NEAR EAST UNIVERSITY

INSTITUTE OF GRADUATE STUDIES

DEPARTMENT OF NURSING

KNOWLEDGE, PRACTICE, AND ATTIDUDE OF NURSES IN INFECTION

PREVENTION AND CONTROL WITHIN

A TERTIARY HOSPITAL IN THE GAMBIA

M.Sc. THESIS

Joseph MENDY

Nicosia

June, 2023

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Approval

We certify that we have read the thesis submitted by Joseph MENDY titled *'Knowledge, Practice and Attitudes of Nurses in Infection Prevention and Control within a Tertiary Hospital in The Gambia "* and that in our combined opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Nursing Sciences.

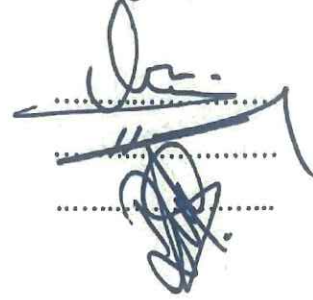Examining Committee   Name-Surname   Signature

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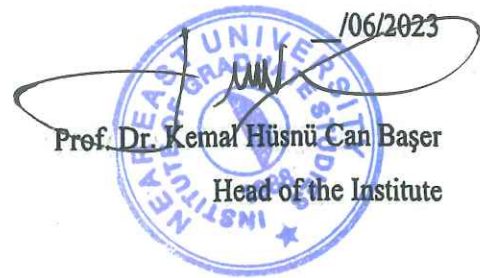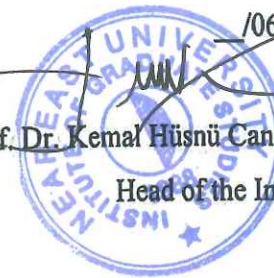Approved by the Head of the Department

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Declaration

I hereby declare that all information, documents, analysis and results in this thesis have been collected and presented according to the academic rules and ethical guidelines of Institute of Graduate Studies, Near East University. I also declare that as required by these rules and conduct, I have fully cited and referenced information and data that are not original to this study.

Joseph Mendy
02/06/2023

Acknowledgments

Abstract

**Knowledge, Practice and Attitudes of Nurses in Infection Prevention
and Control within a Tertiary Hospital in The Gambia**
Mendy, Joseph

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Assoc. Prof. Dr. Dilek SARPKAYA GÜDER

Purpose: The purpose of this study is to determine the knowledge, practices and attitudes of nurses regarding hospital acquire infections prevention and control at a Tertiary Hospital in the Gambia.

Materials and Methods: A descriptive research design was done in a tertiary hospital in The Gambia. The population of this study was 441 nurses. The sample was calculated as 205 nurses using the sampling method whose population is known. The study data were collected using web-based surveys that are structured personal information form and the scale for knowledge, practice and attitude of nurses in infection prevention and control by the researcher. The data of this study were analyzed using, A Mann – Whitney U test, the post hoc test, Kruskal-Wallis H test and Spear-men test.

Findings: It was found that most of nurses (60%) are female, almost half of them (48.3%) are 18-27 years old, almost all of them (96.1%) are Gambian and most of them (66.8%) are single. It was found that nurses' knowledge, practice and attitude scale total score average in preventing and controlling healthcare associated infections was 197.21 (sd=11.23; min.:122.00- max.:218.00). It was determined that the highest overall average score (84.57) from the application, followed by knowledge (71.34) and the lowest attitude (41.30) score. There is a statistically significant difference between level of education, category of nurses, level of employment, nursing experience, department and the total scale score or subscale score of knowledge, practice, attitude on HAIs in this study.

Conclusion: The level of knowledge and practice of nurses about preventing hospital infection is at a good level. It is recommended that in-service educations be planned to develop positive attitudes, since the lowest score for prevention and control of HAI's is in the attitude scale sub-dimension of nurses.

Keywords: Infection, knowledge, nurse, practice, prevention.

Summary

Gambiya'daki Bir Üçüncü Basamak Hastanede Enfeksiyonun Önlenmesinde Hemşirelerin Bilgi, Uygulama ve Tutumları
Mendy, Joseph
MA, Hemşirelik Bölümü
Haziran 2023, 77 sayfa
Doç. Dr. Dilek Sarpkaya Güder

Amaç: Gambiya'da bir Üçüncü Basamak Hastanede hemşirelerin hastane enfeksiyonlarını önleme ve kontrol etme konusundaki bilgi, uygulama ve tutumlarını belirlemektir.

Gereç ve Yöntemler: Gambiya'daki üçüncü basamak bir hastanede tanımlayıcı bir araştırma yapılmıştır. Bu çalışmanın evrenini, 441 hemşire oluşturmaktadır. Örneklem, evreni bilinen örnekleme yöntemini kullanarak 205 hemşire olarak hesaplanmıştır. Araştırma verileri, araştırmacı tarafından yapılandırılmış kişisel bilgi formu ve hemşirelerin enfeksiyon önleme ve kontrolünde bilgi, uygulama ve tutum ölçeği ile çevrimiçi google form kullanılarak toplanmıştır. Çalışmanın verileri, A Mann – Whitney U testi, post hoc testi, Kruskal-Wallis H testi ve Spear-men testi kullanılarak analiz edilmiştir.

Bulgular: Hemşirelerin çoğunluğunun (%60) kadın, yaklaşık yarısının (%48,3) 18-27 yaş aralığında, tamamına yakınının (%96,1) Gambiyalı ve çoğunun (%66,8) bekar olduğu saptanmıştır. Hemşirelerin hastane enfeksiyonu önleme ve kontrol etmede bilgi, uygulama ve tutum ölçek toplam puan ortalamasının 197.21 (sd=11.23; min.:122.00-max.:218.00) olduğu bulunmuştur. Uygulamadan en yüksek genel ortalama puanı (84.57), ardından bilgi (71.34) ve en düşük tutum (41.30) puanının olduğu belirlenmiştir. İstatistiksel olarak önemli bir fark vardır. Bu çalışmada, hastane enfeksiyonu önleme ve kontrol etme konusunda bilgi, uygulama ve tutum ölçeği puan ortalaması ile eğitim düzeyi, hemşire sınıflandırması, çalışma düzeyi, hemşirelik deneyimi arasında istatistiksel olarak anlamlı fark vardır.

Sonuç: Hemşirelerin hastane enfeksiyonunu önleme konusundaki bilgi ve uygulamaları iyi düzeydedir. Hemşirelerin hastane enfeksiyonu önleme ve kontrol altına alma puanları en düşük tutum ölçeği alt boyutunda olduğu için olumlu tutum geliştirmeye yönelik hizmet içi eğitimlerin planlanması önerilmektedir.

Anahtar Kelimeler: Enfeksiyon; bilgi, hemşire, uygulama, önleme

Table of Contents

CHAPTER I

CHAPTER II

CHAPTER III

CHAPTER IV

CHAPTER V

CHAPTER VI

List of Tables

List of Figures

List of Abbreviations

HAIs: Healthcare-Associated Infections

LRTIs: Lower Respiratory Tract Infections

UTIs: Urinary Tract Infections

SSTs: Surgical Site Infections

HCAIs: Healthcare Associated Infections

ICU: Intensive Care Unit

PPE: Personal Protective Equipment

CLABSI: Central Line Associated Bloodstream Infection

MRSA: Methicillin-Resistant Staphylococcus Aureus

HAP: Hospital Acquired Pneumonia

VAP: Ventilator Associated Pneumonia

HES: Hospital Episode Statistics

UPEC: Uropathogenic E. Coli

CNSs: Clinical Nurse Specialists

IPC: Infection Prevention and Control

SPSS: Statistical Package for the Social Sciences

CHNs: Community Health Nurses

KM: Kanifing Municipality

CDC: Centers for Disease Control

WHO: World Health Organization

CHAPTER I

Introduction

This chapter includes the problems, purpose, research questions, significance and limitations of study and definition of terms on study topic.

1.1.Statement the Problem

Healthcare-Associated Infections (HAIs) are considered as infections that patients acquire during admission or stay in the health facility (CDC, 2020; Kumar et al, 2021). Both patients and nurses are at risk for acquiring these infections, the young children, the elderly, and people who have weak immune system are at higher risk (Kumar et al, 2021). Knowledge on infection prevention and control measures are key elements in the prevention of HAIs (Suleyman et al., 2018). These infections are neither present nor incubating prior to the patient's hospitalization in a particular health care setting, HAIs are a widespread, dangerous health issue that raises great concerns on both the patient's and healthcare professionals' safety (Alrubaiee et al., 2017). Healthcare systems and organizations need to prioritize preventing healthcare-associated infections (HAIs), which are a significant threat to the safety of patients and healthcare workers (Haque et al., 2020).

The most common types of HAIs are surgical wound infections, respiratory infections, genital-urinary infections and gastrointestinal infection (Borgio et al., 2021). A study on the prevalence, incidence burden, and clinical impact of healthcare-associated infections and antimicrobial resistance in a hospital in Greece revealed that the frequency of HCAI was 9.1% in Greece, lower respiratory tract infections (LRTIs), bloodstream infections, urinary tract infections (UTIs), surgical site infection (SSIs), and systemic infections were the most prevalent kinds of HAIs (Kritsotakis et al., 2017). There are approximately 1.7 million hospital-associated infections from all types of bacteria (CDC, 2020; Mansuri et al., 2019). 80%-87% of HCAIs are caused by 12–17 microorganisms: which are *S. aureus, coagulase-negative E. coli, and other Enterococcus species* (such as *Faecalis and Faecium*) (Mansuri et al., 2019; Sartelli et al., 2018). These micro-organisms can be transferred from person to person,

environment and contaminated water and food, contaminated health care personnel's skin or contact via shared items and surfaces (Mansuri et al., 2019).

Some of these infections are urinary tract infection patients acquired through catheter insertion, infection in the blood through central line, hospital acquired pneumonia, surgical site infection, device associated infection, these infections make patients stay for a long time in the hospital which have a negative effect on treatment and lengthen recovery process, patients , health workers, and relatives spend a lot of money when they get HAIs , and it can lead to loss of life (WHO, 2022; Suleyman et al., 2018). Hospitals associated infections, or infections acquired in the healthcare institutions are the major recurrent disadvantage in terms of patient out-come in health-care settings globally (Djuric et al., 2018). At any given time, the prevalence of HAIs varies between 5.7% and 19.1% in low- and middle-income countries, the average prevalence is significantly higher (15.5%) in high income countries than in low-income countries which accounts for 8.5% (WHO, 2022). The number of patients with intensive care unit (ICU) acquired infection ranged from 4.4% to 88.9% with a frequency of overall infections as high as 42.7 episodes per 1000 patient's daily (WHO, 2022).

The World Health Organization (WHO) reported that, hundreds of millions of patients are exposed or affected by HAIs globally each year, causing serious, high mortality rate, and bankruptcy in health-care institutions especially in Africa (WHO, 2022). More than 24% of hospitalized patients with HAIs developed sepsis, 52.3% of these patients receiving care in the ICU loss their lives every year (WHO, 2022). Between 2021 to 2022 only 4 out of the 106 countries representing 3.8% met the list requirements of the infection prevention and control standards, at the point of care delivery, only 15.2% of hospitals had the lowest acceptable infection prevention control standards, 70% of these infections can be prevent by the adherence to standards precautions like hand hygiene (WHO, 2022; WHO, 2019).Urinary tract infection is the most recurrent HAIs in countries with high-income, while surgical site infection is the primary cause of infection in hospital settings with finite resources, affecting about one third of surgical patients; this is up to nine times greater than in developed countries worldwide (Bunduki et al., 2021).

HAIs connected to healthcare might arise as a result of receiving medical attention (such as surgical or medical treatment) or coming into contact with a healthcare environment, they lengthen patients stay in hospital, aggravate underlying

illnesses, and maximize death rates (Bittaye et al. 2019; Haque et al. 2020; Manusri et al., 2019). Additionally, HAIs can have negative effects on the patient's functional impairment and mental stress and may in some circumstances, result in incapacitating conditions that lower quality of life (Manusri et al., 2019). With growing economic and human effects, they have become more significant public health issues (Alhumaid et al., 2021; Manusri et al., 2019). Hospital acquired pneumonia is a frequent cause of nosocomial infection with mechanical ventilation demonstrating the main risk factor specifically ventilator-associated pneumonia in England (Lastinger et al., 2022).

Hand-washing habits can be modified by regular training initiatives for healthcare staff to help stop the spread of infections, straightforward infection management measures like washing of hands with an alcohol-based hand rub can help lower the spread of HCAIs, save lives, lower morbidity, and cut down on medical expenses (Bayleygn et al., 2021). To maintain a safe heath care facility, practice good hand hygiene, wear the proper personal protection equipment (PPE), should employ aseptic techniques to prevent patient exposure to pathogens, and manage sharps, blood spills, linen, and hospital wastes (Safadi et al., 2019). The failure to imply infection control measures leads to infectious diseases (Lastinger et al., 2022).

Utilizing their training on infection prevention and control, nurses play a great role when comes to patient safety, they illustrate infection prevention and control measures to patient thereby playing a pivotal role in minimizing the spread of nosocomial infection (Desta et al., 2018; Muthyala et al., 2019). It is important that nurses focus effectively on the right type of infection prevention and control measures for patients who already have infections at the time of admission, differentiating between the types of infection prevention and control measures and when to use them, determines the success of the precaution (Bayleygn et al, 2021).

Infection Control sessions for nurses and effective hand washing practice is extensively accepted as being key to the prevention of HAIs (Kajang et al., 2022). professional nurses have satisfactory knowledge in preventing healthcare associated infections, this helps in patient's recovery (Muthyala et al., 2019; Uloma et al., 2022).

Lack of understanding and practices in infection prevention and control contribute to high rates of HAIs and slows patient's recovery process nurses play a great role that leads to the implementation of evidence-based practice that helps to lessen cost in healthcare settings and also the conversion of care that showed reduction in patient

hospital stay, less hospital readmissions cases related to nosocomial infection and fewer nosocomial cases (Desta et al., 2018).

Studies have found that nurse have high level of knowledge on infection prevention and control in healthcare associated infections (Chitimwango, 2017; Hammoud et al., 2021; Safadi et al., 2019; Salem, 2019). Furthermore, studies showed that nurses with low knowledge and practice scores on prevention and control in healthcare associated infections can do a very high negligence rate in preventing them (Bimerew & Muhawenimana, 2022; Chitimwango, 2017).

1.2. Purpose of the Study

The aim of this study is to determine the knowledge, practices and attitude of nurses regarding hospital acquire infections prevention and control at a Tertiary Hospital in the Gambia.

1.3. Research Questions

There are two questions of this research.
1. What is the scoring level of the knowledge, practice and attitude of nurses in hospital acquire infection prevention and control within a tertiary hospital in the Gambia?
2. Is there a relationship between the scoring level of the knowledge, practice and attitude sociodemographic characteristics?

1.4. Significance of the Study

Like in most developing countries, preventable infections are the main contributing factors for the mortality and morbidity example the Gambia (UNICEF, 2020). Deaths related to nosocomial infection in hospitals continue to be a health care priority; nurses with limited understanding in infection prevention and control jeopardize the safety of the patients and the hospital environment (Baldeh, 2019). Exploring the knowledge and practice of nurses in infection prevention and control will help to know their understanding and to device recommendation on how to improve infection prevention and control practices in the Gambia (Bittaye et al., 2019). Nurses play important role in care organization and transitions and this help to reduce the spread of HAIs, hospital length of stay and fewer hospital readmissions cases related to HAIs (Muthyala et al., 2019).The findings of this research will be used to make recommendations to hospital policy makers thereby improving the nurses understanding on infection prevention and control measures, and will show some of the cardinal factors that put nurses at risk to acquired healthcare associated infections while rendering healthcare service to patients. The findings of this research can also be used for educational reasons and also for future research to design and make policies in the

hospital to make sure there is successful application of general safeguard measures on healthcare associated infections among nurses and other healthcare personnel.

1.5. Limitation

This study will only be limited at Kanifing general hospital therefore; the results of this study couldn't represent the whole country. Other limitation is that the scope of this study is limited only to nurses' knowledge and practices regarding HAI infections.

1.6. Definition of Terms

Healthcare-Associated Infections (HAIs): Healthcare-Associated Infections are infections neither present nor incubating prior to the patient's hospitalization in a particular health care setting (Suleyman et al., 2018).

Tertiary Hospital: A hospital with specialised sub-specialty care example paediatrics, medical/surgical, gynaecology, accident and emergency etc (Baldeh, 2019).

Infection Prevention: Is the act of stopping or avoid the spread of infection by creating barriers or control mechanisms, hospital acquired infection preventions are the rules executed that has the standardize guidelines for nurses or other health care professionals to use while rendering healthcare service to patients to scale down the immensity of HAIs (Bayleyegn et al., 2021).

Infection Control: Infection control is a set of strategies designed to reduce the possibility of infectious disease, it includes both basic safety measures, and guide on infectious diseases, the violation of the standards measures accelerates and perpetuates the link of infections that can be pass from nurse to patient, patient to nurse (Alojaimy et al., 2021).

CHAPTER II

Literature Review

Research related conceptual definitions, descriptions and information related to the subject that already exists in the literature are given in this chapter.

2.1. Theoretical Framework

2.1.1. Definition of Infection

Infection is the establishment and growth of microorganisms not ordinarily found in the host body, such as bacteria, viruses, and parasites. Both asymptomatic (subclinical) and symptomatic (clinically obvious) infections exist. A disease might stay put in one area, or it can travel throughout the body through the circulatory and lymphatic systems (body wide), the body's naturally occurring microorganisms are not infectious, normal flora in the mouth and gut, for instance, do not count as infections (Reis et al., 2019).

2.1.2. Definition of Healthcare-Associated Infections

Acquired in a healthcare setting; sometimes known as a nosocomial infection (from the Greek nosokomeion, meaning "hospital"), it is frequently referred to as a healthcare-associated infection instead to better reflect its prevalence in both inpatient and outpatient facilities, this kind of infection may be picked up in any therapeutic environment, from hospitals and nursing homes to rehabilitation centers and diagnostic labs (Ali et al., 2018). Nosocomial is a medical word for an infection that is acquired when a patient is in a hospital, is defined as an infection that "was not present or incubating prior to admission to the hospital, but frequently occurred 48 hours after admission (Fakery et al., 2018). HAIs and illnesses resistant to many drugs are preventable and treatable, but only if the risk factors for these infections are known and addressed (Khalil & Abdalrahim, 2019).

2.1.3. Historical of Healthcare-Associated Infections

The name nosocomial infection rooted from a Greek word "Nosos which means illness and Komien meaning to nurse for (Pearson, 2009; Lobdell, 2012; Surawicz & Vindigni, 2015). A British citizen by the name James Simpson coined out the word nosocomial infection which he called "Hospitalism" to explain illnesses one get in hospitals in year 1830 (Haque et al., 2018; Lobdell, 2012; Pearson, 2009).

In 1890 skin infection due to streptococcus was regarded as a normal aspect of health facility culture, particularly after operation. Before the nineteen century, typhus was refered to as an infection patients get in the healthcare settings whilst on treatment or come for follow up (Pearson, 2009; Lobdell, 2012; Surawicz & Vindigni, 2015). HAIs increased in the 19th Century prior to the introduction of surgical operations, both major and minor operations like legs, arms dismember and illness cumulated about 80% in year 1870s (Ali et al., 2018; Lobdell, 2012; Surawicz & Vindigni, 2015). The common explanation about how an infection propagated in the early 80s was poor air circulation (ventilation); healthcare practitioners focused more on lowering the transmission of HAIs by maintaining proper ventilation and avoiding patient congestion within the health facility (Pearson, 2009; Lobdell, 2012; Surawicz & Vindigni, 2015).

Lengthy knowledge exists that medicinal actions has both positive and negative effects, decades back the founder of modern medicine (Hippocrates) said , "I shall utilize therapies to the sick to the best of my capability as well as discernment, while striving to protect them from detriment or unfairness, the phrase "unexpected bodily harm" occurring from or influenced by medical intervention, as well as mortality" refers to the possibility that drugs could have negative side effects, its demands further observation and professional attention if not culminates in demise (Pearson, 2009; Lobdell, 2012; Surawicz & Vindigni, 2015). Professor Semmelweis from Hungarian was the first health practitioner who noticed that healthcare workers could transmit disease to patient if there is any negligence, he carried out a research at one hospital in Austria were he pinpointed the means of propagation and unfurl of puerperal sepsis (Ali et al., 2018; Pearson, 2009; Lobdell, 2012; Surawicz & Vindigni, 2015). A diseases specialist passed away after sustaining blade injury while performing postmortem on a patient who dead of puerperal sepsis which he used as a prove to show that both a blade and a healthcare provider dirty hands may spread germs to patients also more death cases were noticed with patients seen by medical Trainees and

obstetricians than those seen by midwives, which he reveals in year 1847. Professor Semmelweis played a great role in the fight against HAIs in the 19s and up to date, he was the first person to report an HAIs case, he didn't stop there he went further to offer a hand - washing solution to stop its growth (Ali et al., 2018; Lobdell, 2012; Surawicz &Vindigni, 2015).

Florence Nightingale's research between October 1854 until April 1855 involved a detailed review of the death statistics that revealed inadequate hygiene as the primary contributing factor, as well as developing fresh information charts that convinced the administration to overhaul healthcare. Her hospital notes' evidentiary foundation was the creation of a contemporary critical method for evaluating patient outcomes, hospital administrative make use of her review to overcome the issue of mass population in health institutions, poor ventilator system, hand hygiene measures, fatalities that were recorded from illnesses that may have been avoided, injuries, as well as other conditions (Pearson, 2009; Lobdell, 2012; Surawicz & Vindigni, 2015).

2.1.4. Etiology of Healthcare-Associated Infections

The risk of infection in a hospital setting is influenced by several variables, such as the quality of infection control practices, the patient's immune system, and the frequency of certain pathogens in the surrounding population. The likelihood of contracting HAI in the ICU is greatly increased by immunosuppression, advanced age, prolonged hospitalization, multiple underlying comorbidities, multiple healthcare facility visits, mechanical ventilation, recent invasive surgery, indwelling devices, and ICU admission (Alhumaid et al., 2021; Ali et al., 2018). Receiving intravenous antibiotics throughout the last 90 days is a major risk factor for the development of antimicrobial resistance to several medications. The risk of infection by nosocomial and, sadly, occasionally antimicrobial-resistant bacteria increases for already-vulnerable patients during hospital stays, despite the vital role hospitals play in the treatment of acute illnesses. Patients, staff, and visitors to healthcare facilities are all potential vectors for the transmission of infectious illnesses (CDC, 2020; Kumar et al, 2021). *Candida*is a common causal agent of Central Line Associated Bloodstream Infection (CLABSI)in the adult intensive ward, while Staphylococcus aureus and *Enterobacteriaceae* (in normal adult wards, paediatric ICU and units, and cancer wards). According to the National Healthcare Safety Centre, the top eight most

prevalent organisms accountable for SSI are as follows; *Staph aureus, coagulase-negative staphylococcus, Enterococcus, Escherichia coli, Pseudomonas aeruginosa, Enterobacter, and Klebsiella pneumonia*, the majority of HAP and VAP cases are generated by *Staph aureus and Pseudomonas aeruginosa* (CDC, 2020; Edwards & Jones 2019; National Healthcare Safety, 2019). Nevertheless, E. coli and Klebsiella pneumonia seem to be more prevalent in young children (CDC, 2020; Edwards & Jones 2019).

Briefly; Risk factors that cause HAIs, the physical inadequacies of the hospital, lack of personnel and the patient's underlying diseases are among the main causes can be counted (Kurt et al., 2021).

2.1.5. Epidemiology of Healthcare-Associated Infections

The term epidemiology origin from the Greek word epi which means "on or upon", demos, means "people" and logos means "the study of 'many interpretations have been offered, but the one below best expresses epidemiology's fundamental ideas and public health spirit, epidemiology is the exploration of the incidence and causes of health-related conditions in specific groups, as well as its implementation to the control of health issues (Pearson, 2009).Results from a 2014 multistate point prevalence evaluation of healthcare-associated infections, including 11,282 patients from 183 hospitals in the United States were publicised (Monegro & Regunath, 2022).

Infections of the skin and surgical sites are often caused by Staphylococcus aureus and, less frequently, Methicillin-resistant Staphylococcus aureus (MRSA). Combining infection monitoring with infection control programs has the potential to reduce infections by a third. Some HAI has decreased in frequency as a result of increased knowledge and rigorous prevention measures applied in hospital settings. Some progress in preventing HAI has occurred from the deployment of rigorous infection monitoring and preventive techniques. From 2008 to 2013, the number of CLABSI cases fell by 46%, as reported by the CDC (CDC, 2020).

2.1.6. Surveillance of Healthcare-Associated Infections

The World Health Organization (WHO) defines surveillance as "the ongoing, systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know." (WHO, 2020; Sinkowitz, 2020). Approximately 2 million people per year are diagnosed with an illness they acquired in a hospital (WHO, 2022). In the United States, tracking these infections dates back to the 1970s and serves as a model for tracking other adverse health occurrences. Surveillance for HAIs follows principles that are very similar to the manufacturing industry's approach to continuous quality improvement. Rather than focusing on individual improvement, both systems attempt to make systemic changes. Deming distinguished between "special causes" and "common causes" of manufacturing mistakes. About 5-10% of all mistakes may be traced back to uncommon sources. Similarly, only 5-10% of HAIs result in officially reported epidemics (WHO, 2020). There is no information on surveillance of HAIs in the Gambia.

2.1.7. Impact of Healthcare-Associated Infections

Healthcare associated infections are those that patient contracts while staying in a healthcare facility, because of the high death and disability rates associated with these illnesses, hospitals often have to spend a lot of money to combat them. Since of this, the overall throughput of patients is reduced because infected patients have to remain in the hospital longer, these infections yearly account to about 37 000 attributable deaths in Europe and in other parts of the globe respectively, while in the USA is amount to about 99000 deaths (Dadi et al., 2021; Monegro et al., 2022). In addition, they cause patients with HAIs to need more antibiotics and stay in more intensive care units. Plus, they expose the medical center to possible legal action (Alhumaid et al., 2021; Suleymen et al., 2018). Its responsible for a sizable share of the harms brought on by medical procedures both in wealthy and low-income institutions, HAIs result in financial consequences for the healthcare system and are rising yearly also medical equipments use in health care settings are detected to have significant heightened in HAIs, resulting in an added cost of more than 10,000 Euros for every patient (Dadi et

al., 2021). Is seriously endangering the life of nurses, patients and healthcare professionals worldwide and gradually emerging a serious public health area of concern (Ali et al., 2018; Surawicz & Vindigni, 2015). Infections that are connected with medical care are a significant public health risk, and nurses play a critical part in both the prevention of these infections and the treatment of patients who get HAIs, it is necessary for the prevention of such illnesses to adhere to the guidelines and practices that are published by organizations such as the CDC and that are supported by staff members who work in infection prevention and control, due to the greater effort and attention that endemic and epidemic infectious agent exposures entail, patients and healthcare personnel may both be adversely impacted by endemic and epidemic infectious agent exposures (Colindres et al., 2018). Staff workloads are affected by exposure to infectious agents often present in the acute care context (Lam et al., 2018). Around 9% to 37% of patients confined to intensive care ward are affected by HAIs and occurs in between 5% to 15% of ICUs inpatients leading to high death rate, poor healthcare outcome, create opportunity for patients to spend more time\days in the healthcare setting, increase the peril of burnout on nurses etc (Haque et al., 2018). Because they cause so much suffering and expense to society, health care-associated diseases are classified as both an epidemic and endemic threat to public health (Haque et al., 2018).

2.1.8. Infectious Ways of Healthcare-Associated Infections

An infection occurs when germs enter the body, increase in number, and cause a reaction of the body.

Three things are necessary for an infection to occur: (CDC, 2016)

- Source: Places where infectious agents (germs) live (e.g., sinks, surfaces, human skin)
- Susceptible Person: A Person with a way for germs to enter the body
- Transmission: A Way germs are moved to the susceptible person

Ways of Transmission.

Hospital Microorganisms that causes infections are or can be transmitted in various ways (Fürnkranz& Walochnik,2021).

Contamination.

Contact moves germs by touch. Healthcare personals hands become contaminated by touching germs present on medical material or high touch surfaces and then carry the germs on their hands and spread to a person (CDC, 2016).

Air–Infection.

Inhalation happen when germs are aerosolized in tiny particles that survive on air currents over great distances and time and reach a susceptible person.Airborne transmission can occur when infected patients cough, talk or sneeze, or when germs are aerosolized by medical equipment or dust from an area (CDC, 2016).

Sharps Injuries.

A puncture/cut either from a needle, scalpel, or any pointy instrument, it can expose the victim to infections like Hepatitis, HIV etc. (CDC, 2019).

Sprays and Splashes.

Direct/indirect contact with patient's fluid (bodily) this can be blood, objects that are infected, secrets, bodily wastes and this happens when rendering health procedure or removing Personal Protective Equipment(PPEs) eg; gown, gloves, masks, facial protection etc. (CDC, 2019).

2.1.9. Healthcare-Associated Infections Types

The most common hospital infections are urinary system infections, surgery site infections, nosocomial blood circulation infections and bacterium (sepsis etc), ventilator-associated pneumonia.

Ventilator Associated Pneumonia.

Lung tissue illness is known as pneumonia. Microorganisms, fluid, and inflammatory cells accumulate in the air sacs (alveoli) of the lungs, disrupting their normal function. 8 out of every 1,000 persons in the United Kingdom will have pneumonia at some point in their lives. It may strike at any age, although the very young or the elderly are more vulnerable. Infecting between 0.5 and 1.0 percent of hospitalized patients, healthcare-acquired pneumonia is the leading healthcare-related illness linked with mortality. *Methicillin-resistant Staphylococcus aureus, Pseudomonas aeruginosa, and other non-pseudomonal Gram-negative bacteria* are the most common causes of infection (Ali et al., 2018; Magill, 2018).

Surgical Site Infections.

An infection at the site of operation is referred to as a surgical site infection (SSI) (Sattar et al., 2019). Up to 20% of all healthcare-associated infections are SSIs (Otieku et al., 2022).Infection near the surgical incision occurs in at least 5% of patients, an infection at the site of the surgery may vary in severity from a minor wound discharge that clears up on its own within 7-10 days to a life-threatening complication, such as a sternal infection following open heart surgery (Ali et al., 2018; Otieku et al., 2022).Gram-positive and gram-negative microbes equally contribute to SSIs, staphylococcus aureus been the main microbes. Due to the fact that the majority of these microorganisms are multi-drug resistant pathogens, they present a serious challenge to the healthcare providers and institutions (Sattar et al., 2019).

Sepsis/Bacteraemia.

Sepsis is a clinical condition triggered by an infection that causes the immune and coagulation systems to activate (bacteria, viruses, or fungi). In the ICU, sepsis is a leading cause of mortality for hospitalized patients. A dangerous illness, septic shock is characterized by organ malfunction and infection, as well as low blood pressure despite appropriate fluid replenishment. Pneumonia, intestinal perforation, UTIs, and serious skin infections are the leading causes of sepsis in adults. According to the UK Sepsis Trust, which relies on data from Hospital Episode Statistics (HES), the number of cases of sepsis is increasing at a rate of roughly 11.5% per year, reaching 141,772 in 2014–2015 (CDC, 2021). The most prevalent complication of sepsis was related to non-communicable diseases affecting the mother. Neonatal problems, lower respiratory infections, and diarrheal diseases were the leading causes of mortality from sepsis. When it comes to neonatal and maternal sepsis, *group B streptococcus* is by far the most common culprit, while *E. coli* is becoming more of a problem. Both of these infections have shown substantial treatment resistance and are high on the list of those that need to be studied further in order to generate new medicines (CDC, 2021; WHO, 2020).

Urinary System Infections.

It is the presence of bacteria in the urinary system and their subsequent spread that leads to the development of a urinary tract infection (UTI). Clinical symptoms that may result from a urinary tract infection include acute and chronic pyelonephritis (infection of the kidney and renal pelvis), cystitis (infection of the bladder), urethritis (infection of the urethra), epididymitis (infection of the epididymis), and prostatitis (infection of the

prostate gland). Whether it's via the bloodstream or neighbouring tissues (as in a perinephric abscess), an infection may quickly become a serious health problem (Eze et al., 2020). Women, children, and the elderly who are generally healthy are more likely to suffer from a simple UTI. Indwelling catheters, urinary tract abnormalities, immunosuppression, or antibiotic use are common risk factors for complicated UTIs. The *bacterium uropathogenic E. coli* (UPEC) is the leading cause of both simple and complex UTIs, being responsible for almost 75% and 65% of all cases, respectively (Eze et al., 2020).

Nosocomial Blood Circulation.

This infection seen in the blood and its either viral, fungus or bacteria, which happens within three days while receiving treatment in healthcare settings (Gezgel et al., 2019).

Bloodstream infection and pneumonitis are the two main nosocomial problems in the intensive care unit that are associated with blood infusion frequencies, the peril of nosocomial infection may be significantly heightened blood transfusion, the decision of the caregiver regarding when to transfuse blood should take into account the probable association between transfusion technique thereby preventing nosocomial blood circulation in patients (CDC, 2017; Gezgel et al., 2019). A Study showed that nosocomial blood circulation was higher than all other nosocomial related infections, pneumonia due to ventilator was 22%, nosocomial burn related infection was 15.7%, infection of the urinary stream connected to the urinary line tube was 8.4%, blood born infections from central venous catheter was 4.9% while nosocomial blood circulation accounting for the highest of all which was 48.1% (Gezgel et al., 2019).

2.1.10. Control and Prevention of Healthcare-Associated Infections

The goal of infection control procedures is to lower the frequency of healthcare associated infections it includes both basic safety measures and a guide on infectious diseases (Alojaimy et al., 2021).Aseptic procedures, careful handling of contaminated materials, frequent and conscientious hand-washing, insisting on personnel education on basic infection control measures, and the use of isolation rooms and wards are all important ways to lessen patients' exposure to potentially harmful microorganisms (Colindres et al., 2018; Lastinger et al 2022). In order to prevent the spread of germs from one patient to the next, it is important to sanitize bathtubs after each usage. Some

germs may thrive and spread easily in the humid conditions created by respirators and humidifiers. HAIs may be avoided by keeping these areas and objects spotless and disinfected, and by sterilizing bandages and incubation (tube insertion into organs like the trachea) materials before use. Remove sterile packaging aseptically to retain its effectiveness. By using antibiotics sparingly, delaying or avoiding invasive operations, and using immunosuppressant's sparingly, doctors may assist their patients better in fighting infection (Ali et al., 2018; Alojaimy et al., 2021; Falagas et al., 2021; Lestinger et al., 2022).

An infection control board is required in each hospital seeking accreditation. The majority of hospitals employ some kind of infection control nurse or epidemiologist (an individual who studies disease in populations). Their job is to find the causes of the problems, such as microorganisms that are resistant to antibiotics or sloppy sterilizing procedures. Checks for microbiological contamination on equipment should be performed on a regular basis by the infection control officer (Meschiari et al., 2021). HAIs preventions are the regulations implemented that have standardized criteria for nurses or other healthcare workers to adopt while providing healthcare to patients in an effort to reduce the massive burden of HAIs (Bayleyegn et al., 2021). Utilizing understanding, skills, and ability to make quick judgments to execute the proper actions in all roles and situations, nurses can lead by example in infection prevention and control (Chitimwango, 2017).

Standard precautions
- Hand hygiene
- Respiratory hygiene
- Personal protection
- Injection safety
- Medication storage and handling
- Cleaning and disinfection (devices, environmental surface)
- Waste management

Transmission based Precautions
- Contact precautions
- Droplet precautions
- Airborne precautions

Immunization/Vaccination

Education and training of healthcare staff

Figure 1. Infection Control Program (WHO, 2022)

Standard Precautions.

Standard precautions are highly necessary for nurses, health care professionals and all patients regardless, standard precautions are based on peril observation, health professionals use PPEs in order to safe guard themselves and avoid passing infections from patient to patient (CDC, 2018; WHO, 2022).

Hand Hygiene or Hand washing.

Hand hygiene/hand washing is the process of maintaining hand cleanliness either by washing or scrubbing your hands under clean running tap water with soap or without soap or using an alcohol-based antiseptic/ 0.5 percent chlorhexidine or 70 percent ethanol to clean your hands (Satriani et al., 2021). In general, the hand washing or hand hygiene process is guided by the WHO 5 hand cleaning procedure and measures; wash hands prior clean/sterile procedures, wash hands after body fluid exposure/risk, wash hands after touching a patient and wash hands post exposing to patient encircle (Satriani et al., 2022; WHO, 2022).Health personnel who do not properly disinfect his/her hands and change gloves between patients are a major cause of the spread of illness in healthcare settings (Satriani et al., 2022).So, according to national and international organization guidelines for infection control, hand washing is still the most effective intervention in reducing the incidence of health care-associated diseases (Satriani et al., 2022; WHO, 2022).

Respiratory Hygiene.

Infection control tactics aim to reduce the spreading of respiratory tract infections that are disseminated by droplet or air pathways, it's very important for nurses to health educate their patients on respiratory protocols and hand hygiene example close mouth and nose with elbow or use napkin when coughing/sneezing or sneeze and wash hands afterwards (CDC, 2018; WHO, 2022).

Personal Protective Equipment (PPE).

Personal protective equipments are the gears uses by nurses or healthcare professionals when rendering health services to patient's example during surgery, dressing patients wound, medication etc. PPEs reduce the risk of nurses to patients or patient to nurse infection (WHO, 2022). A Study revealed that nurses lack proper PPEs gears thereby exposing themselves and their patients to great infection peril and sometimes denied patients the health care service also the incorrect use of PPEs, reused was reported (CDC, 2018; WHO, 2022; Wendt et al., 2022).

Injection Safety.

The term injection safety sometimes known as safe injection methods refers to a series of actions executed by health professionals to provide intravenous, intramuscular shots etc to patients, nurses and other healthcare workers in the most secure possible way (CDC, 2019; Konnor et al., 2022; Ughasoro et al., 2019; WHO, 2020).

Medication Storage and Handling.

Drugs need to be kept safely in a setting that won't degrade their effectiveness, medication storage is any place or ways on storing medicine by nurses or health care professionals either in fridge, lockers and in medicine box in order to maintain its normal temperature, preserved it from heat, moist etc to ensure adherence to the product's storage rules and the applicable laws, like the storage of controlled pharmaceuticals, all healthcare organizations should have regular standard policies in place (CDC, 2019; Konnor et al., 2022; Ughasoro et al., 2019; WHO, 2020). Intravenous medicine, vials should be kept separately with tags showing clearly this helps to knock down the rate of medical errors in healthcare settings, nurses should always know the right route of drugs post giving it the patients also know the right patient, the right time, right dose, have knowledge about the drug then document (Konnor et al., 2022; Ughasoro et al., 2019; WHO, 2020).

Cleaning and Disinfection (Devices, environmental waste management).

Environmental sanitization and cleanliness are crucial for minimizing the propagation of infections, create guidelines and techniques for handling patient gears/materials use in rendering care that could be infected or stained with bodily fluids, Prior to intensity cleaning and disinfecting (CDC 2019; Mansuri et al., 2019; WHO, 2022). Organic particles are eliminated from the major and sub medical tools using the specified cleaning chemicals to promote appropriate decontamination and asepsis method. Environmental guidelines and practices for regular and selective cleaning of the hospital surrounding are very vital and play a great role in the reduction of HAIs (CDC 2019; Mansuri et al., 2019; WHO, 2022). In accordance with the frequency of patients exposure and staining levels, areas that are most prone to harbor germs should be cleaned and disinfected regularly example patients bed guards, tables and area mostly touch by the patient, proper waste management plays a key role to the low spread of HAIs, needle prick injuries etc (CDC 2019; Mansuri et al., 2019; WHO, 2022).However, hospital housekeepers knew more about general hospital waste

management regulations and processes but knew less about the finer points of waste disposal (Uloma et al., 2022).

Transmission Base Precautions.

Transmission base precautions are the secondary lines of defence against disease and should be utilized in conjunction to standard precautions measures in patient who might be infected to avoid the infection from spreading (CDC, 2019; WHO, 2020; WHO, 2022).

Contact Precautions.

Health professionals use contact precautions when they are suspicious of a patient having an illness that can be spread, such patients are separated from general wards and from other patients, proper PPEs are wore before and are dispose safely to avoid contact also the patient have his/her own medical tool/apparatus, regular disinfection is done as well (CDC, 2019).

Droplet Precautions.

Patients who might or suspected of having respiratory illness which is pass through talking, coughing or sneezing, patient is separated and on mask, proper PPEs are strictly wore when rendering health service, nurses health educate the patient on standard coughing, sneezing protocols (CDC, 2019).

Airborne Precautions.

Chickenpox, measles, and tuberculosis patients, healthcare professionals are fully gear up before entry such room and also patient movement is limited (CDC, 2019).

Immunization/Vaccination.

Immunization prevents millions of lives each year, thereby promoting positive health outcome and therapeutic response across the world, on the other hand, an individual immune system reacts when vaccinated, vaccines create immunity and act in conjunction with one body's defence mechanism (Sheikh et al., 2018; WHO, 2022). Immunization is an unquestionable the basic right for each individual, its reduce and safeguard over 5 million fatalities every year, there are over 20 vaccines that helps to fight against deadly diseases (Sheikh et al., 2018; WHO, 2022).

WHO highlighted the region for immunization/vaccination and they ensure that all nations have access to immunization/vaccination, children and new born babies have historically been the focus of national immunization policies, but recently the authorities are attempting to safeguard the masses from infections to be specific those

that can be transfer from one individual to another via direct contact or other means and this is executed by adopting immunization plan (WHO, 2022).

Education and Training of Healthcare Staff.

Education and training sessions provide healthcare staff with the necessary skills, understanding, and expertise to handle various healthcare-related situations effectively is very pivotal in every care institution, it helps to improve and evaluate healthcare workers understanding on various aspects thereby fostering effective therapeutic outcome (Brazil et al., 2021).

Lack/limited training sessions or tutoring can increase the peril of healthcare associated infections, tutoring or sessions on the peril and how to prevent the HAIs plays a great role on decreasing the spread of HAIs in care settings globally (Sheikh et al., 2018). Healthcare professionals/workers must get thorough skills and understanding on how to prevent themselves and patients from getting HAIs, also health educate patients and patient's escorts about HAIs perils and safety measures like covering mouth when sneezing/coughing, rinsing, drying and thorough cleaning of hands regularly (WHO, 2022). Some healthcare settings initiate a body responsible for organizing training sessions and observing workers which helps to boost their understanding and skills (Sheikh et al., 2018). Moreover, education and training greatly improve skills and knowledge, gives a positive impact on staff morale which can increased job satisfactory and decreased staff turnover rates (O'Sullivan et al., 2016).

2.1.11. Nurses' Role in Infection Prevention and Control

As a consequence of their extensive knowledge in the area of infectious diseases, nurses play an essential part in the process of cultivating a culture that prioritizes the safety of patients by encouraging frequent hand washing among other hospital employees. The nursing staff is in a prime position to educate patients on proper infection prevention and control measures (Muthyala et al., 2019). Clinical nurse specialists (CNSs) have been shown to be uniquely qualified to spearhead the implementation of evidence-based quality development activities that reduce costs throughout the healthcare system, as demonstrated by a number of studies and illustrative jobs. A shorter duration of stay in the hospital, fewer readmissions, and

fewer HAIs are all outcomes that may benefit from the CNS's involvement in care organization and transitions of care (Muthyala et al., 2019).

In order to reduce the prevalence of HAIs, competent nurses play a crucial role. When it comes to preventing the spread of illness in a patient's care setting, the nurse is in charge (Uloma et al., 2022). Nurses serve as advocates, partaking in an organized session run by a certified infection prevention and control (IPC) caregiver plays a great role in the fight against HAIs, nurses collect and interpret infection findings to establish actions that are supported by scientific rationales, they health educate patients and patient families about HAIs, how its spreads, how to stop its spreads and hygiene to be precise hand washing, coughing /sneezing practice etc (Burnett, 2018; Muthyala et al., 2019; Ward, 2016). They play an immense role to knock down the spreads of HAIs in health institutions by segregating and managing patients who are suspected to have any illness that can be pass to other patients or to nurses themselves which helped to reduce the risk and spread of HAIs in their settings (Burnett, 2018; Muthyala et al., 2019; Ward, 2016). Nurses use their deviates knowledge on infection control and prevention to avoid and lower the spread of HAIs (Burnett, 2018; Muthyala et al., 2019; Ward, 2016).

There are a lot of nursing interventions to prevent and control infection are described in the Nursing Interventions Classification (NIC) Book (Bulechek et al., 2008). Nurses have activities to minimize the acquisition and transmission of infectious agents. For examples (Bulechek et al., 2008);

- Encourage fluid intake and rest

- Instruct patient to take antibiotics, as prescribed

-Teach patient and family members about signs and symptoms of infection and how to avoid infections

-Change peripheral IV and central line sites and dressings according to current CDC guidelines

-Wash hands before and after each patient care activity and instruct patient on appropriate hand washing techniques

- Isolate persons exposed to communicable disease etc.

In NIC Book, it was explained many activities for nurses to prevent nosocomial infection in the operating room. Moreover, some activities of infection protection include to (Bulechek et al., 2008);

-Monitor for systemic and localized signs and symptoms of infection

-Maintain isolation techniques and asepsis for patient at risk

-Screen all visitors for communicable disease and limit the number of visitors

-Remove fresh flowers and plants from patient areas, as appropriate

2.2.   Related Researches

A research done in a tertiary hospital in Zambia revealed that only 48.88% of the nurses who participated on the research practice infection prevention and control which was a very poor score, this showed that there was a very high negligence rate in infection prevention and control practice among nurse (Chitimwango, 2017).

A study conducted in a tertiary hospital in Saudi Arabia on infection prevention and control, the study showed that 78.3% of the nurses who participated in the study had acceptable understanding regarding infection prevention and control also had satisfactory understanding about hand hygiene practice (Salem, 2019). In addition, in same study was found that 50% of the nurses take part in infection prevention and control sessions (Salem, 2019).

A study done to assess the knowledge, attitude and practice of infection prevention and control among nurses and other health care professionals within a tertiary Hospital in Lebanon, the study revealed that the participants has great understanding on infection prevention (Safadi et al., 2019).

A study conducted in a hospital in India to assess the understanding of nurses on infection prevention and control in the surgical ward working in the surgical ward on, its involved 30 nurses, the study revealed that there was limited understanding regarding infection prevention and control among nurses who were working in the surgical ward during the research (Mansuri et al., 2019).

A study conducted to assess the knowledge of nurses on how to prevent Hospital associated infections revealed that 18.1% out of 25 nurses showed satisfactory result on infection control and standard measures to fight the spread of HAIs, also showed dissatisfactory result on hand washing and limited understanding on health care associated infections (Hammoud et al., 2021).The same study found out that 433 nurses and other health professionals have understanding in the standard measures and healthcare associated infection knowledge was asses on the nurses, its showed that 41.1% of all the nurses had good knowledge about the standard precautions measures

on HAIs, it's also revealed the improvement in nursing avocation and practice (Hammoud et al., 2021).

A study conducted in South Africa to determine the understanding of nurses due to the increasing number of HAIs, the study showed that 90% of the nurses that participated on the study do pre and post washing of hands before doing any medical procedure, 99.5% of the nurse involved the in study practice standard hand hygiene after having contact with bodily fluids from patients, male nurses scored was 92.8% on the understanding of hand hygiene practice while female nurses scored was 91.4% (Bimerew & Muhawenimana, 2022).

In another study found that 37% of the nurses expressed confidence in their ability to avoid and manage HAIs, regarding this, 82.46% said they were aware with HAIs standards, and the majority (89.47%) said they were familiar with the WHO's hand hygiene measures, (89.47%) of nurses do not think that patients with transmittable illness can be admitted in the same ward with patients with non-transmittable illness, (85.96%) participants don't concur they believed that patients do not bring or cannot bring hospital acquired infection from home (Flores et al., 2022).

CHAPTER III

Methodology

This chapter provides information about the research design, participants/sample, data collection and analysis procedures as well as how the findings are analysed.

3.1. Research Design

This study made use of a descriptive and cross sectional research design.

3.2. Population & Sample

The sample size was calculated from the total population of 441 nurses working in Kanifing general hospital in The Gambia. There are four main tertiary Hospitals in The Gambia. The hospital has a total bed capacity of 200, and it is one of the four tertiary public health care delivery facilities in the country serving a catchment area population of over 600,000 inhabitants, about 30% of the Gambian population. It serves as a referral center for over 25 health facilities in the Kanifing Municipality (KM) region and beyond, both public and private. The hospital has IPC committee, this committee was set up to ensure adherence to infection prevention and control protocols and guidelines. It has various departments and specialized units. This hospital operates 24 hours a day. Nurses work three shifts a day (morning 8 am to 2 pm, afternoon from 2 pm to, 8 pm and night shift from 8 pm to 8 am). This hospital has been chosen because of having more health workers and is the second main tertiary and referral hospital in The Gambia, it comprises all units and sub-units directly rendering clinical services, this includes Internal medicine, Surgery, Paediatric, Obstetrics and Gynaecology, Physiotherapy, Pharmacy, Laboratory and Radiology and Imaging Departments. The hospital has IPC committee.

The sample size of 205 nurses. This size was calculated using the sample size method of sample size determination of the known population.

Using the formula of the known population

$$n = \frac{N(Z\text{æ}/2)2}{(Z\text{æ}/2)2 + 4Ne2}$$

Where:

N= Known population (441)

n= sample size

æ/2= Z-score when æ= 5% in two tail test

e= marginal error (0.05)

Zæ/2= 1.96 confidence interval

Sample size (n) = $\dfrac{441(1.96)2}{(1.96)2 + 4*441(0.05)2}$

$$\frac{1693.44}{3.84+4.41}$$

n= $\dfrac{1693.44}{8.25}$ n== 205

Inclusion criteria;

- To work at a Tertiary Hospital in The Gambia and
- To be volunteered participate in the study
- To speak, understand and read English

Exclusive Criteria;

- To work as internship or student in the tertiary hospital

3.3. Data Collection Tools/Materials and Data Collection Procedure

The study data collected using web-based surveys that are structured personal information form and the scale for knowledge and practice of healthcare associated infections. The researcher collected the study data between December 09, 2022 to January 30, 2023. In order to collect the data, the online survey Google form link shared with nurses' WhatsApp groups in the hospital and the nurses' association or by email, and completion of the surveys take almost 10 minutes. With the aid of a research assistant who fully grasped the goals and significance of this study, the researcher was able to contact participants who agreed and were eager to take part in this study.

After receiving approval from the 'Scientific Research Ethics Committee' of Near East University in December; who's granted the researcher permission to conduct this survey in regard to the ethical rules and norms of the institution, the researcher began the distribution of questionnaires to respondents on December to January. It took 3 three weeks for the researcher to gather the necessary information required for this research.

3.3.1. Personal Information Form.

This form was used to collect the participant's personal information and it consists of 9 questions that include their age, gender, nationality, nursing educational level, nursing category, current specialty unit/department, marital status, working duration as a nurse and employment status (Appendix File A).

3.3.2. The Scale for Knowledge, Practice, Attitude of Nurses on Hospital Acquire Infections.

The scale was created to observe the knowledge, practice and attitude of nurses in infection prevention and control. The scale was developed by Dr Kamunge from the University of Seton Hall. Permission was granted to use this scale. The scale consists of seven points that assists to know the knowledge, practice and attitude of nurses in infection prevention and control. Likert 7 points scale format which is; 1=Strongly Disagree, 2=Slightly Disagree, 3=Disagree, 4 =Neutral, 5 = Agree, 6=Slightly Agree, 7=Strongly Agree. The scale is made up of 33 questions and total score of 7 is a

higher score. The Cronbach's alpha value is 0.72. The least score on KPA total score is 33 and the highest is 231.There are 3 divisions in this scale; the first division is knowledge response that include 11 questions, ranges from 1-7 on Likert scales point. The least score of this division is 11 and the highest is 77. The second is practice response that has 14 questions, ranges from 1-7 on a Likert scales point. The least score of the second division is 14 and the highest is 98. The last is attitude response that has8 questions, ranges from 1-7 on a Likert scales. The least score is 8 and the highest is 56. The higher the score, the higher the level of knowledge, attitude and practice on HAI (Kamunge, 2013) (Appendix File B).

3.4. Data Analysis Plan

The data collected analysed using in the Statistical package (SPSS) 26.0 software. The distribution of nurses according to their socio-demographic characteristics was evaluated by frequency analysis. In this study, percentile, mean and standard deviation was used for descriptive statistics of the scale score and age. For statistical analysis, parametric tests will be used when it fits the normal distribution for continuous data, and non-parametric tests when it does not to analyses the relationship between the scoring the scale and socio-demographic characteristics. Hereby, the data of this study were analyzed using, A Mann – Whitney U test, the post hoc test (Dunnett T3 test), Kruskal-Wallis H test and Spear-men test.

3.5. Ethical Consideration

The researcher took the permission from Kanifing General Hospital (Appendix File C). Also, the researchers got the permission Dr. Kamunge to use the scale in this study (Appendix File D). The participations were informed about the aim of this study and then their written informed consent will be obtained by online survey. This study was approved by the NEU ethics committee (YDU/2022/108-1657) (Appendix File E).

CHAPTER IV

Findings

This chapter presents the findings based on the collected data of this study.

4.1. Findings for Sociodemographic Characteristics of the Participants

Table 1.

Sociodemographic characteristics of the participants (n=205)

Variable	Categories	Frequency	Percentage
Gender	Female	123	60.0
	Male	82	40.0
Age Range	18 – 27	99	48.3
	28 – 37	88	42.9
	38 – 47	16	7.8
	48 and above	2	1.0
Nationality	Gambian	197	96.1
	Nigerian	5	2.4
	Others*	3	1.5
Marital Status	Single	142	69.3
	Married	63	33.2
Level of Nursing Education	Bachelors	63	30.7
	Master's degree	7	3.4
	Others**	136	65.9
Nursing Category	Registered Nurse	136	66.3
	Enrolled Nurse	59	28.8
	Others***	10	4.9
Employment Status	Full time	187	91.2
	Part time	8	3.9
	Contract	6	2.9
	Others****	4	2.0

Table 1. (Continue)

Years of Nursing Experience	1-5 years	112	54.6
	Below 1 year	12	5.9
	Above 10 year	5	2.4
Specialty unit or Department	Medical-Surgical Ward	52	25.4
	Maternal (Labor &Delivery, Post-natal)	34	16.6
	Pediatric or Neonatal Unit	33	16.1
	Acute Care	26	12.7
	Emergency Care	26	12.7
	Critical Care or Intensive Care unit	16	7.8
	Telemetry or Recovery	10	4.9
	Psychiatric or Behavioral	8	3.9

*Other = Liberian & Sri Lankan,

** Educated, they went through The Gambia college/University, The Gambia School of Nursing or The Gambia School of CHNs/ ENs Nurses etc. They are all registered nurses who have sat The Gambia nursing state board exam and certify by Nurses and midwifes council in the county in order to execute nursing duties.

***All others types of Nurses including Community Health Nurses (CHNs), Senior Nurse Attendants, Nurse Attendants, Community Health midwives and Enrolled Midwives etc.

**** Daily hire

In Table 1, the distribution of the participant's descriptive socio-demographic characteristics is given. The minimum age of the nurses is 19, the maximum age is 50, and the mean age is 28.576 (standard deviation: 5.97).

It is determined that females made up 60% of respondents, whereas the remaining 40% were male. The minimum age of the nurses is 19, the maximum age is 50, and the mean age is 28.576 (standard deviation: 5.97). The ages that make up the majority of the study were from 18 – 27, making up 99 (48.3%), it was followed by 28 – 37 with 88 (42.9), 38 – 47 were 16(7.8%), and lastly, 48 and above were 2(1%). Gambian make up the largest with 197(96.1%), Nigerian 5(2.4%), Liberian 2 (1%) and Sri Lankan 1(0.5%). Majority of the nurses were single 142 (69.3%) and married 63 (30.7). The majority of the nurses had other qualifications amounting to 134 (65.4%), bachelor's

degree 63 (30.7%), Master's degree 7 (3.4%) and doctoral 1 (0.5%). The category of nurses included registered nurses making up 136 (66.3), enrolled nurses, 59 (28.8%) and another category of nurses, 10 (4.9%). The majority of the nurses were employed full time summing up to 112 (54.6%), it was followed by part-time with 8 (3.9%), contracted nurses were 6(2.9%), and others were 4 (2%). Many of the nurses had been working as a nurse for 1 to 5 years, they totalled 112 (54.6%), 6 to 10 years 76 (37.1%), below one year 12 (5.9%), and above 10 years 5 (2.4%). The various department comprises of the following: Acute care 26(12.7%), Critical care 16 (7.8%), emergency care 26 (12.7%), maternal 34(16.6%), medical-surgical ward 52 (25.4%), paediatric or neonatal unit 33(16.1%), psychiatric or behavioural 7 (3.4%) and telemetry or recovery 10 (4.9%).

4.2. Findings for Research Question I

Table 2.

The Descriptive statistics nurse's scores on the scale of knowledge, practice, attitude of hospital acquire infections (n=205)

	$\overline{x}$	s	Min	Max
Total Score on Scale of Knowledge, Practice, Attitude of HAI	197.21	11.23	122.00	218.00
Knowledge Subscale	71.34	4.82	34.00	77.00
Practice Subscale	84.57	6.39	44.00	94.00
Attitude Subscale	41.30	3.69	34.00	53.00

The Table 2 presents the descriptive statistics of the nurse's scores on the Scale of Knowledge, Practice, and Attitude of HAIs.

The total score on Scale of Knowledge, Practice, Attitude of HAI has a mean of 197.21 and a standard deviation of 11.23 (min.:122.00- max.:218.00). Practice has the highest total mean score of 84.57; followed by Knowledge with mean score of 71.34, the least mean score was the attitude which has 41.30. The total mean score of KPA of 197.21 which is 85.3% of the total score of 231 shows that on average, the KPA of nurses with respect to HAI is good. The practice means score of 84.57 is 86.1% of 98.

This indicates that nurses have good practice in the prevention of HAI. Knowledge mean score is 71.34, which is 96.6% of 77 indicating that they are well knowledgeable about the prevention of HAI. Lastly, is attitude, the mean score is 41.3 which is 74% of 56. This again indicates that nurses have an intermediate attitude in the prevention of HAIs.

4.3. Findings for Research Question II

Table 3.

Differences in nurses' knowledge, practice, and attitude in infection prevention and control according to the Nurses' age range

Variable	Age range	N	Mean Rank	X^2	df	p
Total Score of KPA-HAI	18 – 27	99	104.74	2.597	3	0.458
	28 - 37	88	105.43			
	38 - 47	16	81.47			
	48 and above	2	82.25			
Knowledge	18 – 27	99	100.06	6.533	3	0.088
	28 - 37	88	108.74			
	38 - 47	16	80.69			
	48 and above	2	174.25			
Practice	18 – 27	99	110.06	5.113	3	0.164
	28 – 37	88	99.43			
	38 - 47	16	86.22			
	48 and above	2	45.25			
Attitude	18 – 27	99	102.32	0.182	3	0.980
	28 – 37	88	104.17			
	38 - 47	16	99.41			
	48 and above	2	114.00			

$p \leq 0.05^*$ $p \leq 0.01^{**}$

In Table 3, It was compared on the score of nurses taken from KPA-HAI scale by age group.

It was found that there is no statistically significant difference between age group and the score of KPA-HAI among nurses (p>0,05).

Table 4.

Differences in nurses' knowledge, practice, and attitude in infection prevention and control according to the Nurses' Nationality

Variable	Nationality	n	Mean Rank	X^2	df	p
Total Score of KPA-HAI	Gambian	197	104.36	4.298	3	0.231
	Liberian	2	53.75			
	Nigerian	5	87.60			
	Sri – Lankan	1	10.00			
Knowledge	Gambian	197	104.22	5.017	3	0.171
	Liberian	2	38.50			
	Nigerian	5	98.80			
	Sri – Lankan	1	13.00			
Practice	Gambian	197	104.81	5.742	3	0.125
	Liberian	2	66.00			
	Nigerian	5	65.00			
	Sri – Lankan	1	9.50			
Attitude	Gambian	197	101.09	6.141	3	0.105
	Liberian	2	125.50			
	Nigerian	5	163.20			
	Sri – Lankan	1	132.50			

$p \leq 0.05^*$ $p \leq 0.01^{**}$

In Table 4, It was compared on the score of nurses taken from KPA-HAI scale by nationality. It was figured out that there is no statistically significant difference between nationality and the score of KPA-HAI among nurses ($p < 0,05$).

Table 5.

Differences in nurses' knowledge, practice, and attitude in infection prevention and control according to the Nurses' Marital Status

Variable	Marital Status	n	Mean Rank	X^2	df	p
Total Score of KPA-HAI	Single	142	107.37	2.394	3	0.495
	Married	63	94.85			
Knowledge	Single	142	105.23	0.642	3	0.887
	Married	63	98.85			
Practice	Single	142	108.47	4.230	3	0.238
	Married	63	93.41			
Attitude	Single	142	104.06	5.465	3	0.141
	Married	63	105.41			

$p \leq 0.05^*$ $p \leq 0.01^{**}$

In Table 5, It was compared on the score of nurses taken from KPA-HAI scale by marital status. It was found that there is no statistically significant difference between marital status and the score of KPA-HAI among nurses (p<0,05).

Table 6.

Differences in nurses' knowledge, practice, and attitude in infection prevention and control according to the Nurses 'level of education

Variable	Educational Level	n	Mean Rank	X^2	df	p
Total Score of KPA-HAI	Doctoral	1	10.00	4.910	3	0.179
	Master's	7	134.07			
	Bachelor	63	98.07			
	Others	134	104.39			
Knowledge	Doctoral	1	5.00	7.726	3	0.052
	Master's	7	133.93			
	Bachelor	63	92.27			
	Others	134	107.16			
Practice	Doctoral	1	16.50	20.794	3	0.000**
	Master's	7	73.71			
	Bachelor	63	79.86			
	Others	134	116.06			
Attitude	Doctoral	1	192.50	5.465	3	0.142
	Master's	7	93.64			
	Bachelor	63	113.14			
	Others	134	98.05			

p≤0.05* p≤0.01**

Table 6 shows that there is a statistically significant difference between the educational level of nurses in terms of practice (p < 0.001) infection prevention and control.

The post hoc test show that the difference is between bachelor and others for practice (p < 0.05). Others (134) and bachelors (63) have higher scores as compared to other educational groups.

Table 7.

Differences in knowledge, practice, and attitude in infection prevention and control according to the category of Nurses

Variable	Nurses Category	N	Mean Rank	X^2	df	p
Total Score of KPA-HAI	Registered Nurse	136	101.44	0.575	2	0.750
	Enrolled Nurse	59	107.66			
	Others	10	96.65			
Knowledge	Registered Nurse	136	98.36	5.733	2	0.057
	Enrolled Nurse	59	117.22			
	Others	10	82.15			
Practice	Registered Nurse	136	101.15	2.810	2	0.245
	Enrolled Nurse	59	111.10			
	Others	10	80.35			
Attitude	Registered Nurse	136	99.84	8.253	2	0.016*
	Enrolled Nurse	59	101.58			
	Others	10	154.35			

$p \leq 0.05^*$ $p \leq 0.01^{**}$

Table 7 shows that there is a statistically significant difference between the category of Nurses in terms of attitude ($p < 0.05$) in infection prevention and control. The post hoc test reveals that the differences are between other nurses and registered and enrolled nurses ($p < 0.05$). Registered nurses (136) have higher scores on the score of KPA – HAI than enrolled and other nurses. However, there is no statistically significant difference in their knowledge and practice toward infection prevention and control.

Table 8.

Differences in nurses' knowledge, practice, and attitude in infection prevention and control according to their level of employment

Variable	Employment Status	N	Mean Rank	X^2	df	p
Total Score of KPA-HAI	Full - Time	187	107.39	11.806	3	0.008*
	Part-Time	8	54.06			
	Contract	6	64.08			
	Others	4	54.25			
Knowledge	Full - Time	187	107.66	15.400	3	0.002*
	Part-Time	8	53.94			
	Contract	6	73.92			

	Others	4	26.88			
Table 8	**(Continue)**					
Practice	Full - Time	187	108.37	19.428	3	0. 000**
	Part-Time	8	48.25			
	Contract	6	62.50			
	Others	4	22.00			
Attitude	Full - Time	187	103.81	2.209	3	0. 530
	Part-Time	8	75.50			
	Contract	6	102.50			
	Others	4	120.88			

p≤0.05* p≤0.01**

Table 8, It was determined that there is a statistically significant difference between the employment status and the total score of KPA-HAI (p < 0.05) of nurses. The post hoc test show that the difference is between Part – time and Full – time. Full-time (187) and Part-time (8), has the highest score as compared to others' employment status of the nurses. There is also a significant difference between the employment status of nurses in terms of knowledge (p < 0.05) and practice (p < 0.001) in infection prevention and control. The post hoc test for both knowledge and practice shows that the differences are between others and full–time and between part-time, full time.

Table 9.

Differences in nurses' knowledge, practice, and attitude in infection prevention and control according to their nursing experience

Variable	Nursing Experience	n	Mean Rank	X^2	df	p
Total Score of KPA-HAI	Below 1 Year	12	69.17	11.246	3	0.010*
	1 - 5 Years	112	111.79			
	6 - 10 Years	76	99.10			
	Above 10 Years	5	46.70			
Knowledge	Below 1 Year	12	53.38	10.209	3	0.017*
	1 - 5 Years	112	109.17			
	6 - 10 Years	76	102.28			
	Above 10 Years	5	94.80			
Practice	Below 1 Year	12	51.54	17.412	3	0. 001**
	1 - 5 Years	112	114.25			
	6 - 10 Years	76	97.57			
	Above 10 Years	5	57.20			
Attitude	Below 1 Year	12	121.17	1.573	3	0.665
	1 - 5 Years	112	101.56			
	6 - 10 Years	76	103.24			
	Above 10 Years	5	88.10			

p≤0.05* p≤0.01**

Table 9 shows that there is a statistically significant difference between the years of nursing experience and the total score of knowledge, practice, and attitude ($p < 0.05$) of HAI. The post hoc test show difference between group: above 10 years, and $1 - 5$ years($p < 0.05$). 1 to 5 years (112), and 6 to 10 years (76) have higher scores as compared to other nursing experience categories. There is also a statistically significant difference between years of nursing experience with regard to their knowledge ($p < 0.05$) and practice ($p < 0.001$) in infection prevention and control. The post hoc test for both reveals that the differences exist between those below 1 year and 6 to 10 years ($p < 0.05$) and below 1 year and 1 to 5 years ($p < 0.05$).

Table 10.

Differences in nurses' knowledge, practice, and attitude in infection prevention and control according to their Department

Variable	Department	n	Mean Rank	X^2	df	p
Total Score of KPA-HAI	Recovery	10	96.00	12.198	8	0.143
	Psychiatric	7	139.64			
	Paediatric	33	107.02			
	Surgical Ward	52	111.31			
	Maternal	34	91.40			
	Emergency Care	26	84.60			
	Intensive Care Unit	16	122.81			
	Acute Care	26	99.08			
	Others	1	10.00			
Knowledge	Recovery	10	81.45	15.899	8	0.044*
	Psychiatric	7	128.93			
	Paediatric	33	109.44			
	Surgical Ward	52	109.84			
	Maternal	34	82.69			
	Emergency Care	26	89.88			
	Intensive Care Unit	16	128.91			
	Acute Care	26	109.96			
	Others	1	5.00			
Practice	Recovery	10	122.65	12.271	8	0. 140
	Psychiatric	7	81.29			
	Paediatric	33	113.14			
	Surgical Ward	52	112.46			
	Maternal	34	96.28			
	Emergency Care	26	88.04			
	Intensive Care Unit	16	119.31			
	Acute Care	26	86.54			
	Others	1	16.50			
Attitude	Recovery	10	98.65	13.590	8	0.093
	Psychiatric	7	126.93			
	Paediatric	33	96.68			
	Surgical Ward	52	94.25			
	Maternal	34	90.84			
	Emergency Care	26	113.54			
	Intensive Care Unit	16	138.72			
	Acute Care	26	103.69			

P≤0.05* p≤0.01**

In Table 10, It was compared on the score of nurses taken from the total score on the KPA-HAI scale by the department. There is a statistically significant difference between the nurse's departments with regard to their knowledge ($p < 0.05$) in infection prevention and control. The post hoc test shows the difference between maternal and intensive care units ($p < 0.05$). Surgical ward (52), maternal (34) has a higher score on the KPA of HAI as compared to other departments. However, there is no statistically significant difference in their practice and attitude toward infection prevention and control($p>0.05$).

Table 11.

Spearman's Correlation Coefficient Matrix between Knowledge, Practice and Attitude Correlation Analyse the relationship between Knowledge, Practice, and Attitude of Nurses

Correlations			Knowledge	Practice	Attitude
Spearman's rho	Knowledge	Correlation Coefficient	1.000	.283**	.148*
		Sig. (2-tailed)	.	.000	.035
		N	205	205	205
	Practice	Correlation Coefficient	.283**	1.000	-.103
		Sig. (2-tailed)	.000	.	.141
		N	205	205	205
	Attitude	Correlation Coefficient	.148*	-.103	1.000
		Sig. (2-tailed)	.035	.141	.
		N	205	205	205

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

The Correlation between knowledge, practice and attitude on HAI is given in Table 11. The correlation coefficient measures the strength and direction of the relationship between two variables, ranging from -1 to +1. A value of 1 indicates a perfect positive correlation, while a value of -1 indicates a perfect negative correlation. A value of 0 indicates no correlation. Based on the matrix, the correlation coefficient between Knowledge and Practice is .283**, which indicates a positive correlation. This

means that as Knowledge increases, Practice tends to increase as well. The correlation is significant at the 0.01 level (2-tailed), which suggests that this relationship is not due to chance.

The correlation coefficient between knowledge and Attitude is .148*, which indicates a positive correlation. This means that as knowledge increases, attitude tends to increase as well. The correlation is significant at the 0.05 level (2-tailed), which suggests that this relationship may be due to chance. The correlation coefficient between Practice and Attitude is -.103, which indicates a negative correlation. This means that as Practice increases, Attitude tends to decrease. However, this correlation is not statistically significant at the 0.05 level (2-tailed), which means that this relationship may be due to chance.

CHAPTER V

Discussion

This chapter presents the discussion on the level of knowledge, practice, attitude of HAIs findings and the relationships between the scoring of the knowledge, practice, attitude of HAIs and socio-demographic characteristics findings in comparison to the studies in the literature.

The sociodemographic traits of the participants offer important context for evaluating the study's findings. In this study conducted in a terrier hospital in Gambia, most of nurses have worked since 1-5 year as registered nurse. Most of nurses work as registered nurses in this study. The high percentage of female participants in the study shows that, as previously stated, women continue to make up the majority of the nursing work force. The age range of the participants indicates that a variety of age groups are drawn to the nursing profession, with a large percentage of younger nurses entering the profession. Medical-Surgical Ward, Maternal and Pediatric or Neonatal Unit were the most prevalent specialist units or departments in this study (Table 1). These units/departments are risky in terms of hospital infections. For this reason, it is considered important that the nurses working in these units have a high level of knowledge, application and attitudes regarding hospital infections.

5.1. The Discussion on Level of Knowledge, Practice, Attitude of Healthcare-Associated Infections

The results of this study showed that nurses had a mean overall score of 197.21 (sd=11.23; min.:122.00- max.:218.00) practice received the greatest overall mean score (84.57), followed by knowledge (71.34), and attitude (41.30), which received the lowest overall mean scoreof Hospital Acquired Infections. In general, nurses' KPAs with regard to HAI are good, as seen by their total mean KPA score of 197.21, which is 85.3% of their total score of 231. A score of 84.57 is 86.1% of 98, which is the practice mean (Table 2). This shows that nurses have a good level of practical skills in preventing HAI's. The nurses' mean knowledge score across the subscales was 71.34, with a standard deviation of 4.82, demonstrating their extensive understanding of HAI prevention. The average score for attitude is 41.3, which is 74% of 56, this shows that nurses are fair in their approach to HAIs prevention once more. Nurses may be

receiving in-service training on HAI's. The success of the infection control team may also have influenced this result.

In the study by (Safadi et al., 2019), the least knowledge score was 34.00 and the maximum score was 77.00, showing that the nurses had a pretty good level of knowledge regarding HAIs prevention and control. According to (Safadi et al., 2019), who supported the study's findings, participants in the study had a thorough awareness of infection prevention and control for HAIs and a study on infection prevention and control that was conducted in a tertiary hospital in Saudi Arabia revealed that 78.3% of the nurses who took part in the study had acceptable understanding of infection prevention and control as well as satisfactory understanding of the practice of hand hygiene (Salem, 2019).There was also related findings with a study conducted in a tertiary hospital in Pakistan to assess the determinants of infection prevention and control in clinical practices among Staff Nurses which showed that the study's subjects had scores for sufficient understanding, a favourable behaviour, and appropriate practice that ranged from 154 (77%), 165 (82.2%), and 106 (53%) out of a possible 200 (Siraj et al., 2022). Findings of the current were also related to that of (Gezie, 2021), a study done in a referral hospital in Ethiopia which showed, 86.4%, 76.4%, and 77% of respondents had strong understanding, an optimistic attitude, when it came to preventing healthcare-associated infections. A study conducted in South Africa to determine the understanding of nurses due to the increasing number of HAIs, 90% of nurses who took part in the study washed their hands before and after performing any health procedure, and 99.5% of nurses practiced routine hand cleanliness after coming into contact with patients' fluids. Male nurses scored 92.8% on the understanding of hand hygiene practice, while female nurses scored 91.4% (Bimerew & Muhawenimana, 2022). In another study found that 37% of the nurses expressed confidence in their ability to avoid and manage HAIs, regarding this, 82.46% said they were aware with HAIs standards (Bordo & Flores, 2022). In Bayleyegn et al.'s study (2021) and Shrestha & Thapa (2018) study which show that the nurses had a positive attitude toward HAIs prevention. A study conducted in Jema's Hospital to evaluation the knowledge, attitude and practice of infection prevention and control among nurses have shown that nurses have very high knowledge on prevention of HAIs and the positive attitude towards HAIs (Kajang et al., 2022). In Alrubaiee et al.'s study (2017), it was found that nurses had fair and good practices about HAIs. The results of these study (Alrubaiee et al., 2017; Bayleyegn et al., 2021; Bimerew & Muhawenimana,

2022; Bordo& Flores, 2022;Gezie, 2021; Kajang et al., 2022; Safadi et al., 2019; Shrestha & Thapa, 2018; Siraj et al., 2022; Salem, 2019) support the findings of this study.

In some study did not supports this study findingsnurses with low knowledge and practice scores on prevention and control in HAIs can do a very high negligence rate in preventing them (Bimerew & Muhawenimana, 2022; Chitimwango, 2017).The nurses in the Hammoud et al., 2021's study had a moderate degree of knowledge, practice, and attitude toward HAI prevention and management. A study conducted in a hospital in Turkey, it was determined that nurses' knowledge was at a moderate level on hospital infections prevention (Kurt, 2021).Different from this study's findings, in Okwii's study, majority of the nurses (81.8%) had a positive attitude towards prevention and control of healthcare associated infections (Okwii, 2017). A systematic review study, it was highlighted, in spite of adequate knowledge and a positive attitude about HAIs, nurses unfortunately have a poor level of performance (Nasiri et al., 2019).

Nurses who have poor and moderate level of knowledge, practice and attitude on HAI's, have different demographic characteristics, work in different clinics and different working conditions. These factors are seen as the reason for the differences among studies. For example, the large number of patients and long working hours can negatively affect nurses' ability to prevent and control HAI's.

5.2. The Discussion on Level of Knowledge, Practice, Attitude of healthcare-associated infectionsand Socio-Demographic Characteristics

In this study, there are not statistically significant difference between age group, nationality, marital status and the score scale of knowledge, practice and attitude on HAIs among nurses. Otherwise, there are a statistically significant difference between level of education, category of nurses, level of employment, nursing experience, department and the total scale score or subscale score of knowledge, practice, attitude on HAIs in this study.

In this study, that there is no statistically significant difference between age group and the total score or subscale score of knowledge, practice, attitude on HAIs among nurses (Table 3). Unlike this result of the study, in a study, age increase, nurse's knowledge about HAI's increased (Kurt, 2021). Likewise, In Desta et al's (2021), it was founded that older age was significantly associated with both knowledge and

practice of infection prevention among healthcare workers. As age increases, people's sense of confidence can increase and problem solving increased skills. Otherwise, as the age increases, the knowledge competence of the nurses on the subject can decrease. Within the scope of this study, nurses may not have changed the results of the study because they were mostly a young group.

Marital status may not be a significant factor in nurses' knowledge, practice, and attitude towards infection prevention and control (Desta et al., 2021). But in this study, there are not statistically significant difference between marital status and the score scale of knowledge, practice and attitude on HAIs. In this study, there is a statistically significant difference between the educational level of nurses in terms of practice (p<0.001) infection prevention and control (Table 6). The level of education increases, nurses' practice about HAI's decrease. This indicates that there were statistically significant differences in nurses' practices based on their level of education. The longer nursing experience and level of employment of those with lower education levels may have affected this result. In this study, registered nurses have higher scores on the score of knowledge, practice and attitude about HAIs than enrolled nurses (Table 7). Full-time working nurses has more high score of knowledge, practice and attitude about HAIs (Table 8). This finding suggests that the level of employment may affect the extent to which nurses are knowledgeable about and able to practice infection prevention and control. In Bayleyegn et al. (2021), it was found that as working experience of healthcare workers increases, attitude of towards HAIs prevention get better good. In Desta et al's (2021), it was determined thatlengthy work experience was significantly associated with both knowledge and practice of infection prevention among healthcare workers. The results of these studies support this result.

In Getahun et al., 2022 study conducted in a Hospital in Tanzania Africa, showed the performance of nurses with a degree or a higher quality of nursing education was considerably greater with than nurses with low level of training in nursing. A study conducted in a hospital in India, I was found that nurses working in the surgical ward at the time of the investigation had little understanding of infection prevention and control. The findings are also in line with a study done a Hospital in Egypt, evaluated the knowledge, attitudes, and practices of healthcare professionals about trash disposal, indicated that experience length and coaching had no significant impact on knowledge, attitude, and practice ratings (Chitimwango, 2017). In Bayleyegn et al. (2021), it was found that as educational level of healthcare workers increases, attitude of towards

HAIs prevention get better good. In Desta et al's (2021), it was determined thatthe educational level was significantly associated with both knowledge and practice of infection prevention among healthcare workers. Otherwise, similar of this study, in Kurt's Study (2021), the level of education increases, nurses' knowledge about HAI's decreases. Overall, these results highlight the importance of considering various factors that may influence nurses' knowledge, practice, and attitude toward infection prevention and control. By understanding these factors, interventions and training programs can be designed to target specific areas where improvements are needed.

In this study the nurse's departments' knowledge, there is a statistically significant disparity (p < 0.05) in infection prevention and control. The difference between the maternal and intensive care units, and maternal had higher scores than other departments. However, there is no statistically significant difference in their practice and attitude toward infection prevention and control (p>0.05). According to their department or expertise, nurses' behavior and attitude did not change significantly.The findings suggest that there may be variations in the training and education provided to nurses in different departments or specialties, which could impact their knowledge of infection prevention and control. Nurses working in certain departments may need more targeted training and education to ensure that they are adequately equipped to prevent and control infections. For instance, nurses working in psychiatric departments may require additional training in managing infections related to mental health conditions. Despite the fact that there were no significant differences in nurses' practice and attitude, this does not necessarily mean that all nurses in all departments are equally skilled in infection prevention and control. It is possible that there are individual differences among nurses within each department or specialty, which were not captured in this analysis. In Fakery et al.'s (2018) study conducted in medical and surgical units, majority of the nurses had a good level of awareness regarding injection safety. It is reported that infection control and prevention knowledge of nurses is important especially in surgical and intensive care units, which are risky units (Bundiki et al., 2021; Gezgel et al., 2019; Mansuri & Mansuri, 2019; Sattar et al., 2019).

In this study, it was determined that the subscale of knowledge on HAI's increases, practice tends to increase as well and practice increases, attitude tends to decrease (Table 11). The fact that nurses increase the level of knowledge about preventing HAI's shows that this knowledge will reflect positively on practice.

However, as the working experience of the nurse increases, their practice skills on preventing HAI's improve, but their attitude towards HAI's decreases.

Overall, the results of this study highlight the importance of providing ongoing training and education to nurses in infection prevention and control, particularly in departments or specialties where there may be gaps in knowledge. By equipping nurses with the necessary skills and knowledge, healthcare facilities can improve patient outcomes and prevent the spread of infections.

CHAPTER VI

Conclusion and Recommendations

This chapter presents conclusions based on the research findings according to the questions of the research and gives recommendations accordingly.

6.1. Conclusion

- It was found that most of nurses (60%) are female, almost half of them (48.3%) are 18-27 years old, almost all of them (96.1%) are Gambian and most of them (66.8%) are single.

- It was determined that the majority of the nurses (66.3%) are registered nurse, most of them (30.7%) have a bachelor's degree, most of them have worked since 1-5 year (54.6%) as full time (91.6%). In this study, nurses declared that they are working various department and the first departments in order worked by nurse are medical-surgical ward (25.4%), maternal (16.6%) and paediatric or neonatal unit (16.1%).

- It is found that the total score on Scale of Knowledge, Practice, Attitude of HAI has a mean of 197.21, practice has the highest total mean score of 84.57; followed by knowledge with mean score of 71.34, the least mean score was the attitude which has 41.30. This indicates that nurses have good practice in the prevention of HAI.

- There is not a statistically significant difference between age group, nationality, marital status and the score scale of knowledge, practice and attitude on HAIs among nurses.

- There is a statistically significant difference between level of education, category of nurses, level of employment, nursing experience, department and the total scale score or subscale score of knowledge, practice, attitude on HAIs in this study.

- Nurses with bachelor's degrees have higher scores of practice subscale on HAI's as compared to other educational groups in this study.

- Registered nurses have higher scores on the score of attitude subscale – HAIs than enrolled and other nurses. However, there is no statistically significant difference in their knowledge and practice toward infection prevention and control.

- Nurses with worked full time has the highest score as compared to others' employment status of the nurses in terms of knowledge ($p< 0.05$) and practice ($p<0.001$) in infection prevention and control.

- Nurses with worked 1 to 5 years, have higher total scores, knowledge subscale and attitude subscale as compared to other nursing experience categories.

- Surgical ward, maternal has a higher score on the KPA of HAIs as compared to other departments. However, there is no statistically significant difference in their practice and attitude toward infection prevention and control ($p>0.05$).

6.2. Recommendation

6.2.1. Recommendation According to Findings

- It is recommended that in-service educations be planned to develop positive attitudes, since the lowest score for prevention and control of HAI's is in the attitude scale sub-dimension of nurses.

- It is recommended that hospitals and healthcare facilities offer nurses continuing programs about infection prevention and control of HAI's, for especially for groups with long nursing work experience, part-time and non-registered nurses.

6.2.2. Recommendations for Further Research

- It is recommended that future research might examine the influence of continuous education and training programs on nurses' understanding, application, and attitudes toward HAI prevention and management as well as on patient outcomes.

- Further investigation is needed to understand the expertise and conduct of nurses in infection prevention and control in order to evaluate the effects of other variables not included in this study. Additionally, it is important to

consider other factors that may influence nurses' knowledge, practice, and attitudes on HAI's, such as working hours and duration, the approximate number of patients.

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APPENDICES

Appendix A

.

INFORMED CONSENT

Dear Participant,

My name is Joseph Mendy, a Gambian by nationality, I am a master student currently studying at Near East University in Northern Cyprus who developed interest to conduct a research on the Knowledge and practice of nurses in infection prevention and Control within a Tertiary Hospital in The Gambia under the supervision of my course advisor Assistant Professor Dr. Dilek SARPKAYA GUDER. This questionnaire is an important part of a study that investigates the Knowledge and Practice of Nurses in Infection Prevention and Control within a Tertiary Hospital in The Gambia.

You were selected as a possible participant in this study, therefore, I kindly request for your appropriate time to answer the following questions down below. If you decide to participate, you can sign in the consent form using (V) and respond to the questions. It will take about 10 minutes to fill in the questionnaires. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law.

Your participation is voluntary. Your decision whether or not to participate will not affect your relationship with Kanifing general hospital, you are also free to withdraw your consent and discontinue participation at any time without penalty. I will be immensely happy for your participation in this study. Completion of this survey signifies your consent to participate

I have understanding about the study and I am ready to participate in the study.

....
Signature of participant

Section 1. Personal Information Form

Please check (X) in the box that corresponds to your response.

1. **Gender**

    Male ( )

    Female ( )

2. **Age**

    ………………………….

3. **Nationality**

    ………………………………..

4. **Marital Status**:

    1. Single ( )

    2. Married ( )

    3. Divorced ( )

    4. Other………… ( )

5. **Highest level of nursing education**

    1. Doctoral degree ( )

    2. Master degree ( )

    3. Bachelors ( )

    4. Others……………… ( )

6. **Nursing Category**

    1. Registered Nurse ( )

    2. Enrolled Nurse ( )

    3. Others……………...( )

7. **Employment status**

    1. Full time ( )

    2. Part time ( )

    3. Contract ( )

4. Others   ( )

8. Year of working as a nurse

1. Below 1 year   ( )

2. 1-5 years   ( )

3. 6-10 years   ( )

4. Above 10 year ( )

9. What is your current specialty unit or department?

☐   Emergency Care

☐   Pediatric or Neonatal Unit

☐   Telemetry or Recovery

☐   Maternal (Labor &Delivery, Post-natal)

☐   Medical-Surgical Ward

☐   Psychiatric or Behavioral

☐   Critical Care or Intensive Care unit

☐   Acute Care

☐   Ambulatory Care

☐   Oncology

Other (please specify) _____

☐

Appendix B

Section 2. Knowledge and Practice of Hospital Acquire Infections

A. Knowledge: To complete this section, please circle the number corresponds to how you agree with the given statement.

1=Strongly Disagree, 2=Slightly Disagree,3=Disagree, 4 =Neutral,5 = Agree, 6=Slightly Agree, 7=Strongly Agree

1. I am fully aware of hand-washing guidelines 1 2 3 4 5 6 7

2. I have been watched or supervised during hand-washing 1 2 3 4 5 6 7
    activity.

3. Healthcare facilities harbor a variety of microorganisms that
    could be transmitted by healthcare workers. 1 2 3 4 5 6 7

4. I know how to use the biohazard bag I container. 1 2 3 4 5 6 7

5. I know where and how the contents in biohazard bags or 1 2 3 4 5 6 7
    containers are disposed.

6. I know the safety precautions for disposal of needles, syringes,
    catheters etc and risk of transmission of nosocomial infections 1 2 3 4 5 6
7
    to healthcare workers.

7. Nosocomial infections may be transmitted via medical
    equipment such as syringes, thermometers, needles, catheters,
    stethoscopes etc. 1 2 3 4 5 6
7

8. Neutropenic patients or those with communicable diseases
    (e.g. diseases of the respiratory system) should be kept in 1 2 3 4 5 6
7
    private rooms.

9. Some microorganisms such as C. difficile are not eradicated by
    alcohol based solutions.

                                                                1 2 3 4 5 6
7

10. Hand hygiene should be performed after removing sterile or
    non-sterile gloves.
1 2 3 4 5 6 7

11. I am aware of the recommended guidelines for hand hygiene
    with alcohol- based formulations. 1 2 3 4 5 6
7

B. Practice: To complete this section, please circle the number corresponds to how you agree with the given statement.

1=Strongly Disagree, 2=Slightly Disagree, 3=Disagree, 4 =Neutral, 5=Agree, 6=Slightly Agree, 7=Strongly Agree

1. I follow recommended guidelines for use of alcohol based solutions or other antiseptics before and after helping a patient to   1   2   3 4 5 6 7 move, or lifting I transferring the patient in and out of bed.

2. I follow recommended guidelines for use of alcohol based solutions or other antiseptics before opening vascular access   1   2   3   4   5   6 7 equipment.

   3. I use of alcohol based solutions or other antiseptics between each patient contact.

   1   2   3   4   5   6   7

   4. I wash   my hands or rub with alcohol based solution or other antiseptics before and after providing a nursing procedure: for example bed bath, perineal care.   1 2   3   4   5   6 7

   5. I wash my hands or rub with alcohol based solution or other antiseptics after contact with equipment I objects likely to be contaminated followed by patient care activity e.g. taking vital   1   2   3   4   5   6   7 Signs.

   6. I wash hands before and after drawing and, or manipulating patient's body fluid sample.   1 2   3   4   5   6 7

   7. I always wash hands before and after having direct contact with patient's intact skin.

   1 2   3   4   5   6 7

   8. I always wash my hands before and after inserting indwelling urinary catheters.   1 2   3   4   5   6 7

   9. I always wash my hands when moving from a contaminated body site to aclean-body site during patient care.   1 2   3   4   5   6 7

   10. I occasionally polish my fingernails or wear artificial nails. 1   2   3   4   5   6 7

   11. I am less compliant with recommended guidelines for reducing transmission of NI when workload increases or in emergencies.   1 2   3   4   5   6 7

12. I wash my hands after touching inanimate surfaces and objects
in patient's surroundings.   1 2   3   4   5   6 7

13. During a busy patient care episode, I chart or use the computer
keyboard with my gloves on.   1 2   3   4   5   6 7

14. I remove my ring{s}, watch or bracelet before beginning hand-
hygiene.   1 2   3   4   5   6 7

C.   Attitude: To complete this section, please circle the number corresponds to how you agree
with the given statement.

1=Strongly Disagree, 2=Slighly Disagree, 3=Disagree, 4 =Neutral, 5 =Agree, 6=Slightly Agree,
7=Strongly Agree

1. In my opinion, nosocomial infections are pose a serious outcome
   (e.g. extended hospital stay days mortality and increased cost of   1   2   3   4   5 6   7
   healthcare).

2. In my opinion, I could transmit nosocomial infections.   1   2   3   4   5 6   7

3. In my opinion, nurses respond negatively when a colleague
   (e.g. nurse or physician) is non-compliant with the recommended
   guidelines for patient safety.   1   2   3   4   5 6   7

4. I am more compliant with the recommended guidelines for
   reducing the transmission of a nosocomial infection when training 1   2   3   4   5 6   7
   a new worker.

5. I serve as a role model in demonstrating adherence to
   recommended practices for hand hygiene.   1   2   3   4   5 6   7

6. It is unrealistic to expect healthcare workers to clean their hands
   after every contact with the patient.   1   2   3   4   5 6   7

7. In my opinion, healthcare workers should be sanctioned for
   non-compliance with protocols for reducing transmission of   1   2   3   4   5 6   7
   nosocomial infections (for example, yearly assessment, denied
   promotion).

8. In my opinion healthcare workers should be rewarded (for   1   2   3   4   5 6   7
   example, given plaques, certificate) for compliance with protocols
   aimed at reducing transmission of nosocomial infections.

Thank you for completing this questionnaire.

Appendix C.

THE REPUBLIC **OF THE GAMBIA**

KANIFING GENERAL HOSPITAL
KANIFING EAST LAYOUT
KANIFING

Tel: 4380134

9th November, 2022

Prof. Dr Omran DAL YILMAZ
Near East University
Dean of the Faculty of Nursing

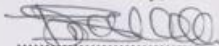## RE: PERMISSION TO CONDUCT RESEARCH

I am pleased to inform you that permission has been granted on behalf of your student **Joseph Mendy** for him to conduct study on the topic **"Knowledge and Practice of Nurses in Infection Prevention and Control Within a Tertiary Hospital in The Gambia"**. He can therefore proceed with the study as planned.

His study would be of great interest to the Hospital Management, as the findings could contribute significantly in the decision-making processes for better outcomes in our health service delivery.

In this regard I solicits his cooperation on behalf of the Hospital Management in providing a copy of the final draft of the study for our reference. By a copy of this letter, all relevant authorities are herein notified.

Please be assured of our continuous co-operation and support.

Yours sincerely,

Jariatou Drammeh
Principal Nursing Officer
FOR: CHIEF EXECUTIVE OFFICER

Cc: Chief Executive Officer
    Administrator
    Human Resources Manager
    Duty Room
    Student – Gambia College
    OIC – IPC, A&E, OPD, Theatre, IDC, Lab
      "   Maternity, Surgical, Paediatric, Medical
      "   Isolation Ward, MOPD.
    Head of Medical Records
    File

Appendix D.

Re: Permission to use your scale for my study
1 mesaj

JOSEPH MENDY <20205733@std.neu.edu.tr>
Alıcı: DILEK SARPKAYA <dilek.sarpkaya@neu.edu.tr>, "Kamunge, Eunice" <kamunge@essex.edu>

18 Ekim 2022 15:56

Sure I'll
Thank you
Can you kindly send me the questionnaire please so I can share it my advisor *Prof, Dr. Dilek Serapkaya Guder*
Thank you once again..

On Tue, Oct 18, 2022 at 15:51 Kamunge, Eunice <kamunge@essex.edu> wrote:

Hi Joseph.

I am glad you are with the majority on exploring further on healthcare issues that affect our society globally. You have my permission. I will love to read your findings. Good Luck.

From: JOSEPH MENDY <20205733@std.neu.edu.tr>
Sent: Tuesday, October 18, 2022 3:26 AM
To: irb@shu.edu; Kamunge, Eunice <kamunge@essex.edu>; kamungeu@shu.edu
Subject: Permission to use your scale for my study

CAUTION: This email originated outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello Sir/ Madam, My name is Joseph Mendy, a Gambian by nationality and I am from Near East University in Northern Cyprus. I am a Master's Student interested in carrying out research on the

"Knowledge and practice of nurses in infection prevention and control within a tertiary hospital in The Gambia" as my thesis study. My Advisor is Prof, Dr. Dilek Serapkaya Guder. A little background about my school Near East University (www.neu.edu.tr), was established in 1988, is located in Nicosia, capital of North Cyprus, I would like to kindly ask for your permission to use your Likert scale you used on your research "Exploring Knowledge, Attitudes and Practices of Registered Nurses Regarding the Spread of Nosocomial Infections". 2013. doi: http://scholarship.shu.edu/cgi/viewcontent.cg i?article=2872&context.

I hope that you grant me this request

Thank you.

Hello Sir/ Madam, My name is Joseph Mendy, a Gambian by nationality and I am from Near East University in Northern Cyprus. I am a Master's Student interested in carrying out research on the **"Knowledge and practice of nurses in infection prevention and control within a tertiary hospital in The Gambia"** as my thesis study. My Advisor is Prof, Dr. Dilek Serapkaya Guder. A little background about my school Near East University (www.neu.edu.tr), was established in 1988, is located in Nicosia, capital of North Cyprus, I would like to kindly ask for your permission to use your Likert scale you used on your research "Exploring Knowledge, Attitudes and Practices of Registered Nurses Regarding the Spread of Nosocomial Infections". 2013. doi: http://scholarship.shu.edu/cgi/viewcontent.cg i?article=2872&context.

I hope that you grant me this request
Thank you.

postmaster Oct 18
Your message to kamungeu@shu.edu couldn't be deliver...

Kamunge, Eunice Oct 18
to me, Eunice

Hi Joseph.

I am glad you are with the majority on exploring further on healthcare issues that affect our society globally. You have my permission. I will love to read your findings. Good Luck.

From: JOSEPH MENDY <20205733@std.neu.edu.tr>

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Appendix E.

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YAKIN DOĞU ÜNİVERSİTESİ
BİLİMSEL ARAŞTIRMALAR ETİK KURULU

ARAŞTIRMA PROJESİ DEĞERLENDİRME RAPORU

Toplantı Tarihi :30.11.2022
Toplantı No :2022/108
Proje No :1657

Yakın Doğu Üniversitesi Hemşirelik Fakültesi öğretim üyelerinden Yrd. Doç. Dr. Dilek Sarpkaya Güder'in sorumlu araştırmacısı olduğu, YDU/2022/108-1657 proje numaralı ve **"Knowledge and Practice of Nurses in Infection Prevention and Control Within a Tertiary Hospital in the Gambia"** başlıklı proje önerisi kurulumuzca değerlendirilmiş olup, çalışmanın yapılacağı kurumdan izin alınması şartıyla onay verilmiştir.

Prof. Dr. Şanda Çalı
Yakın Doğu Üniversitesi
Bilimsel Araştırmalar Etik Kurulu Başkanı

Kurul Üyesi	Toplantıya Katılım Katıldı(✓)/ Katılmadı(X)	Karar Onay(✓)/ Ret(X)
Prof. Dr. Tamer Yılmaz	✓	✓
Prof. Dr. Şahan Saygı	✓	✓
Prof. Dr. Mehmet Özmenoğlu	✓	✓
Prof. Dr. İlker Etikan	✓	✓
Doç. Dr. Mehtap Tınazlı	X	X
Prof. Dr. Nilüfer Galip Çelik	✓	✓
Yrd. Doç. Dr. Dilek Sarpkaya	✓	✓

Sayfa 1 / 1

Appendix F

Turnitin Similarity Report

Thesis Last

ORİJİNALLİK RAPORU

%21	%18	%7	%11
BENZERLİK ENDEKSİ	İNTERNET KAYNAKLARI	YAYINLAR	ÖĞRENCİ ÖDEVLERİ

BİRİNCİL KAYNAKLAR

1	docs.neu.edu.tr İnternet Kaynağı	%4
2	careersdocbox.com İnternet Kaynağı	%3
3	Submitted to Yakın Doğu Üniversitesi Öğrenci Ödevi	%2
4	scholarship.shu.edu İnternet Kaynağı	<%1
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9	www.ijraset.com İnternet Kaynağı	<%1