed by all 40 participants (see Appendix E). The mean score for the questions in the course evaluation was 4.95. Participants agreed that the course provided the information they needed to implement infection control practices.

Unanticipated Events

There were some technical difficulties in the beginning of the project. I had to wait for about 1 week to get stable electricity, and the electricity still went out during the beginning of the presentation. Eventually, the hospital used a generator and proceeded with the presentation. After I set up the PowerPoint, the individuals at the site had

difficulty with the media player during the slide show. One of my team members at the site helped me navigate the PowerPoint; changing some settings in their computer and reopening the window resolved the issue. The presentation was virtual, and my image was projected next to the PowerPoint through Zoom. I was unable to go to the location in person due to a transportation error. My flight was cancelled midway, stranding me in another state for a few days; my bags were also stuck in another country. My family advised me not to come due to the ongoing civil war; my family did not want another attempted kidnapping (I was almost kidnapped for ransom the last time I went to the country). However, these unexpected events did not impact the validity and reliability of the results.

Implications

The results revealed that many of the practicing nurses lacked knowledge of the most effective evidence-based practices for the prevention of HAIs in this health care setting. Nurses had limited knowledge of infection prevention and control practices prior to participating in the program, which could have led to the low compliance rates with evidence-based infection prevention and control protocols. During a question-and-answer session after the presentation, most participants thought nosocomial infection was prevalent only in North America and European countries. One of the nurses raised their hand and stated “I thought only countries like America and those in Europe dealt with that.” Additionally, many nurses were not taught current evidence-based infection prevention practices that are influential in decreasing the spread of nosocomial infection,

such as recognition of signs and symptoms of infection. As a result, it was appropriate for me to provide nursing education on how to prevent these infections.

Recommendations

It is important that nurses be educated on infection prevention factors including hand hygiene, safe infection practices, wearing of personal protective equipment, environmental hygiene, health care waste disposal, and disinfection or sterilization of medical equipment. This education should focus on empowering nurses, especially those with little experience. For example, health care institutions should make it a policy to educate newly recruited nurses on infection prevention and control during the orientation phase of recruitment. Although some health care facilities have infection prevention guidelines and committees, many providers are unaware of these critical resources. Health care facilities should ensure nurses are familiar with the availability of these resources. Compliance with all measures recommended in this DNP project would result in an empowered nursing workforce that adheres to infection prevention guidelines. The potential for these infections may decrease substantially leading to better health outcomes and quality of life for hospitalized patients.

Contribution of the Doctoral Project Team

The doctoral project team, which included four doctors, four nurses, one pharmacists, one IT technicians, and two hospital administrators, assisted me in ensuring that as many nurses as possible participated in the presentation. The project team helped me pass out the pre- and posttest and collect the completed tests. One of my team members was in charge of the slide show and navigating the slides while I gave the

presentation. The doctors and administrators whom I communicated with about giving the presentation expressed their gratitude for the time given to educate their nurses. There was an emphasis on the project team using the presentation to educate incoming nurses and existing nurses.

Strengths and Limitations of the Project

The PowerPoint presentation allowed me to maintain the participants' attention by using visual and verbal techniques. The pacing of the presentation provided the participants with enough time to understand what was on each slide. The slides were not too wordy so participants could focus on what I had to say rather than trying to read the slides. There were some technical difficulties at the beginning, but after they were sorted out there were no issues during the presentation. The presentation was virtual. My image was projected next to the PowerPoint through Zoom. I was unable to go to the location in person because flights were cancelled. The United States had designated this area of West Central Africa as a red zone because of civil unrest.

Section 5: Dissemination Plan

Dissemination has broad goals relating to evidence and information: (a) to increase the reach to a variety of audiences, (b) to increase nurses' and practitioners' motivation to use and apply the information, and (c) to increase nurses' and health care practitioners' ability to use and apply evidence. The key audiences for this project were nurses and hospital administrators. The overall goal was to equip nurses with knowledge regarding nosocomial infections so they could implement current evidence-based infection control practices that had the potential to reduce the risk of nosocomial infections.

I employed several methods of dissemination. First, I organized a seminar to present the information through PowerPoint to the nurses in the subacute area of the hospital. This served as an educational session to reach out to a larger audience that included the heads of departments of the hospitals and the nurses. Second, I recorded a webinar that would be stored on the local computer server of the hospital. The recorded webinar would serve as a learning resource that would be readily available and accessible for the nurses at any time and at any location of the hospital where there was access to a computer. The webinar would provide a tool for continuous learning and a refresher to foster compliance with the recommendations in the project. Third, I developed a poster for handwashing procedures that would be placed in strategic locations in the hospital where it would be clearly visible to nurses, patients, and visitors.

Analysis of Self

As a nurse practitioner, I am involved in continuous professional development through reading scientific journals and attending seminars and webinars. These scholarly activities have equipped me with valuable knowledge and skills that have deepened my understanding of many aspects related to disease prevention and the education of health care professionals. As a practitioner, I am involved in patient care management and participate in raising awareness of healthy lifestyles and disease prevention by identifying risk factors and developing methods to mitigate the risks. I play a role in educating patients, their family members, and the community, and I advocate for the best interest of the patients for improved and affordable health care services.

In my role as a project manager, I have been able to identify issues regarding HAIs in a hospital in West Central Africa. I developed an education program and collaborated with the administration of the hospital to implement the project to address these issues and come up with recommendations. I performed the role of a project manager as an individual who had general responsibilities for the successful and effective initiation, planning, design, and execution of a project (see Alexander, 2021). Furthermore, I have been engaging in the observation and monitoring of disease occurrence and held the responsibility for the project scope, resources, budget, and outcomes. I was responsible for the current project, including its implementation and influence in the West Central African community. These roles were directly related to the project experience, the current situation in African health care facilities, and my long-term professional goals. I am convinced that the project will be successfully applied in

practice, thereby helping health care facilities in West Central Africa reduce the occurrence of nosocomial infection.

This project was exciting to me. It allowed for easy interaction with the health care workers and getting to know what affects them. The questionnaires revealed that nurses were not fully aware of the risks they faced each day in their places of work. There were limited resources to reach more hospitals, but the hospital that was chosen acted as a representation of the several hospitals that face the same issues. Coming up with an appropriate questionnaire made it easy for me to obtain the data from the participants. My team was accommodating in offering support. I worked with them throughout the project preparation and execution. This project enhanced my communication, managerial skills, collaboration, and professional skills.

Summary

This project addressed the issues of nosocomial infections and provided a tool kit for nurses to mitigate the risk and incidence of nosocomial infections. The primary goal of this project was to educate nurses about nosocomial infections and provide them with the skills to identify the risk factors for nosocomial infection and implement preventive measures to reduce these risks. This project will be made available to the targeted stakeholders in different formats to enhance the adoption and implementation of the recommendations.

The project was valuable and needed because the issue of nosocomial infections in West Central African health care facilities required an urgent solution due to the scope of the problem and its spread. The infection prevention measures increased nurses'

awareness of strategies they could implement to improve the quality of care they provide to decrease nosocomial infection and increase the health of the local population. This project provided an evidence-based education program to improve infection control practices that have the potential to decrease nosocomial infection incidence in subacute health care facilities in West Central Africa.

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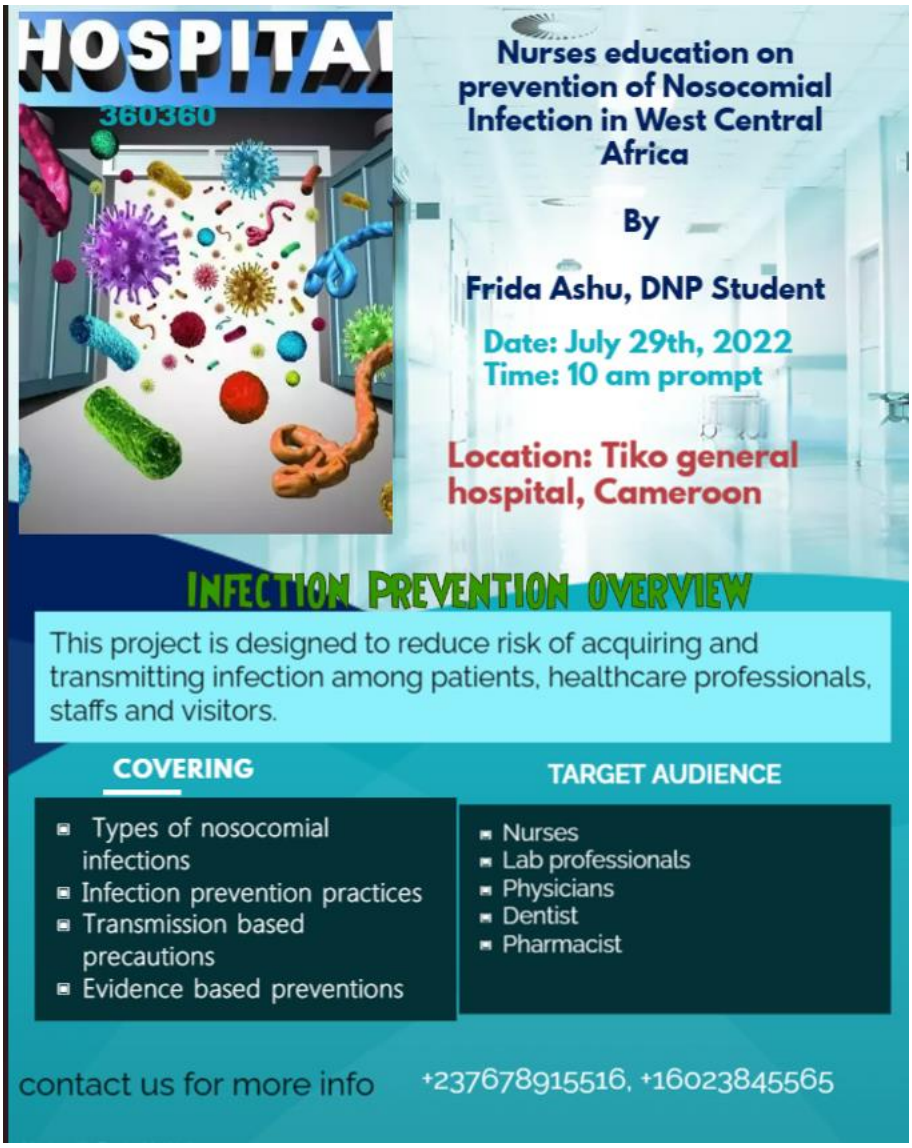
Appendix A: Invitation Flyer



Appendix B: PowerPoint Presentation

Critical Diseases and Monitoring

- Monitoring:
  - Ineffective use of antibiotics;
  - Isolation for a given period whilst observing patients' performance (Voidazan, et al., 2020, p. 5)

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Types of Patients and Space between Beds

Spacing between beds should compose 1.5 meters (Voidazan, et al., 2020, p. 6)

Types of patients with the highest NI's risk:

- Wounded patients;
- Patients' secretions, including saliva, sweat and mucous (Asfaw, 2021)

20

Prevention of NIs

- Up to 70% of NIs can be prevented (Olatade & Ifeoluwa, 2021, p. 176);
- A thorough handwashing with soap for 20s.
- Wearing of sterile gloves and masks.
- Wearing of white gowns.
- Monitoring of microorganisms in a hospital

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NI's and Hospital Stay Duration

- A Long hospital stay hinders causes hospital crowding.
- Hospital crowding increases the risk of NI's among patients and medical staff.
- NI's lengthens hospital stay: An average of 6.6 days more (Wolkewitz et al., 2019).
- A Long hospital stay also leads to increased medical workload and errors.
- High rates of medical errors are associated with high prevalence of NI's (Wolkewitz et al., 2019).

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Disposal of Needles and Clean Standards

Clean standards:

- Regular disinfection of hospital;
- Easy access to protective wearables

Disposal of Needles:

- Are epidemiologically hazardous waste.
- Collected in specially marked containers.
- Utilized in special places

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Scenarios to Apply Safe Sanitation Practices

- Wear a face mask, gloves, and gowns when caring for COVID-19, urinary tract infections, surgery patients etc.
- Properly dispose needles immediately after injection of patients (Khan et al., 2017).
- Frequently wash hands(for about 20s) after interacting with medical staff and patients.
- Maintain a 1.5 meter distance with patients with coughs and sneezes (Ji et al., 2020).
- Avoid hand shaking or hugging of patients and other medical staff during interactions

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Appendix C: Pre- and Posttest

Nurses Education: Preventing Nosocomial Infections in West-Central Africa.

Nurse Survey

Frida Ashu

Doctor of Nursing Practice: NURS 8701

Walden University

This test is designed to test your knowledge about prevention of nosocomial infections. The answers you provide are confidential. Do not write your name on the questionnaire. Please circle the letter you believe best answers the question. Answer to the best of your ability.

1. Hospital acquired infection is also known as
    a. Immunocompromised infection
    b. Nosocomial infection
    c. Nosocomial infection
    d. Environmental infection
2. What is the CDC definition of nosocomial infections?
    a. They are illnesses that are contracted during a stay at the hospital. They are associated with an organism that is a strain of infectious agent.
    b. They are illnesses that occurs outside the hospital.

c. They are infectious agents diagnosed more than 48hrs without evidence of the pathogen already in the incubation phase.

d. They are defined as illnesses acquired from environmental contaminations.

3. What is a common characteristic of nosocomial illnesses?

a. They tend to show resistance to antibiotics.

b. Disappearance of original signs of symptoms for diseases.

c. Loss of body mass.

d. Elevated temperature.

4. Factors influencing the nosocomial infection are:

a. Patient susceptibility

b. Microbial agent

c. Environment factors

d. All the above

5. The most likely agents to cause nosocomial infections include?

a. Staphylococcus, pseudomonas, and E.coli

b. Staphylococcus, pseudomonas, and marek's disease

c. Streptococcus, E-coli bacteria, Pseudomonas

d. Covid-19, pseudomonas, and parvovirus

6. The priority option for the nurse to prevent the spread of NI in hospitalized patients is to:
    a. Prevent patients from leaving the room.
    b. Wear gloves only
    c. Wearing both gloves and other protective gears.
    d. washing hands before and after providing care
7. Which list presents popular ailments that are acquired in health centers?
    a. Viral diseases, urinary infections, respiratory infections, Gastro-intestinal tract infections
    b. Rash, legionellosis, Gardnerella.
    c. Fever, shingles, blood loss.
    d. Dementia, hereditary diseases, HIV

8. Chlorhexidine is an agent that is:
    a. Bactericidal
    b. Bacteriostatic
    c. Germicidal
    d. Antiseptic

9. What is the most appropriate finding that indicates the importance of the need to educate healthcare workers?

a. The healthcare worker put on protective garments when feeding an elderly patient.
b. Health worker wears a mask, gloves, and gown before getting into a room with an isolated patient.
c. as the healthcare worker inform the patients with Tuberculosis that they will need to wear a mask during their stay and treatment at the hospital.
d. The nurse's aide reminding her colleague to put on protective garment before entering a room with a patient who has tuberculosis.

10. Effective hand washing requires that you wash your hands for at least:

a. 1 minute
b. 15 seconds
c. 20 seconds
d. 45 seconds

11. What are the examples of hospital acquired infection

a. Ventilator associated pneumonia
b. Surgical site infection
c. Central line associated blood stream infection
d. All the above

12. Contaminated instruments, wards, beds, hospital staffs, are considered as?

a. Causes of Nosocomial infection
b. Prevention of Nosocomial infection
c. Diseases of Nosocomial infection

d. Sources of Nosocomial infection

13. All of the following individuals are susceptible to Nosocomial infection except?

a. Admitting Staff

b. Inpatients

c. outpatients

d. Hospital visitors.

Appendix D: Expert Evaluation

Nurses Education: Preventing Nosocomial Infections in West–Central Africa.

Frida Ashu

Doctor of Nursing Practice: NURS 8701

Walden University

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Thank you for agreeing to evaluate my presentation for Nurses Education: Preventing Nosocomial Infections in West–Central Africa validity and usability. Please evaluate the course content based on the following statements. Rate the statements from 1-5 (1=do not agree. 5=strongly agree)

1. The course objectives are specifically described
2. The course content is congruent with the course objectives. _____
3. The content in the PowerPoint slides is appropriate and clear for the nurses to understand. _____
4. The information presented in the PowerPoint is appropriate to guide the nurses in understanding the principles and skills related to Preventing Nosocomial Infections. _____
5. Information is presented clearly to allow the nurses to put the principles and skills related to Preventing Nosocomial Infections into practice. _____
6. The test items are specific and unambiguous. _____
7. The test items are congruent with the course objectives. _____

Appendix E: Course Evaluation

Nurses Education: Preventing Nosocomial Infections in West-Central Africa

Please evaluate the course content based on the following statements. Rate the statement from 1-5 (1=do not agree. 5=strongly agree)

1. Was the information clearly presented? _____
2. Was the content specific to what you needed to know? _____
3. Do you believe that the method of presentation made it easy for you to understand the content? _____
4. Was the time of the presentation enough for you to understand the information presented? _____
5. Were the questions clear and related to the content presented? _____