KNOWLEDGE AND PRACTICE OF W.H.O 5 MOMENTS OF HAND HYGIENE AMONG NURSES-MIDWIVES WORKING IN A TERTIARY HOSPITAL IN BENIN CITY

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IN PARTIAL FULFILLMENT OF THE AWARD OF THE DEGREE OF BACHELOR OF NURSING SCIENCE FACULTY OF NURSING SCIENCES, UNIVERSITY OF BENIN, BENIN CITY.

OCTOBER, 2025

DECLARATION

This is to declare that this research project titled **" KNOWLEDGE AND PRACTICE OF W.H.O 5 MOMENTS OF HAND HYGIENE AMONG NURSES-MIDWIVES WORKING IN A TERTIARY HOSPITAL IN BENIN CITY."**, which was carried out by **ONI FAITH EKATA .** Is solely the result of my work except where acknowledged as being derived from another person (s) or resources. With mat number **BMS2001133.**

FACULTY /SCHOOL: NURSING SCIENCE, COLLEGE OF MEDICAL SCIENCES, UNIVERSITY OF BENIN, BENIN CITY.

Signature: ……

Date: ……

CERTIFICATION

This is to certify that this project was carried by **ONI FAITH EKATA** with Mat number **BMS2001133.** Faculty of Nursing Science, under the supervision of **MRS. C. C EDO-OSAGIE.**

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External Examiner **DATE**

DEDICATION

This work is dedicated to GOD ALMIGHTY who is providing me with the strength to complete my academic journey.

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I would like to begin by giving all the glory to the Almighty God, the sovereign owner of my life. I am eternally grateful for His guidance, protection, and unfailing provision throughout my life and academic journey. I am incredibly grateful to Mrs. C. C. Edo-Osagie, a distinguished scholar of impeccable standing. Her invaluable contributions, meticulous corrections, and expert guidance were instrumental in shaping this research study. I would also like to extend my appreciation to the Dean of Faculty of Nursing Sciences, University of Benin, Prof. F. U. Okafor, and to the Head of Department (Med Surg), Prof. (Mrs) C.E. Omoregbe. Special appreciation to Prof. (Mrs).R.E Esewe, Prof (Mrs) J. A. Afemikhe, Dr (Mrs) C. Enuku, Sr. J. N. Chukwurah, Mrs C. C. Edo-Osagie, Dr T. A. Ehwarieme, Mrs. M. A. Iniomor, Mrs. E. N. Oyana, Mrs. R. Lawal, Mrs Ikhuobase, Mrs F. Esebanme and Mr Aragua as well as all other lecturers and non- academic staff for their immense contribution, dedication and support.

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ABSTRACT

HAND HYGIENE IS A CRITICAL COMPONENT OF INFECTION PREVENTION AND CONTROL, PARTICULARLY AMONG HEALTHCARE WORKERS. THE WORLD HEALTH ORGANIZATION (WHO) INTRODUCED THE "5 MOMENTS FOR HAND HYGIENE" (MOHH) TO REDUCE HEALTHCARE-ASSOCIATED INFECTIONS (HAIS) AND PROMOTE PATIENT SAFETY. THIS STUDY ASSESSED THE KNOWLEDGE AND PRACTICE OF THE WHO 5 MOHH AMONG NURSE-MIDWIVES IN SELECTED WARDS OF THE UNIVERSITY OF BENIN TEACHING HOSPITAL (UBTH), BENIN CITY, NIGERIA. A DESCRIPTIVE CROSS-SECTIONAL DESIGN WAS EMPLOYED, USING A STRUCTURED SELF-ADMINISTERED QUESTIONNAIRE. DATA WERE COLLECTED FROM 161 NURSE-MIDWIVES AND ANALYZED USING SPSS VERSION 23. FINDINGS SHOWED THAT 52.2% OF RESPONDENTS HAD GOOD KNOWLEDGE, 31.7% HAD FAIR KNOWLEDGE, AND 16.1% HAD POOR KNOWLEDGE OF THE MOHH. REGARDING PRACTICE, THE HIGHEST COMPLIANCE WAS SEEN IN MOMENT 3 (AFTER BODY FLUID EXPOSURE/RISK) AND MOMENT 4 (AFTER TOUCHING A PATIENT), WHILE MOMENTS 1 (BEFORE TOUCHING A PATIENT) AND 2 (BEFORE ASEPTIC PROCEDURES) HAD THE LOWEST ADHERENCE RATES. ADDITIONALLY, 60.2% OF RESPONDENTS BELIEVED HAND HYGIENE IS NOT NECESSARY IF GLOVES ARE WORN, AND 85.7% INCORRECTLY THOUGHT THAT HYGIENE COULD BE SKIPPED AT MOMENT 1 IF IT WAS RECENTLY PERFORMED AT MOMENT 5. THE STUDY CONCLUDES THAT WHILE GENERAL AWARENESS OF HAND HYGIENE IS HIGH AMONG NURSE-MIDWIVES, THERE ARE SIGNIFICANT DEFICIENCIES IN BOTH SPECIFIC KNOWLEDGE AND CONSISTENT PRACTICE OF THE WHO 5 MOHH. STRENGTHENING TRAINING PROGRAMS, IMPROVING SUPPLY OF HYGIENE MATERIALS, AND PROMOTING SUPPORTIVE SUPERVISION ARE RECOMMENDED TO BRIDGE THESE GAPS AND IMPROVE INFECTION CONTROL PRACTICES.

KEYWORDS: AFFECTING COMPLIANCE INCLUDED WORKLOAD, AVAILABILITY OF HAND HYGIENE MATERIALS, KNOWLEDGE GAPS, AND INSTITUTIONAL SUPPORT.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Healthcare-Associated Infections (HAIs) are a major problem for patient safety. They are related to adverse events such as longer hospitalizations, increased antimicrobial resistance, morbidity and mortality, economic and psychological consequences (Allengranzi *et al*., 2020). In developed countries, HAIs affect 5–15% of hospitalized patients and can reach 9–37% of those admitted to intensive care units (Allengranzi *et al*., 2020). The situation is more dire in low-income countries where health care systems are often less developed (Asare *et al*., 2021). HAIs prevention must be a priority as decreasing their incidence (Asare *et al*., 2021).

The hands of Nurses are the most common vehicle for the transmission of microorganisms from patient to patient within the healthcare environment. For instance, *Klebsiella Sp*, Methicillin Resistant *Staphylococcus aureus* (MRSA), *Clostridium difficile* and Gram-negative bacilli are some of the organisms that are likely to be found on HCWs hands (Allengranzi *et al*., 2020). Hand hygiene (HH; i.e. washing hands with soap and water, or disinfection using alcohol based hand rub solution: ABHR) is essential to prevent and control HAIs as it reduces microbial colonization and direct transmission from patient to patient (Khan *et al*.,2021). However, compliance with HH among HCWs is frequently reported as poor and is usually estimated as less than 50% (Pittet, 2021). Average compliance with HH recommendations varies between hospital wards, among professional categories, working

conditions as well as according to the definitions used in different studies (Allengranzi *et al*., 2023).

To promote HH, World Health Organization (WHO) has published "My five moments for hand hygiene", describing the HH opportunities, which are the moments during healthcare activities when HH is necessary to interrupt germ transmission by hands: Moment 1- before touching a patient, Moment 2- before clean/ aseptic procedure, Moment 3- after body fluid exposure risk, Moment 4- after touching a patient and Moment 5- after touching patient surroundings The compliance to HH is the proportion of times that HCWs perform HH of all five observed opportunities (WHO, 2023). The WHO and the Centers for Disease Control and Prevention (CDC) recommend that HCWs wash their hands with soap and water, when visible soiling is present for 40 to 60 s. When hands are not visibly soiled, alcohol based hand rub (ABHR) for 20 to 30 s is recommended (WHO, 2020).

Despite the evidence of benefits of good HH practices and the relative cost-effectiveness and simplicity of this procedure, compliance remains a challenge, and more so in developing countries (Kilpatrick *et al*., 2021). Different factors have been described to influence HH compliance. For instance, the lack of appropriate infrastructure, the cultural backgrounds and even religious beliefs can play an important role in hindering good practices (Ahmed *et al*., 2022). The professional category such as doctors, nurses and situations requiring wearing of gowns and gloves can also determine poor HH compliance

The University of Benin Teaching Hospital (UBTH), Benin City, is a major referral hospital in Nigeria, offering specialized maternity care services. As a tertiary institution, it is expected to maintain high standards of infection prevention and control practices, including adherence to the WHO 5 Moments for Hand Hygiene. However, existing literature suggests that hand hygiene compliance among healthcare workers in Nigerian hospitals is often below recommended levels due to factors such as inadequate knowledge, lack of resources, high

workload, and negative attitudes toward hand hygiene practices (Amissah *et al*., 2022; Okeke *et al*., 2020). While previous studies have examined hand hygiene compliance among healthcare workers in general, there is limited research specifically assessing the knowledge and practice of the MOHH framework among **nurse-midwives** in UBTH's maternity wards.

Addressing this gap is essential for developing effective interventions that promote hand hygiene compliance among nurse-midwives and enhance infection control measures in maternity units. Understanding the current level of knowledge and practice of MOHH among nurse-midwives will provide evidence-based insights to inform hospital policies, training programs, and resource allocation for improved hand hygiene adherence. This study aims to assess the knowledge and practice of the WHO 5 Moments for Hand Hygiene among nurse-midwives in selected wards of UBTH, Benin City, to identify gaps and recommend strategies for strengthening infection prevention and control practices in maternal and neonatal healthcare settings.

1.2 Statement of the problem

Hand hygiene is a fundamental practice in infection prevention and control, especially among healthcare workers who are directly involved in patient care. The World Health Organization (WHO) introduced the "5 Moments for Hand Hygiene" (MOHH) as a global standard to reduce healthcare-associated infections (HAIs) and improve patient safety. These five moments include (1) before touching a patient, (2) before clean/aseptic procedures, (3) after body fluid exposure risk, (4) after touching a patient, and (5) after touching patient surroundings (WHO, 2009). Despite the well-documented benefits of hand hygiene in preventing the spread of infections, compliance among healthcare workers, including nurse-midwives, remains a significant challenge (Allegranzi *et al*., 2023).

Nurse-midwives, as frontline healthcare providers in maternity and neonatal wards, play a

critical role in preventing maternal and neonatal infections. Studies have shown that poor hand hygiene compliance contributes to increased cases of puerperal sepsis, neonatal sepsis, and other nosocomial infections in maternity settings (Kassebaum *et al*., 2024). The University of Benin Teaching Hospital (UBTH), Benin City, is a major referral hospital in Nigeria, catering to a large number of patients, including mothers and newborns. Despite existing infection prevention policies, anecdotal evidence suggests varying levels of knowledge and adherence to the WHO 5 Moments for Hand Hygiene among nurse-midwives in different wards.

Previous research in Nigeria and other low- and middle-income countries has identified several barriers to effective hand hygiene compliance, including lack of awareness, inadequate training, unavailability of hand hygiene resources, heavy workload, and negative attitudes toward adherence (Amissah *et al*., 2021; Okeke *et al*., 2020). However, there is limited empirical data specifically assessing the knowledge and practice of MOHH among nurse-midwives in UBTH. Understanding the current level of awareness, compliance, and factors influencing adherence to MOHH is essential for designing targeted interventions to improve hand hygiene practices and ultimately reduce the burden of HAIs in maternity wards. Therefore, this study seeks to assess the knowledge and practice of the WHO 5 Moments for Hand Hygiene among nurse-midwives in selected wards of UBTH, Benin City. By identifying gaps in knowledge and practice, the findings will contribute to evidence-based recommendations for strengthening infection prevention policies, improving patient safety, and reducing healthcare-associated infections in maternity settings.

1.3 Objectives of the study

Broad objective: To examine the knowledge and the practice of the WHO 5 Moments for Hand Hygiene (MOHH) among nurse-midwives in selected wards of the University of Benin

Teaching Hospital and identify intervening factors.

Specific objectives: The specific objectives are to:

1. assess the level of knowledge of the WHO 5 MOHH among nurse-midwives in UBTH.
2. evaluate the level of practice of the WHO 5 MOHH among nurse-midwives in UBTH.
3. determine factors that affect the practice of the WHO 5 MOHH among nurse-midwives in UBTH.

1.3 Research questions

1. Do nurse-midwives in UBTH have knowledge of the WHO 5 moments of hand hygiene?
2. Do nurse-midwives in UBTH practice the WHO 5 moments of hand hygiene in their daily activities in the clinical area?
3. What factors affect the practice of the WHO 5 moments of hand hygiene in the clinical area among nurse-midwives working in UBTH?

1.4 Hypothesis

Null Hypothesis (Ho): There is no significant relationship between the knowledge and the practice of WHO 5 moments of hand hygiene among nurse-midwives in UBTH

1.5 Significance of the study

The knowledge and practice of the WHO 5 Moments for Hand Hygiene (MOHH) among nurse-midwives is an essential aspect of infection prevention and control in healthcare settings. This study holds significant implications for nursing practice, nursing research, and

nursing education, as it seeks to provide insights into the compliance levels, knowledge gaps, and challenges faced by nurse-midwives in adhering to the WHO's hand hygiene guidelines.

In the field of **nursing practice**, this study is essential as it will identify gaps in compliance and adherence to hand hygiene protocols among nurse-midwives. Understanding these gaps will help in developing effective interventions and policies to improve hand hygiene compliance, thereby reducing the risk of infections in maternity wards. The study will also provide evidence-based recommendations to hospital administrators and policymakers on the need for continuous training, adequate resource allocation, and institutional support to reinforce proper hand hygiene practices. By fostering a culture of infection control among nurse-midwives, the study will contribute to enhancing the overall quality of maternal and neonatal care.

From a **nursing research** perspective, this study is particularly valuable as there is limited empirical data on the knowledge and practice of MOHH among nurse-midwives in Nigeria. While several studies have examined hand hygiene compliance among healthcare workers in general, there is a lack of specific research focusing on midwives working in maternity and neonatal units (Okeke *et al*., 2020). This study will help fill this research gap by providing data on hand hygiene compliance levels, identifying barriers to adherence, and highlighting factors that influence compliance, such as workload, availability of hygiene resources, and institutional policies. The findings from this research will serve as a foundation for future studies and help in designing targeted interventions that enhance infection prevention and control measures in maternity settings.

In the realm of **nursing education**, this study will offer insights that can help improve hand hygiene training at both undergraduate and postgraduate levels. Hand hygiene is a critical component of infection control education in nursing and midwifery training programs, yet studies have shown that knowledge does not always translate into practice (Amissah *et al*.,

2016). By identifying gaps in knowledge and areas where nurse-midwives require additional training, the study will help inform curriculum development in nursing schools. Additionally, it will emphasize the need for simulation-based training, workshops, and continuous professional development programs to reinforce hand hygiene practices among student nurses and practicing midwives. Incorporating findings from this study into nursing education will ensure that future healthcare professionals develop a strong commitment to hand hygiene compliance, thereby reducing the risk of HAIs and improving patient safety.

Overall, this study is significant in advancing nursing practice, research, and education by addressing a critical component of patient care—hand hygiene compliance among nurse-midwives. By assessing the knowledge and practice of the WHO 5 Moments for Hand Hygiene, the study will contribute to evidence-based improvements in infection prevention strategies, ensuring safer maternity care services and better health outcomes for mothers and newborns.

1.6 Scope of study

This study generally borders on staff nurse-midwives working in the University of Benin Teaching Hospital, Benin City, Edo State, Nigeria. The population was made up of trained and qualified nurses-midwives, registered with the Nursing and Midwifery Council of Nigeria (NMCN), who possess at least an Ordinary National Diploma (OND) in Nursing and/or Midwifery from respective Schools of Nursing and Schools of Midwifery recognized by the NMCN.

Specifically, this study will dwell on nurse-midwives working in selected wards including maternity and paediatric wards.

1.8 Operational definition of terms

Hand hygiene: In this study, ‘hand hygiene’ refers to the activity of cleaning one’s hands with soap and water or alcohol based hand sanitizer, to get rid of germs.

Knowledge of WHO 5MOHH: In this study, 'knowledge' refers to the awareness, familiarity or understanding of the WHO 5 moments of hand hygiene collectively, judged in levels as poor, fair or good.

Moments: In this study, 'moments' refer to those instances during health care activities when hand hygiene is required.

Practice of WHO 5MOHH: In this study, 'practice' refers to the actual performance of the WHO 5 moments of hand hygiene according to set expectations judged in levels as good or poor.

Summarily, this study was put together to examine the awareness of the WHO 5 moments of hand hygiene among selected nurse-midwives in the University of Benin Teaching Hospital and to survey the actual practice of this prescribed guideline aimed at infection prevention and control. This is aimed at filling the knowledge gap observed in the reported adoption of the WHO 5 moments of hand hygiene, especially among nurse-midwives, who account for the largest fraction of the health workforce.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Concept of Hand Hygiene Definition

The Centers for Disease Control and Prevention [CDC] (2021), defined hand hygiene as a way of cleaning one's hands that substantially reduces potential pathogens (harmful organisms) on the hands. The CDC also states that hand hygiene procedures include handwashing with soap and water and the use of alcohol-based hand rubs (containing 65% - 95% alcohol) (CDC, 2021). The Public Health Agency of Canada (PHAC) cited in Mfuh *et al*. (2021) asserted that hand hygiene is a basic skill and key component of patient safety and affects the morbidity and mortality of clients in all health care settings.

The World Health Organization (WHO) provides guidelines on performing hand hygiene thus;

Hand washing steps:

Step 0: Wet hands with water.

Step 1: Apply enough soap and hand wash to cover all hand surfaces. Step 2: Rub hands palm to palm.

Step 3: Right palm over the other hand with interlaced fingers and vice versa. Step 4: Palm to palm with fingers interlaced.

Step 5: Backs of fingers to opposing palms with fingers interlocked.

Step 6: Rotational rubbing of left thumb clasped in right palm and vice versa.

Step 7: Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa.

Step 8: Rinse hands with water. Step 9: Dry thoroughly with a towel.

Step 10: Use the same towel to turn off the faucet. Duration of procedure: 40-60 seconds

Hand rubbing steps:

Step 1a: Apply a palmful of the product in a cupped hand Step 1b: Cover all surfaces of hand with product.

Steps 2-7: Same with steps of hand washing.

Step 8: Hands are clean when dry (no need for rinsing). Duration of procedure: 20-30 seconds

Shehu *et al*. (2021) reported that hand washing is the single most important means of preventing hospital acquired infections and that alcohol-based hand rub (ABHR) is the most effective means of hand hygiene and is the generally recommended method of hand hygiene. An earlier study referred to hand hygiene as either hand washing with soap and water and water of hand disinfection and regarded alcoholic handrub as superior to handwashing, having stronger antimicrobial activity, better skin tolerability and lesser time requirement (Pfäfflin *et al*, 2021).

Handwashing in maternal and newborn care has been shown to reduce mortality rates, improve child survival rates and reduce maternal mortality (Bouzid *et al*., Songa *et al*., cited in Robles 2020).

Jemal (2018) uncovered numerous studies done on hand hygiene which were but limited to hand washing and lacked reference to hand rubbing as a form of hand hygiene whereas Passaro *et al*. (2016) suggested that the use of alcohol-based disinfectants could potentially contribute to a reduction in hospital acquired pneumonia (HAP).

In their article about the importance of washing one's hands, the Northeast Texas Public Health District (2020) claimed that simple activity of frequent handwashing has the potential to save more lives than any single vaccine or medical intervention whereas Mfuh *et al*. (2021) observed that not many studies have been done concerning the subject wash hand washing amongst health care providers in Nigeria.

Alzyood *et al*. (2020) in their editorial reported that COVID-19 pandemic made hand

washing the focus of attention but that long before the outbreak of the novel Coronavirus, the subject of hand washing was one in which health care workers performed poorly.

History of hand hygiene

The practice of hand hygiene in the health care setting has been upheld for many years. It has been labelled as the most important measure for preventing the transmission of infections, even when done alone (Mfuh *et al*., 2021).

Rotter, cited in Shehu *et al*. (2021) stated that the relevance of hand hygiene in health care environments began by the work of Semmelweis in 1847. He compared the mortality rate amongst female patients in a labour ward where chlorine water was used by midwives to wash hands to a hospital where hand washing was not practised. Semmelweis found the former to be 18% and the latter to be 3%. This revealed the role of hand hygiene in reducing death rate by first reducing cross contamination from the hands of health care workers.

The Global Handwashing Partnership (GHP) (2021) made reference to the lady with the lamp - Florence Nightingale as an advocate of handwashing. In her work in Italy, Nightingale achieved a reduction in the number of infections in the Crimean War hospital by ensuring hand washing was done. She did this in an era when foul odours referred to as miasmas were thought to be the cause of infections and hygiene practices basically sought to combat these odours.

Almost half a century ago, the CDC developed hand hygiene guidelines for hospital use. These guidelines focused mainly on washing with soap and water with an alternative consideration of alcohol-based hand sanitizers when a sink in the hospitals was not available to aid hand hygiene with soap and water. The CDC's hand hygiene guidelines were updated in 2002, to reflect the institution's leaning towards alcohol-based sanitizers. The 2020 update contained recommendations to use alcohol-based solutions to disinfect hands with each patient contact and the use of soap and water for hands that are visibly soiled. On their part,

on May 5, 2009, the WHO developed their own guidelines on hand hygiene bearing resemblance to that of the CDC's guidelines but with main focus on guiding and educating healthcare staff (Mathur, cited in Moran *et al*., 2020).

The first Global Handwashing Day was marked on 15th October 2008 (Global Handwashing Partnership (GHP) (2017), with May 5th marking the yearly call to action by the World Health Organization (WHO) to improve hand hygiene in healthcare settings across the world (Shehu *et al*., 2021).

Hand hygiene as an infection control measure

Hammerschmidt and Manser (2021) reported that healthcare-associated infections stand as a significant cause of morbidity and mortality in nursing homes just as Aledeilah *et al*. (2021) affirmed that most common vehicle for transmission of most health care associated infections from patient to patient and within the healthcare environment is indeed health care workers (HCWs) themselves. Garba and Uche (2021) showed that about 50% of all such infections are passed on by the contaminated or soiled hands of HCWs. This literally puts the focus and responsibility of infection control in the hands of health care workers.

In their review of literature, Aledeilah *et al*. (2021) found that hand hygiene when correctly done before and after each contact with any patient proved to be an important step in the prevention of Hickman catheter-related infection (HCRI) in cancer patients.

In her online discussion on Nursing Times, Shaw (2021) explained that infection will not occur if any of the links in the chain of infection is broken. This chain, according to Berman *et al*. (2021), links an etiologic agent to a reservoir, to the portal of exit, to the mode of transmission, to the portal of exit and then to the susceptible host. The CDC (2020), affirmed that hand washing prevents illnesses and spread of infection, hinting on the ability of germs to gain entrance into the body through the eyes, nose and mouth. These orifices serve as both portals of exit and entry to microorganisms. Hand washing can reduce the chances of

inadvertently transferring germs from various objects in the environment to the body. Rubbing hands with alcohol-based hand rub can serve as hand hygiene when hands are not obviously dirty (CDC, 2020).

Nguyen *et al*. (2020) cited the work of Salmon *et al*. for its recommendation that alcohol-based hand rub is a substitute solution for improving the adherence of HCWs' to hand hygiene in developing countries.

Mfuh *et al*. (2021), outlined some contributing factors that have impeded hygiene compliance among health care workers. They include the lack of knowledge among health care personnel about the role that hand hygiene plays in curtailing the spread of infection, lack of knowledge about how hands become contaminated and lack of understanding of correct hand hygiene technique.

These retarding factors were observed in another dimension by Shobowale *et al*. (2021) who reported from their study that several health personnel did not carry out hand hygiene before conducting an invasive procedure but simply went on to don their gloves whereas BaderAldeen and Kheder (2020) reported on their study that included participants from obstetrics and gynaecology wards, that non removal of gloves between patients contributes to the transmission of pathogens and cross infection, giving the instance of some health workers wearing the same pair of gloves for long periods and in various activities because they thought it offered protection. Lindberg *et al*. (2020) also concluded that gloves, when worn for too long, can inadvertently contaminate clean health care materials and surfaces.

Various other studies have explored this knowledge challenge and reveal that wearing gloves to replace the need for hand hygiene is unacceptable as gloves are not a completely protective measure (Fuller *et al*., American Academy of Pediatrics, cited in Robles, 2020). Linberg *et al*. (2020) argued that gloves may even lead to contamination during usage and removal.

Mfuh *et al*. (2021) cited studies that patterned the design of healthcare-related infection

prevention programs after assessing practitioners' knowledge, risks, attitudes and perceptions for hand hygiene. This shows that infection control interventions also required a consideration of the knowledge of hand hygiene amongst those for whom the intervention is meant.

On a positive note, Garba and Uche (2019) reported on studies carried out in various centres that illustrate that faithfulness to hand washing is encouraging among HCWs in intensive care units (ICUs) and those who had training on proper hand washing. This possibly reveals the need for training in the application of hand hygiene for infection prevention and control.

2.1.2 Concept of the WHO 5 moments of Hand Hygiene

Pittet *et al*. cited in Hammerschmidt and Manser (2021) declared that the WHO 5 moments of hand hygiene define care situations that should always lead to a hand rub. They offer information on when and how to apply hand hygiene during routine care activity.

Various reports on the subject of hand hygiene point to the WHO 5 Moments of Hand Hygiene as an effort to address the challenge of low compliance with hand hygiene. Sax *et al*. cited in Gould *et al*. (2021) revealed that the 2009 WHO guidelines for implementing and evaluating hand hygiene programmes in healthcare settings incorporate '5 Moments for Hand Hygiene', which sets out a framework for understanding, training, monitoring and reporting hand hygiene compliance. The guidelines also highlight components for specific implementation.

Kirk *et al*. (2022) opined that the WHO 5 moments of hand hygiene is regarded as an evidence-based, field-tested, user-centered approach designed to be easy to learn, logical, and applicable in a vast range of health care settings and patient care activities. Sax *et al*. cited in Kirk *et al*. (2022) also hinted that these moments, being in the regular workflow order of health care providers, provide the opportunity for increased compliance to hand hygiene especially if point of care hand hygiene products are made available in these moments.

The WHO 5 moments for hand hygiene as a concept, has been acceptably used to improve understanding, training, monitoring, and reporting hand hygiene among healthcare workers with some researchers calling for meticulous methods in its universal adoption (Sax *et al*. cited in Amed *et al*., 2021).

A unique feature of this concept is its delineation of areas of the healthcare field that pertain to the patient and those that pertain mainly to the HCW, respectively termed 'patient zone' and 'healthcare zone'. The patient zone comprises the patient, surfaces and items that are dedicated to the patient temporarily or permanently, during the course of health care delivery, e.g a patient's bed. The health care zone comprises all other persons that come in contact with the patient in addition to the items and surfaces that pertain to them e.g the nurses and the nursing station.

Maniriho *et al*. (2021) conducted a study in Rwanda and reported that 96.4% of their respondents agree on the importance of hand hygiene at the WHO 5 moments of hand hygiene.

Moment 1 (Before touching a patient)

This moment speaks to hand hygiene before touching a patient when approaching him/her. It can be viewed any moment during which one crosses into the patient zone to make contact with the patient. It is beyond merely washing one's hands or performing hand hygiene as soon as one resumes for work or enters a unit. However, these may suffice if hands are not used for any other purpose before actual patient contact. When unsure, it is advised to hand hygiene to avoid inadvertent transmission of infectious agents to patients.

Moment 2 (Before clean/aseptic procedure)

This moment calls for the performance of hand hygiene before accessing a critical site with infectious risk for the patient, referring to clean/aseptic procedures. For tasks carried out on clean sites, like lumbar puncture, surgical procedures and tracheal suctioning, the use of

gloves is standard procedure. In such cases, it is required that hygiene is performed before donning gloves because gloves alone may not prevent contamination entirely.

Moment 3 (After body fluid exposure/risk)

This moment calls for the performance of hand hygiene immediately after an exposure to body fluids (and after glove removal). Hand hygiene done at this moment reduces the risk of colonisation or infection of HCWs with infectious agents which can occur whether or not visible soiling is noticed. Gloves offer themselves as a barrier against the exposure of hands to body fluids. However, hand hygiene is strongly recommended after doffing gloves, as gloves do not provide the maximum protection from potentially infectious microorganisms in body fluids.

Moment 4 (After touching a patient)

This moment requires that hand hygiene be done after touching a patient. A study in Nigeria reported a worrisome trend of noncompliance with this moment of hand hygiene at high rates. A failure to perform hand hygiene after patient contact can make the hands of health care workers become potent reservoirs for the transmission of pathogens from one patient to another. (Shobowale *et al*., 2016).

However, it is prudent to reckon that HCWs may touch the patient and/or objects in the patient zone, hence for clarity, even though Moment 4 bears emphasis on patient contact, it should be understood as 'after contact with the patient or his/her immediate surroundings'.

Moment 5 (After touching patient surroundings)

This moment buttresses the need for hand hygiene after touching a patient surrounding whether or not the patient has been touched. This addresses the concern that contact with patient objects even without physical contact with the patient is associated with hand contamination.

Controversially, Canadian thought leaders have integrated the WHO 5 moments for hand

hygiene into 4 moments and adopted the same. At the time of their introduction. They did this with the belief that cleaning one's hands ‘before contact with a patient’s surroundings’ was as important as cleaning them ‘after contact with a patient's surroundings’. This expresses moment 1 as cleaning one’s hand before touching a patient’s environment (to which the patient actually belongs) and merges moments 4 and 5 into one moment. Thus, they have the Canadian moments 1-4 (Kirk *et al*, 2021).

2.1.3 The Nurse-midwife

According to the Cambridge English Dictionary, a nurse is (the title given to) a person whose job is to care for people who are ill or injured, especially in a hospital.

The WHO, while not expressly defining who a nurse is, defines nursing as encompassing autonomous and collaborative care of individuals of all ages, families, groups and communities, sick or well and in all settings, including the promotion of health, the prevention of illness, and the care of ill, disabled and dying people. (WHO, 2021)

The midwife is someone trained to assist women before during and after childbirth. In Nigeria, midwifery is a nursing specialty.

Foremost nursing theorist Florence Nightingale defines nursing in her environmental theory as the act of utilizing the patient’s environment to assist him in his recovery.” (Gonzalo, 2021)

Buerhaus *et al*, cited in Majeed *et al*. (2018) claimed that nurses constitute the largest percentage of the health care workers (HCW) and label them as the “nucleus of the healthcare system”.

Nurses' hands come into regular contact with patients, which increases the risk of cross-contamination of HAIs (Maniriho *et al*., 2019). Also cited in Majeed *et al*. (2018), Abualrub revealed that the fact that nurses spend more time with patients than any other HCWs, their compliance with hand washing guidelines is perhaps more important for stalling the

transmission of diseases among patients.

2.2 EMPIRICAL REVIEW

2.2.1 Knowledge of the WHO '5 moments of hand hygiene'

The result of the study done by Hammerschmidt and Manser in 2021 aimed at improving the understanding of individual and organisational factors that related to hand hygiene compliance as perceived by the respondents, indicated that one in five nurses had correct knowledge of practical implementation of the hygiene training contents. The study was conducted as a mixed-methods study that surveyed 165 nurses and interviewed 27 nursing managers from nursing homes. In this study, the findings on hand hygiene revealed a 20% knowledge level among the nurses. Explanatively, 79% of nurses knew that for use of hand rub for hand hygiene, the recommended duration is 30seconds; 68% knew that wearing gloves can never substitute for hand hygiene, only 52% of the nurses knew they always have to use hand rub after using gloves and 61% of staff completely understood hand hygiene standards.

The study by Aledeilah *et al*. (2022) to assess the knowledge, attitude and practice of hand washing among health care workers (HCW) was based on WHO's Five Moments of Hand Hygiene Questionnaire. This descriptive cross sectional study involved the use of a self-administered questionnaire. Results showed that among 116 participants, 105 (90.5%) had a high (>75%) level of knowledge of hand hygiene; 5 participants (4.3%) had moderate (50%-75%) level of knowledge of hand hygiene, likewise for low (<50%) level of knowledge of hand hygiene. The mean score of hand hygiene knowledge among the 38 participating nurses was 18.3(±1.2), with 89% of them agreeing that for sterilization of one's hands with alcohol to eliminate most germs, 20 seconds is the least time necessary.

Nguyen et.al. (2020) conducted a study where a structured questionnaire based on the WHO 5 moments of hand hygiene concept and the national guidelines on hand hygiene was used as

data collection tool. The study had 120 people as the population size drawn from health care workers including those working in obstetrics and gynaecology wards of a general hospital, giving consideration to their main source of access and frequency of access to clinical information. Using 19 true-false statements about the WHO 5 moments of hand hygiene, they reported that almost half of the respondents did not have correct knowledge regarding all WHO 5 moments for hand hygiene. Correct knowledge meant correctly answering all 19 questions and only 65 % of respondents (82% of which were nurses) were able to do so. Mfuh *et al*. (2021) put together a study to test the knowledge of potential nurses about hand hygiene. The study captured the WHO 5 moments of hand hygiene in their data collection tool and results indicated that about 62% of respondents had good knowledge regarding hand hygiene.

Garba and Uche (2021) reported on the knowledge, attitude, and practice of hand washing among healthcare workers in a tertiary health facility in northwest Nigeria. Focally, respondents from paediatric and special baby care baby units had better knowledge of hand

hygiene, than respondents from obstetrics and gynaecology wards who had lower knowledge levels. Using a two-stage stratified sampling technique, they conducted a cross-sectional descriptive study among the HCWs of Ahmadu Bello University Teaching Hospital Zaria, northwest Nigeria. Their sample size of 116 HCWs consisted of doctors, nurses, laboratory and supportive staff. In their results, majority of respondents were aware of the World Health Organization's five moments of hand hygiene, about three-quarters (72.4%) of the respondents showed good knowledge of hand hygiene, a little over a quarter (27.6%) had poor knowledge of hand hygiene. Of this, 90.5% of nurses had good knowledge of hand hygiene, compared to 20.0% each of support staff and laboratory technologists.

Soesanto (2022) independently conducted a study to measure the level of knowledge,

attitude, behaviour and level of adherence to the WHO 5 moments of hand hygiene andapplied an analytical cross-sectional approach and used a questionnaire The study is unique for having only female nurses as respondents, it also considered education and work time of respondents. In the study, it was observed and reported that none of the respondents (neither from regular staff nor executive nurses) had very good knowledge about the WHO 5 moments of hand hygiene, only 4.55% had good knowledge, 86.36% of the nurses had a level of knowledge in the bad category and that 9.09% fell in the 'very bad' category. Noteworthy is that the few (4.55%), who had good knowledge were the executive nurses, most of who had worked for 6-8years and between 31-40 years of age.

Majeed *et al*. (2022) conducted a descriptive cross sectional study to access knowledge of hand hygiene with emphasis on choice of agents used for hand hygiene before patient contact (moment 1) and after patient contact (moment 4) and used a questionnaire. Results of this showed that majority of the health care workers correctly identified the stated indications for hand hygiene either by hand washing or use of alcohol based hand rub. Precisely, with 66 of the 80 participating HCWs (82.5 %) reported the need for hand hygiene after exposure to the immediate surroundings of a patient (moment 5), moments 2 and 3 (immediately before a clean/ aseptic procedure and after a risk of body fluid exposure respectively) were both correctly identified by 78.7 % of respondents and before touching a patient (moment 1) by 68.7%.

Kadi and Salati (2021) put together a cross sectional study to evaluate hand hygiene based on the World Health Organization's concept of 5 moments of hand hygiene. The study showed that only 29% of the medical students that partook in the study were able to identify all the five indications for hand hygiene represented by the WHO 5 moments for hand hygiene. On a gender basis, the average awareness regarding the positive indications of hand hygiene was 51.7% for male students and 62.5% for female students. Conversely, 36% males and 41.5%

females were unsure about hand hygiene in scenarios that depicted Moments 2 and 3, where they were supposed to wear gloves and perform hand hygiene after removal of gloves as evident in procedures that required aseptic techniques and procedures that had body fluid exposure/risk.

The study of Zohoun *et al*. (2020) to assess knowledge about the 5 moments for hand hygiene, made use of questionnaires that relied on the WHO guidelines and concluded from their findings that was satisfactory. About 84.1% of the 119 participants in the study who returned the data collection tool had responses that showed optimum knowledge. For clarity, 93.3% of healthcare workers declared that it is necessary to practice hand hygiene before touching a patient (moment 1), 76.5% before an aseptic procedure (moment 2), 85.5% after body fluid exposure (moment 3), 93.3% after touching a patient (moment 4), 72.3% after contact with a patient environment (moment 5). All the participants had knowledge about simple hand washing and alcohol based hand rub but concerning the minimum duration of alcohol-based hand rub, they found that no nurse had the correct knowledge.

Shehu *et al*. (2021) conducted a cross sectional study to assess the level of hand hygiene among nurses, using the WHO standardized HH knowledge questionnaire to gather data. They reported that among the 322 respondents, only 16% had good knowledge of HH, 52% had moderate knowledge, and 32% had poor knowledge. From this, the mean knowledge score of the 60 responding nurses was about 40%.

2.2.2 Practice of the WHO 5 moments of hand hygiene.

Asare, cited in Mfuh *et al* (2021) reported that hygiene compliance of physicians and nurses in a neonatal intensive care unit was low. This study was done in Ghana to assess hand hygiene practices.

Maniriho *et al*. (2021) reported that HCWs in the neonatal intensive care unit had a 90.9% adherence rate to the WHO 5MOHH while those the paediatric ICU ha 43% adherence rate.

Yawson *et al*., cited in the systematic review article by Buković *et al*. (2021) to assess the availability of hand rubs and hand hygiene compliance rate among healthcare workers in the Korle-Bu Teaching Hospital reported on their study set in Korle-Bu Teaching Hospital Ghana which revealed that overall hand hygiene compliance for nurses ranged from 9.6% to 54%. This study was a cross sectional, observational study that utilized standardized checklist designed by the Infection Prevention and Control Unit of the hospital where the study was set. It aimed at and showed that compliance rate was higher on the high-risk wards.

An observational study on hand hygiene compliance among nurses in a teaching hospital in Ghana and from this Alhassan (2020) reported:

Out of the 410 indications for hand hygiene compliance, hand hygiene was present or done for 329 indications and not done for 81 indications. Hence the hand hygiene compliance level recorded from observation was 80.2% and 19.8% for no compliance. The dominant (47.3%) hand hygiene action was hand washing; hand washing was high (68.4%) when it came to after touching a patient indication. The second most (17.3%) hand hygiene action was hand rub with hand sanitizer, hand rub was high (39.3%) after touching patient surroundings. Hand hygiene action missed was high (40.2%) before touching the patient's surroundings. From observation, gloves were used in 77.8% of the indications. The observation indicated that hand hygiene was only practiced 8.8% before glove use and 96.9% after glove use. (Alhassan, 2020, p. 30).

This study also showed that Moment 3 of WHO 5 moments of hand hygiene had the highest compliance rate of 97.4% with Moment 1 having least (59.8%) compliance. Handy hygiene indications at moments 2, 5 and 4 respectively had 6.7%, 89.33% and 95.5% compliance.

Garba and Uche (2021) in their study to check hand hygiene practices, reported that over half (55.2%) of respondents in their study had good adherence to proper hand washing practices. As touching the WHO 5 moments of hand hygiene frequency, they reported that out of 116

respondents, majority (86.2%) of the respondents confirmed that they always practice hand hygiene on exposure to body fluids from patients, 23.3% after touching a patient's surrounding 16.4% reported always performing hand hygiene before touching a patient. 32 (27.6) of the respondents confirmed unfailing hand hygiene performance after gloving but only 9 respondents (7.8%) always performed hand hygiene before gloving. This study also showed that in the 'rarely' frequency of hand hygiene moments, 26.7% of respondents performed hand hygiene in moment 1, more respondents (57.8%) rarely performed hand hygiene before gloving than after gloving (11.2%). It is striking to note that in this study, 1 respondent reported never performing hand hygiene before touching a patient but encouraging to note that all respondents performed hand hang hygiene after exposure to fluid risk, either always or sometimes.

Ugwu *et al*. (2020) organized a study designed to assess the knowledge, attitude and hand hygiene practices (on the backdrop of the WHO 5 moments of hand hygiene) among healthcare workers in Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Amaku, Awka, Nigeria. The findings revealed that handwashing instances by HCWs was highest (93%) after emptying a bedpan. Emptying of a bedpan cuts across Moments 3, 4 and 5. A bedpan can have fluid content, necessitating the need for hand hygiene in Moment 3. During the retrieval of a bedpan, a nurse may touch a patient, calling for the performance of hand hygiene as shown in Moment 4. This extends to Moment 5 as the used bed and the patient constitute the patient's surroundings. The study also showed that 76.6% of participants did not routinely use an alcohol-based hand rub for hand hygiene thus negatively impacting overall level of practice of hand hygiene.

Nguyen *et al*. (2020) reported that 67% of respondents indicated from their responses on Likert scale that all 5 moments mattered. This is a reflection of the level of practice of the hand hygiene guideline in that health facility especially with the nursing workforce.

In their three-month observational study to observe hand hygiene practice among HCWs based in Benin Republic, Zohoun *et al*. (2020) reported from their study that hand hygiene practice among HCWs in paediatric intensive care unit was low (6.9%). This is regardless of the category and seniority of the participating health care worker, and also regardless of the type of hand hygiene practised (whether simple hand washing or the use of alcohol-based hand rub). In the nurses' category specifically, the rate of adherence was a meagre 7.5% as none observed the minimum required duration of hand hygiene.

Loyland *et al*. (2019) utilized the World Health Organization's (WHO) "5 moments for hand hygiene" validated tool to record indications and adherence to hand hygiene, in an observational study that used nursing students as the observers of identified behaviours of interest. They reported that hand hygiene was performed for 57.2% of the 2,393 indications observed and recorded, showing the average compliance rate.

In the study by Aledeilah *et al*. (2021), the attitude and practices of hand hygiene were assessed using a self-administered questionnaire with questions bordering on hand hygiene practice after touching the patient (moment 4) and immediately after exposure to any bodily secretions (moment 3). Results from the assessment of hand hygiene practice showed that all (116) participants (comprising nurses, nursing assistants, residents and technicians) agreed on washing or disinfecting the hands after patient contact (moment 5) and also on washing or sterilizing one's hands immediately after exposure to patient's body secretions.

In the study done by Hammerschmidt and Manser in 2021 to assess hand hygiene practices, 47% of nurses indicated that they always follow hand hygiene standard. However, it was suggested that 33% of the population did not disinfect their hands after doffing gloves.

Kolola and Gezahegn cited in Buković *et al*. (2021) conducted a 24-hour observational study to observe hand hygiene compliance based on the WHO hand hygiene observation method for measuring compliance. With 917 hand hygiene opportunities observed among 261 health

care workers, the compliance rate was 21.2% for midwives. The rate of compliance according to the WHO 5 Moments for Hand Hygiene was lower in Moment 1; before patient contact (2.4%), Moment 2; before the aseptic procedure (3.6%) and Moment 5; after contact with patient surroundings (3.3%). Higher levels of compliance were found in Moment 3; after exposure to bodily fluid (75.8%) and Moment 5; after patient contact (42.8%). In 47.0% of the 202 times hand hygiene actions were performed, it was with alcohol-based hand rub. Hand rubbing was frequently (55.8%) performed, after patient contact whereas handwashing with soap and water was more frequent, (76.6%) after body fluid exposure compared with other indications/moments. This study also indicated that there was a higher rate of compliance with WHO 5MOHH in the paediatric ward and neonatal intensive care unit at 26.5% and 27.5% respectively. The study concluded that compliance with indications or moments that protect patients from infection was lower than that of moments which protect the health care worker from infection.

Shobowale *et al*. (2022) in their study to observe the nature and frequency of hand hygiene, reported on the behavioural pattern of noncompliance with hand hygiene by health workers in Babcock University Teaching Hospital in the South-West of Nigeria. The study was cross-sectional and applied observation as the data collection tool in both inpatients and outpatients units. They and discovered low levels of compliance with the WHO prescribed 5 moments of hand hygiene especially in Moment 1, in 160 of the 176 recorded observations. Among all health care personnel observed, circulating nurses practiced hand washing the most.

Shehu *et al*. (2023) reported that only 14% of nurses had a self-reported routine practice of hand hygiene judged from hand hygiene before giving an injection (moment 1), after emptying a bedpan (moment 3) and after making a patient's bed (moment 5).

Jemal (2021) conducted a descriptive cross-sectional study to assess hand hygiene practice among health professionals in a tertiary hospital in Ethiopia. They reported that only 19.8%

of respondents, some of whom worked in paediatric wards, always performed hand hygiene before and after patient contact (moment 1 and moment 4), 78% always performed hand hygiene after contact with body secretions (moment 3) and 36.3% always performed hand hygiene before performing clean and aseptic procedures (moment 2). The sample size of this study was 91 and it was concluded that respondents had poor practice of hand washing even though they had good knowledge of it.

Okanu *et al*. cited in Jinjiri and Getso (2021) conducted a study on handwashing practices among healthcare providers in a tertiary hospital in Southeast Nigeria. They reported that about 54% of respondents always washed their hands between direct contact with a patient (moment 1 and moment 5) and after an invasive procedure (moment 2). 92% of them washed their hands when visibly soiled (moment 3).

Balafama *et al*. also cited in Jinjiri and Getso (2022) carried out a study on handwashing practices among HCWs in University of Port Harcourt Teaching Hospital, Nigeria. They

revealed that 76.7% of respondents never washed their hands while only 9.3% always washed their hands before interacting with patients (moment 1); 69.7% never washed their hands while 13.6% always washed their hand before performing clean and aseptic procedures. After patient interaction, 51.2% always washed their hands while 24.8% sometimes washed their hands.

In their own work, Jinjiri and Getso (2022) reported that 232 (92.8%) of the 250 respondents in their descriptive survey always practice handwashing at the right moments. It is important to note that 155 of these were nurses.

Rusli *et al*. (2020), conducted a cross-sectional study to examine nurses' compliance with the practice of safety precautions (SP) at a hospital in Indonesia. They found that among the analyzed specific components of non-compliance with SP practices, the proportion of hand

hygiene compliance according to the WHO 5 moments was the highest (17.5%). This means that non-adherence to hand hygiene according to the prescribed moments gave rise to more accounts of non-compliance with SP, compared with other components (personal protective equipment and safe disposal of waste). However, the overall compliance of nurses with safety precaution practices was 56.7%

2.2.3 Factors affecting hand hygiene practice.

Tschudin-Sutter *et al*. cited in Buković *et al*. (2021) indicate that younger healthcare workers and those employed for shorter time periods more likely followed to all the recommended steps of hand hygiene. Thus, they identified age and employment duration as factors intervening in the practice of hand hygiene.

Nguyen *et al*. (2020) pointed out that the knowledge of hand hygiene was significantly related to age, work position, frequency of access to clinical information, and clinical information source whereas Soesanto (2018) discovered that there was influence from the nurses' level of knowledge on compliance with the WHO 5 moments of hand hygiene in a bid to prevent the transmission of shingles in nursing homes. This highlights knowledge as an intervening factor in the performance of hand hygiene.

Findings by Ugwu *et al*. (2021) showed that HCWs are motivated to wash their hands because of fear of contracting disease as such tend to wash their hands more often after contact with patients (Moment 5) than before contact (Moment 1) and also after performing a procedure (100%) than before such procedure (89.6%). In the same vein, Kolola and Gezahegn (2017) also suggested that HCWs are more likely to perform hand hygiene at moments that promote self-protection from microbial contamination and infection rather than moments that simply protect patients. The tendency of self-protection is identified in these studies as a factor that encourages hand hygiene, even though not at all times.

The study conducted by Majeed *et al*. (2021), used a standard WHO observational tool to

collected data about hand hygiene practices about health care workers. From this, they concluded that common barriers to effective hand hygiene noted were the choice of gloving instead of hand hygiene performance as observed in 66.2 %, forgetfulness as shown in 56.2% and lack of alcohol-based hand rub and lack of towels reported by 43/ 80 participants (53.7%). On the positive side, 83.8% of participants submitted that clear and simple instructions for hand hygiene made visible for every health care worker would be very effective if hand hygiene was to be improved. The same fraction of respondents (83.8%) hinted that hand hygiene would improve if leaders and senior managers their institution support and openly promote hand hygiene.

Hammerschmidt and Manser (2021) noted that even though nurses were motivated to apply the contents of hand hygiene training in practice, the actual compliance with hand hygiene practices was strongly influenced by the direct availability of hand hygiene equipment at the point of nursing care. This is in tandem with reports from Ugwu *et al*. (2019) where unavailability of hand washing sinks, time required to perform hand hygiene, patient's condition, effect of hand-hygiene products on the skin and inadequate knowledge of the guidelines were given as factors that impacted the practice of hand hygiene.

Robles (2020), included absence of multimodal hand hygiene promotion and behavioural problems as part of factors constituting barriers to hand hygiene performance according to stipulated guidelines just as Kolola and Gezahegn (2020) also established a link between low compliance with hand hygiene and the lack of implementation of a multimodal strategy for improving hand hygiene, lack of visual reminders in the workplace and unavailability of long term evaluation and performance feedback on hand hygiene.

Results from the study by Mfuh *et al*. (2021) study showed a relationship between knowledge and practice of hand hygiene ($p=0.000$, $X2 =25.533$). This communicates knowledge as a factor that affects the practice of hand hygiene.

The study by Maniriho *et al*. reported in 2022 aimed at establishing demographic factors associated with nurses' perceptions and adherence to five moments of hand hygiene. They discovered that among 106 bedside nurses in their descriptive cross sectional and observational study, 97.7% were prompted to perform hand hygiene on the account of leaders and senior managers who support and openly promoting hand hygiene, 94% performed hand hygiene in response to posters at point of care. They also found that the practice of hand hygiene was encouraged by visible, clear and straightforward instructions for hand hygiene 92.9% of the times and that, in-service education, provision of alcohol-based hand rub, availability of safe continuous water supply, soap and towels encouraged hand hygiene practice 78.6%, 77.4% and 61.9% of the times respectively.

Garba and Uche (2021) discovered that factors found to be significantly associated with level of adherence to hand washing were respondents' professional cadre ($P< 0.0001$), and their attitude toward hand washing practices ($P < 0.0001$), however in their direct observation of hand hygiene practice, they reported infrequent and partial availability of running tap, soap, or alcohol-based hand rub. This study captured responses from paediatric, obstetrics and gynaecology wards and special care baby unit.

Shehu *et al*. (2021) conducted a study aimed at determining hand hygiene knowledge, training gaps, level of practice and factors influencing the practice of hand hygiene among health care workers. Using a multi-stage randomized sampling method, they obtained information on health care workers training in the preceding 3 years before the study and the practice of hand hygiene. They found that only about 23.5% of respondents had received formal training on hand hygiene in the preceding 3years and only about 22% could self-report a routine practice of hand hygiene.

Abdul'aziz and Bakr, cited in Jinjiri and Getso (2021) indicated that low compliance to hand washing was as a result of lack of awareness among health care workers as regard the

importance, techniques, methods and quality of hand hygiene. This presented a mitigating factor.

Engdaw *et al*. (2021), put together a cross-sectional study in central Gondar zone public primary hospitals in northwest Ethiopia to assess hand hygiene compliance among health care providers, including midwives, and the associated factors. They found that the knowledge of the steps of hand hygiene, knowledge on five moments of hand hygiene, having training for hand hygiene, presence of promotion for hand hygiene in the hospital were factors that affected hand hygiene compliance. Also, adequate provision of materials for hand hygiene in easily accessible forms and locations, the presence of posters and a protocol for hand hygiene, knowledge on hand hygiene compliance and attitude were shown to be significantly associated variables with the hand hygiene compliance of health care providers. In this study also, regarding reasons why they do not practice hand hygiene, 89% of respondents gave non-compliance of their other colleagues to hand hygiene, 88% mentioned that their hands were not dirty, 86.6% submitted that hand hygiene was not important for every patient and that patients got offended by it. 72% gave that hand hygiene caused damages to skin and caused irritation, 66.3% gave that there was insufficient time for hand hygiene, 53.10% were confident in their glove protection. About half of respondents, gave their reason for non-compliance to hand hygiene as non- accessibility of sinks or alcohol-based hand rub.

Kirk *et al*. (2022) conducted a cross-sectional study to examine health care workers point of care and hygiene practice. They reported that out of 350 respondents, factors that discouraged hand hygiene practice were inconveniently located dispensers/sinks (41%), being busy (36%), empty hand hygiene product dispensers (33%), and hand hygiene products drying out hands (32%).

In the study by Pfäfflin *et al*. (2021), there was a significant increase in compliance (from 2.1% to 14.2%) with hand hygiene among midwives after the application of a multimodal

hand hygiene improvement strategy. This strategy factored in a system change to make hand hygiene materials available at each point of care, training and education with clear and simple instructions for hand hygiene made visible for every HCW, feedback with HCWs regularly receiving the results of their hand hygiene performance, workplace reminders with hand hygiene posters displayed at point of care and lastly, support and open promotion of hand hygiene by the institution's leaders. Patients were also invited to remind HCWs to perform hand hygiene, thus delivering cues for hand hygiene action. HCWs in the neonatology wards recorded a 24.5% compliance from a mere 3.6%, after the application of this strategy.

Rusli *et al*. (2020), conducted a cross-sectional study to explore the factors pertaining to nurses' compliance with the practice of safety precautions at a hospital in Indonesia, using a 12-point observational form. Hand hygiene according to the WHO 5 moments was assessed as part of the safety precautions. They found that the proportion of nurses who had received training also showed a larger proportion in compliance with safety precautions than those

who had not been trained (OR=2.70, 95% CI 1.07-6.79). This highlighted training as a factor that affects hand hygiene practice.

THEORETICAL REVIEW

The Health Belief Model (HBM) first postulated by Irwin M. Rosenstock, Godfrey M. Hochbaum, Stephen S. Kegeles and Howard Leventhal in the 1950s and revised in the 1980s, is a theory which explains health behaviours as a result of certain perceptions that an individual has about the various aspects of the health behaviour (Ban & Kim, 2020; Boskey & Snyder, 2022) . Hand hygiene is a health behaviour that has to do with the prevention of infection. Compliance with hand hygiene reflects the attitudes, behaviours, and beliefs of healthcare personnel. Various theories seek to explain the factors that contribute to the

performance of a health behaviour. The HBM stands as one of the most widely applied theories in the design and evaluation of health behaviour intervention (Rusli *et al*., 2020).

2.2.4 The Health Belief Model (HBM)

This study engaged the HBM as a foundation on which to investigate nurse-midwives' knowledge and practice of the WHO 5 moments of hand hygiene which on its own is an approach to a health behaviour. The major constructs of the HBM include:

Perceived susceptibility: This refers to an individual's subjective assessment of the risk of developing an illness. The HBM holds that individuals who perceive that they are vulnerable to an illness will engage in behaviour to reduce their risk of developing the illness/ health problem.

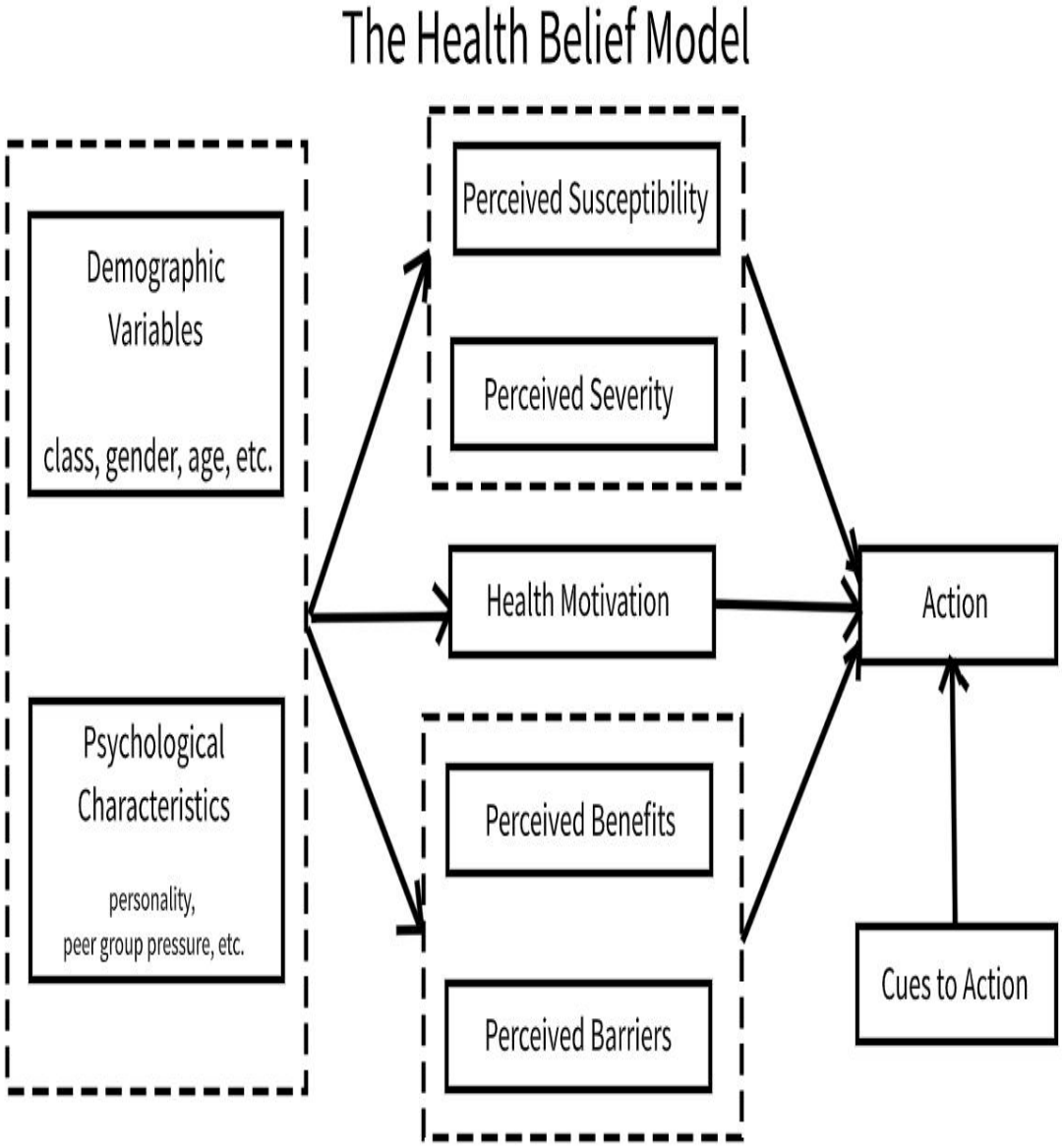
Perceived severity: This speaks to an individual's subjective assessment of the seriousness of developing an illness or not engaging in a health promotion behaviour. It is a consideration of the consequences of a particular health problem.

Perceived benefits: This refers to an individual's assessment of effectiveness of a certain health behaviour to prevent or reduce the threat of the health problem. It is a reflection of a person's acceptance of a prescribed health behaviour as beneficial.

Perceived barriers: This refers to an individual's assessment of the obstacles or impediments to performing the health behaviour. These could be in the form of challenges and constraints that discourage the performance of recommended health behaviours.

Cues to action: This refers to the factors that prompt the performance of the health behaviour. It is the stimulus that triggers the decision to accept a prescribed health behaviour. These could be either internal or external.

Self-efficacy: This speaks to the confidence level an individual has in his or her ability to perform a desired health action. It is the last construct to be added to the HBM.



2.2.5 Application of the Health Belief Model to the WHO 5 Moments of Hand Hygiene among Nurse-midwives.

Perceived susceptibility:

Nurse-midwives are more likely to apply the WHO 5 Moments of hand hygiene if they consider that they are at risk for infections that may arise from not washing one's hands at

every time necessary.

Perceived severity:

Nurse-midwives are more likely to apply the WHO 5 Moments of Hand Hygiene if they consider the severity of infections that may arise from not washing hands at every time necessary. The implications of life-threatening infections due to non-performance of hand hygiene at stipulated times range from poorer health outcomes, to increased cost of healthcare and even to death and loss of workforce among HCW.

Perceived benefits:

Nurse-midwives are more likely to apply the WHO 5 moments of hasnd hygiene if they factor in the benefits.

Perceived barriers:

Nurse-midwives are likely to apply the WHO 5 moments of hand hygiene if they can overcome the perceived barriers to this activity.

Cues to action:

Nurse-midwives are more likely to perform hand hygiene at the stipulated times if there are prompts that serve as reminders for when hand hygiene is required. These prompts may be one time or continuous.

Self-efficacy:

Nurse-midwives are more likely to perform hand hygiene according to stipulated guidelines if they are confident in their ability to carry out proper hand hygiene. This confidence can come from a personal assessment of their knowledge and skill in the performance of hand hygiene.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discussed the method and procedures used in this research, in order to achieve the objectives of the study under the following subheadings: Research design, Research Setting, Population of the study, Sample and sampling technique, Research instrument, Validity of the research instrument, Reliability of research instrument, Method of data collection, Method of data analysis, and Ethical consideration.

3.2 Research Design

The design that was adopted for this study is a non-experimental descriptive design which involves description of events, situations and phenomena. A body of data was collected, organized, and analyzed to capture and describe the knowledge level and actions of subjects. The purpose of the study was to measure the extent to which an activity is done and analyze data about the level of knowledge possessed, hence a descriptive approach was used.

3.3 Research Setting

The study was set in the University of Benin Teaching Hospital (UBTH), Benin City, Edo State, Nigeria and the area captures staff nurses in various wards of the hospital. The University of Benin teaching hospital is a tertiary health care facility which came into being on May 12, 1973 following the enactment of an edict (12) of the Nigeria National Health Act. It is the sixth of the first-generation teaching hospitals to be established in Nigeria. UBTH was founded as a complementary institution to the University of Benin, to provide secondary and tertiary care. It is located along Benin-Lagos expressway in Egor Local Government Area of Edo State. The hospital offers services ranging from nursing, laboratory, paramedics,

dentistry, pharmacy, to diagnostics. The in-patient wards of the hospital are open to the general public from on every day of the week. The outpatient clinics are closed on weekends with the exception of the general practice clinic.

UBTH also provides essential facilities for the training of high and middle level manpower for the health industry and drives opportunities for research for lecturers in the university and other persons who focus on local morbidity in their research endeavours.

3.4 Target population

The target population for this study were nurses and midwives working in the University of Benin Teaching Hospital, specifically in wards where maternal and child health care was carried out. These include the two maternity wards, labour ward, gynaecology ward, paediatric wards, special care baby unit, antenatal clinic and family planning clinic. The total number of nurses in these wards at the time of this study is 173.

3.5 Sample size determination

The population size was considered exhaustible for the research and as such all members of the population were included in the sample. Therefore, sample size is 173.

3.6 Sampling technique

The participants was selected using the total sampling method (which captures all members of the population) in order to get the best representation of the population. All the study participants are staff nurses-midwives drawn from the two maternity wards, labour ward, gynaecology ward, paediatric wards, special care baby unit, antenatal clinic and family planning clinic.

Table 3.1 Population from selected wards

Number of nurse-midwives according to professional ranking									
Selected wards	DD	ADNS	CNO	ACNO	PNO	SNO	NO I	NO II	Total
Maternity ward 1	-	-	2	2	3	3	5	4	19
Maternity ward 2 Labour	-	1	1	1	3	4	4	3	17
ward Gynaecology ward	-	1	-	2	4	3	6	4	20
Paediatric surgical ward	1	-	2	1	3	2	5	4	18
Paediatric medical ward	-	1	-	2	2	4	3	3	15
Paediatric ward extension-		1	1	1	2	3	3	4	15
Special care baby unit-		1	-	1	3	3	3	4	15
Antenatal clinic	1	1	1	1	4	5	5	4	22
Family planning clinic	1	- 1	1	2	3	2	4	4	17
Total	-		1	1	3	2	4	3	15
	3	7	9	14	30	31	42	37	**173**

3.7 Instrument for Data Collection

A structured self-administered questionnaire was used for data collection. It consists of four sections which are A, B C and D. Section A comprised of questions that provided the demographic data of the participants (age, sex, tribe, highest level of education attained and professional ranking.) Section B assessed participants' knowledge of the WHO 5 moments of hand hygiene. Section C evaluated participants' practice of the WHO 5 moments for hand hygiene in areas of patient care. Section D related intervening factors to nurse-midwives' practice of the WHO 5 moments of hand hygiene in the hospital area.

3.8 Validity of the Research Instrument

Validity is defined as the extent to which an instrument measures what it is supposed to measure and perform as it is designed to perform. Face and content validity was considered in the study. Face validity involves simply looking at the instrument to be used and inspecting them at face value to be sure that it measures what it is supposed to measure. The instrument for the research work was validated by a maternal and child health nurse, an expert statistician and the project supervisor, who scrutinized the content and gave approval for its use.

3.9 Reliability of the Research Instrument

Reliability of the instrument was established by Pilot Testing. This was done by exposing the structured questionnaire to a pilot study group of thirty (30) registered nurses in Central Hospital, Benin City, Edo state, another tertiary hospital in the locality where the population sample for the research was drawn from. This number is about twenty percent of the sample size of the main study. The reliability of the instrument was confirmed using the Cronbach alpha reliability technique. Computation using SPSS, Cronbach's alpha values obtained from test of reliability were >0.7.

3.10 Method of Data Collection

The nurse-midwives who met the inclusion criteria were identified and contacted in person, at the selected wards in the hospital. The objectives of the study were explained to each prospective participant verbally, they were given the consent form and politely invited to participate in the research. Every consenting nurse was given a questionnaire to complete privately. Completed questionnaires were collected immediately, however, some participants opted to complete their questionnaires at a later time; these were collected at the participants'

desired time. The contact details and names of the participants were not requested, to ensure confidentiality. All the completed questionnaires were put in an envelope, sealed and delivered safely for the data analysis step of the research process.

3.10.1 Inclusion criteria

Members of the population who fit into the sample had the following characteristics.

1. The status of registered nurse and/or midwife, with valid employment with the University of Benin Teaching Hospital confirmable by identification by colleagues.
2. Verbally consented to participate in the study and were willing to return the self-administered instrument of data collection at a time suitable for him/her but within the data collection time frame of the study.

3.10.2 Exclusion criteria

Members of the target population who were not included in the sample include:

1. Anyone who did not verbally consent to participate in the study and was unwilling to return the self-administered instrument of data collection at a time suitable to him/her within the data collection time frame of the study.
2. Any nurse and/or midwife who works in all other wards not captured in the target population.

3.11 Method of Data analysis

Data was collected, collated and analyzed using the Statistical Package for Social Sciences (SPSS) version 23.0. Descriptive and inferential statistical analyses were employed. The Chi-square test was used to assess the significance of the data with P-values of less than 0.05 considered significant.

3.12 Ethical Consideration

The principles of confidentiality, voluntary participation and anonymity were applied in the conduct of this research. To obtain informed consent, respondents were fully informed about the purpose of the study, with the objectives of the study verbally explained to the participants. No participant was forced to partake in the research and personal identifiers such as names, phone numbers and contact address was not written in the questionnaire, hence they remained anonymous. Permission to carry out the study was obtained from the Health Research and Ethical Committee of the University of Benin Teaching Hospital, Benin City.

CHAPTER FOUR

RESULTS

4.1 Presentation of data

This chapter presents the data analysis and test of hypotheses based on responses obtained. Frequencies, percentages, mean and standard deviation presented in tables as well as pie charts were used to analyze the data showing 161 respondents out of a sample size of 173.

Table 4.1: *Sociodemographic characteristics of respondents* n=161

Variables	Attributes	Frequency	Percentage
Age (Years)	21-25	17	10.5
	26-30	39	24.2
	31-35	43	26.7
	36-40	12	7.5
	41-45	22	13.7
	46 and above	28	17.4
Sex	Male	22	13.7
	Female	139	86.3
Religion	Christianity	146	90.7
	Islam	13	8.1
	Traditional	0	0.0
	Others	2	1.2
Tribe	Edo	69	42.9
	Esan	29	18.0
	Yoruba	18	11.2
	Igbo	20	12.4
	Hausa	4	2.5
	Others	21	13.0
Highest level of education	Registered nurse (only)	12	7.4
	Registered nurse and registered midwife	83	51.6
	Bachelor of Science	58	36.0
	Master of Science	8	5.0
	Ph.D	0	0.0
Professional ranking	Nursing officer II	35	21.7
	Nursing officer I	42	26.1
	Senior Nursing Officer	30	18.6
	Principal Nursing Officer	30	18.6
	Assistant Chief Nursing Officer	13	8.1
	Chief Nursing officer	8	5.0
	Assistant Director of Nursing Service	3	1.9

Table 4.1 shows demographic characteristics of respondents. Most respondents 43(26.7%) were within the age range of 31-35 years, 139(86.3%) were females, most respondents 146(90.7%) were Christians, 69(42.9%) were from Edo ethnic group, 83(51.6%) were at least registered Nurse and registered Midwife, 42(26.1%) were Nursing Officer I by professional ranking.

Table 4.2: ***UBTH Nurses-midwives' knowledge of the WHO 5 Moments of Hand Hygiene***

n=161

	True	**False**
Hand washing is an infection control measure	159(98.8)	2(1.2)
The WHO 5 moments hand hygiene occur at the same time	83(51.6)	78(48.4)
All the moments require hand hygiene	157(97.5)	4(2.5)
Moment 1 is 'before clean/aseptic procedure'	32(19.9)	129(80.1)
Moment 2 is 'before touching a patient'	42(26.1)	119(73.9)
Moment 3 is 'before body fluid exposure/risk'	78(48.4)	83(51.6)
For moment 5, it is necessary to perform hand hygiene if the patient's surroundings look clean	124(77.0)	37(23.0)
You can skip hand hygiene at moment 1 for a patient if you most recently performed it at moment 5 for a previous patient	138(85.7)	23(14.3)
It is not necessary to perform hand hygiene if you will don a glove	97(60.2)	64(39.8)
You need to clean your hands with water every time	101(62.7)	60(37.3)

Table 4.2 shows nurse-midwives' knowledge of the WHO 5 moments of hand hygiene, 159(98.8%) reported that hand washing is an infection control measure, 83(51.6%) reported that the WHO 5 moments of hand hygiene occur at the same time, 157(97.5%) reported that all the moments require hand hygiene, 32(19.9%) reported that moment 1 is 'before clean/aseptic procedure', 42(26.1%) reported that moment 2 is 'before touching a patient', 78(48.4%) reported moment 3 is 'before body fluid exposure/risk', 124(77.0%) that for moment 5, it is necessary to perform hand hygiene if the patient's surroundings look clean, 138(85.7%) reported that you can skip hand hygiene at moment 1 for a patient if you most recently performed it at moment 5 for a previous patient, 97(60.2%) reported that it is not

necessary to perform hand hygiene if you will don a glove, 101(62.7%) reported that you need to clean your hands with water every time.

Figure 4.1: ***UBTH Nurse-midwives' knowledge of the WHO 5 Moments of Hand Hygiene***

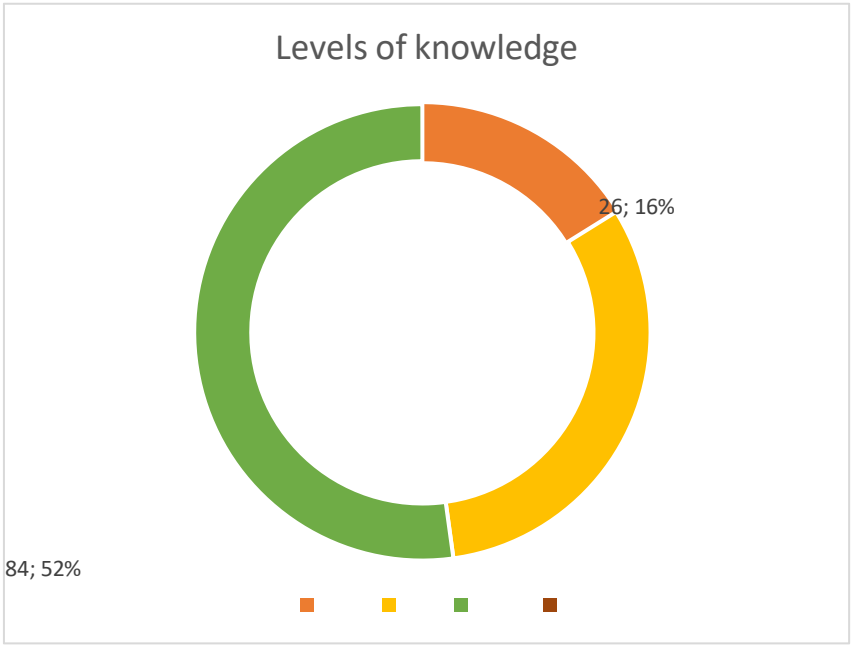


Figure 4.1 shows the nurse-midwives' knowledge of the WHO 5 moments of hand hygiene. It reported that 26(16.1%) of nurse-midwives have poor level of knowledge, correctly answering only 0-39.9% of questions that assessed knowledge. 51(31.7%) of nurse-midwives have fair level of knowledge, correctly answering 40-69.9% of the questions that assessed knowledge. 84(52.2%) of nurse-midwives have good level of knowledge, correctly answering at least 70% of the questions that assessed knowledge.

Table 4.3: ***UBTH Nurse-midwives' Practice of the WHO 5 Moments of Hand Hygiene*** **n=161**

	Never	Some-times	Often	Always	Mean	St.D
Do you perform hand hygiene before clean/aseptic procedures?	1(0.6)	5(3.1)	20(12.4)	135(83.8)	3.79	0.51
Do you perform hand hygiene between patients?	21(13.0)	4(2.5)	27(16.8)	109(67.7)	3.39	1.03
Do you perform hand hygiene before donning gloves during patient care?	40(24.8)	21(13.0)	42(26.1)	58(36.0)	2.73	1.18
Do you perform hand hygiene after doffing gloves during patient care?	28(17.4)	36(22.4)	40(24.8)	57(35.4)	2.78	1.10
Do you perform hand hygiene before touching a patient?	26(16.1)	40(24.8)	42(26.1)	53(32.9)	2.75	1.07
Do you perform hand hygiene after touching a patient's surrounding?	3(1.8)	32(19.9)	65(40.4)	61(37.9)	3.14	0.79
Do you perform hand hygiene after fluid exposure/risk?	0(0.0)	1(0.6)	11(6.8)	148(91.9)	3.89	0.28
Do you perform hand hygiene after touching a patient	3(1.8)	37(22.9)	49(30.4)	72(44.7)	3.18	0.84

Table 4.3 shows nurse-midwives' practice of the WHO 5 MOHH. Do you perform hand hygiene before clean/aseptic procedures had a mean and St.D of 3.79±0.51, do you perform hand hygiene between patients had a mean of 3.39±1.03, do you perform hand hygiene had a mean and St.D of 2.73±1.18, do you perform hand hygiene after doffing gloves during patient care had a mean and St.D of 2.78±1.10, do you perform hand hygiene before touching a patient had a mean and St.D of 2.75±1.07, do you perform hand hygiene after touching a patient's surrounding had a

mean and St.D of 3.14±0.79, do you perform hand hygiene after fluid exposure/risk had a mean and St.D of 3.89±0.28, do you perform hand hygiene after touching a patient had a mean and St.D of 3.18±0.84.

Figure 4.2: ***Level of Practice of the WHO 5 Moments of Hand Hygiene***

Figure 4.2 shows the level of Practice of WHO 5 moments of hand hygiene among nurse-midwives in UBTH. It shows that 144(89.4%) have high level of practice with either 'often' or 'always' as responses to questions on practice, while 17(10.6%) have low level of practice with either 'never' or 'sometimes' as responses to questions on practice.

Table 4.4: ***Factors affecting UBTH Nurse-midwives' Practice of the WHO 5 Moments of Hand Hygiene*** **(n=161)**

	SD. P	D.P	NE.P	E. P	SE. P	M	St.D
Provision of hand washing materials at point of care	19(11.8)	18(11.2)	0(0.0)	41(25.5)	83(51.5)	3.93	1.00
Fear of contracting a nosocomial infection	12(7.5)	38(23.6)	28(17.4)	33(20.5)	50(31.0)	3.44	1.17
Perception of the severity of nosocomial infections	31(19.2)	26(16.1)	47(29.2)	28(17.4)	29(18.0)	2.98	1.35
Confidence in glove protection	26(16.1)	20(12.4)	65(40.4)	37(22.9)	13(8.1)	2.94	1.14
Practice of the WHO 5 MOHH among superiors	21(13.0)	27(16.8)	32(19.9)	31(19.2)	50(31.0)	3.38	1.40
Provision of picture reminders around the work area	39(24.2)	28(17.4)	67(41.6)	17(10.5)	10(6.2)	2.57	1.14
Heavy workload in the clinical area	9(5.6)	11(6.8)	32(19.9)	57(35.4)	52(32.2)	3.81	1.12
The need to avoid official query (for defaulters)	32(19.9)	32(19.9)	40(24.8)	38(23.6)	19(11.8)	2.87	1.29
Desire to achieve best outcomes for patients	14(8.7)	39(24.2)	28(17.4)	42(26.1)	38(23.6)	3.31	1.30
Prompt feedback on hand hygiene from superiors	50(31.0)	28(17.4)	41(25.5)	30(18.6)	12(7.5)	2.54	1.29
Peer to peer reminders on hand hygiene (5 MOHH)	16(9.9)	38(23.6)	70(43.5)	29(18.0)	4(2.5)	2.72	0.93

Key: SD.P: Strongly discourages practice D.P: Discourages practice

NE.P: No effect on practice E.P: Encourages practice

SE.P: Strongly encourages practice M: Mean

St.D: Standard deviation

Table 4.4 shows factors affecting the practice of WHO 5 moments of hand hygiene. Provision of hand washing materials at point of care had a mean of 3.93±1.00, Fear of contracting a nosocomial infection had a mean of 3.44±1.17, Practice of the WHO 5 MOHH among superiors had a mean of 3.38±1.4, Heavy workload in the clinical area had a mean of 3.81±1.12 and Desire to achieve best outcomes for patients had a mean of 3.31±1.30. These five factors were statistically significant at 3.0.

4.2 Hypothesis Testing

Hypothesis: There is no significant relationship between the knowledge and the practice of WHO 5 moments of hand hygiene among nurses in UBTH

Table 4.5:

Relationship between the Knowledge and the Practice of the WHO 5 Moments of Hand Hygiene among Nurse-Midwives in UBTH

	Level of practice			
	Poor	**Good**	**2**	**p**
Level of Knowledge				
Poor	0(0.0)	26(100.0)	3.924	0.101
Fair	11(10.6)	51(88.9)		
Good	0(0.0)	84(100.0)		

Table 4.5 shows the association between the knowledge and the practice of WHO 5 moments of hand hygiene among nurses in UBTH. It shows that there is no significant association ($p<0.05$) between level of knowledge and level of practice. We therefore accept the null hypothesis.

4.3 Answers to research questions

1. Do nurses-midwives in UBTH have knowledge of the WHO 5 moments of hand hygiene?

From the results of this study, it is shown that over half of nurse-midwives in UBTH have

good knowledge, barely a third have fair knowledge and less than a fifth have poor knowledge of the WHO 5 moments of hand hygiene

2. Do nurse-midwives in UBTH practice the WHO 5 moments of hand hygiene in their daily activities in the clinical area?

Findings from this study showed that most nurse-midwives in UBTH have a good level of practice of the WHO 5 moments of hand hygiene with only 11% having poor level of practice.

3. How do intervening factors affect the practice of the WHO 5 moments of hand hygiene in the clinical area?

From the analysis of results, it is shown that availability of materials, fear of contracting infection, heavy workload, modelling of hand hygiene by superiors and the desire for best patient outcomes were statistically significant factors that affected hand hygiene practice among nurse-midwives in UBTH.

CHAPTER FIVE

DISCUSSION

5.1 Discussion of findings

5.1.1 Sociodemographic characteristics of respondents

Out of 161 respondents, 43(26.7%) of the nurses were in the age range of 31 to 35years, 139(86.3%) were females and 22(13.7%) were males. A higher percentage (90.67%) of respondents were Christians and 69(42.9%) were from the Edo ethnic group. These findings are likely because the study was carried out in Benin City, Edo state where the predominant ethic group and religion is Edo and Christian respectively. More than half (51.6%) of the respondents were both registered nurse and registered midwife at the least. This finding was key to this study as it centred on nurse-midwives. Again, double qualifications give an employment advantage. Just a little above a quarter (26.1%) of the respondents were at the rank of Nursing Officer I (NOI) which is the next rank after the entry level of Nursing officer II. This rank had more respondents, probably because most respondents were double qualified.

5.1.2 Nurse-midwives' knowledge of the WHO 5 moments of hand hygiene

From the findings of this study, it is shown that a largest proportion (52.2%) of nurse-midwives had a good level of knowledge of the WHO five moments of hand hygiene and that more than a third of them (31.7%) had a fair level knowledge of it and those who had a poor level of knowledge of it accounted for the smallest fraction (16.1%).

This is similar to the report from Saudi Arabia by Aledeilah et al. (2021), which showed that most (90%) participants had a high level of knowledge of the WHO five moments of hand hygiene and that there was no difference in the number of participants with moderate knowledge and with poor knowledge.

Taking good knowledge versus poor knowledge into account, the findings in this study is in

tandem with the study by Garba and Uche (2021) set in Northwest Nigeria, which found that there were more (72.4%) nurses with good knowledge of hand hygiene than there were with poor knowledge of hand hygiene (27.6%).

It is however at slight variance with the study carried out by Shehu et al. (2021) in North-Central Nigeria, where the largest proportion (52%) of respondents had a moderate knowledge of hand hygiene as assessed by the WHO standardized hand hygiene knowledge questionnaire.

This study also differs from the study conducted in India by Soesanto (2021) where most (86.36%) nurses had their hand hygiene knowledge level in the 'bad' category which was midway between 'good' and 'very bad' and can be interpreted as fair or moderate when graded on three categories or levels.

The findings on nurse-midwives' knowledge of the WHO 5 moments of hand hygiene from this present study are probably because the data collection tool did not focus merely on the ability to recall the 5 moments as they would occur during patient care, but also on the knowledge of the concept of WHO 5 moments of hand hygiene which reveal the level of understanding they have. From this study, 62.7% reported you need to clean your hands with water every time whereas 89% of respondents in the study by Aledeilah et al. (2021) considered the use of alcohol rub for at least 20 seconds as equally effective in eliminating germs.

In this study, 19.9% of nurse-midwives could not correctly identify moment 1 as 'before touching a patient' whereas in the 2018 study by Majeed et al., 68.7% of respondents correctly identified moment 1 of the WHO 5 moments of hand hygiene. In the same 2021 study set in Iraq, 78.7% of respondents also could correctly identify moment 3 as after a risk of body fluid exposure unlike in this present study where only 48.4% could correctly identify moment 3.

However, only 39.8% of nurse-midwives in this present study knew that wearing gloves cannot substitute for hand hygiene unlike 68% of respondents in the cross-sectional study by Hammerschmidt and Manser (2021) in Germany. The use of gloves in patient care speaks to clean or aseptic procedures. A good knowledge of what obtains here is a reflection of a good knowledge of the WHO 5 moments of hand hygiene with emphasis on moment 2 'before clean/aseptic procedure'.

5.1.3 Nurse-midwives' Practice of the WHO 5 moments of hand hygiene.

At a glance, the results of this study showed that majority (89.4%) of nurse-midwives in the selected wards have good level of practice of WHO 5 moments of hand hygiene. This good level of practice is probably due to the fact that the WHO 5 moments of hand hygiene correlate with basic practice of asepsis that nurses are exposed to and required to carry out in the course of their practical education before qualification.

In depth, the findings here revealed that on the average, there are more (54.0%) nurse-midwives in the 'always' category of performance of hand hygiene according to the WHO prescribed 5 moments of hand hygiene. This is very similar to the study by Garba and Uche (2021) where it was reported that more than half (55.2%) of respondents in their study had good adherence to proper hand washing practices. Also similar is the report of the study conducted in Norway by Loyland et al. (2021) which showed that hand hygiene was performed 57.2% of the times it as indicated. It however differs from the study conducted in Ethiopia by Kolola and Gezahegn (2021) where it was reported that with reference to WHO hand hygiene observation method for measuring compliance, the compliance rate for nurses was a mere 21.2% of the observed opportunities. HCWs in the neonatal intensive care units had the highest compliance at 27.3%, and night shifts recorded the least compliance of 22.6% when compared with morning and afternoon shifts, each at 23.3%.

Exploring the practice of the WHO 5 moments of hand hygiene in detail, findings from this

study showed that moment 3 has the highest number ‘always’ responses; 91.9% of nurses claimed that they always perform hand hygiene after fluid risk exposure. This finding is in line with various other studies. The study by Jemal (2021) in Ethiopia, drawing responses from HCWs including nurses and midwives, also recorded the most (78%) responses for hand hygiene performance after contact with body secretions. The same picture is painted in the study by Kolola and Gezahegn (2021) where hand hygiene in moment 3 was observed in 75.8% of the times. This is however in contrast with the study by Tschudin-Sutter et al. cited by Buković et al. (2021) where the total compliance rate for hand hygiene was observed in moment 4.

Closely followed by moment 3, moment 1 had the next highest ‘always’ responses for performance of hand hygiene at 135 responses accounting for 83.8% of respondents.

In this current study, it is shown that hand hygiene before donning gloves had the third poorest compliance rate among nurse-midwives with only 36.0% claiming to ‘always’ and an bothersome 24.8% admitting to ‘never’. The report by Alhassan (2020) in Ghana, has similar findings with hand hygiene before gloving observed only 8.8% of the times.

In this study, hand hygiene practice in moment 1 had the poorest performance rate with only 32.9% claiming to always perform hand hygiene before touching a patient. In the same vein, in the study by Kolola and Gezahegn (2021), hand hygiene compliance in moment 1 among respondents was equally low; at a meagre 2.4%. Likewise, only 9.3% of HCWs washed their hand before patient contact in the study by Balafama et al. in Port-Harcourt, Nigeria, cited in Jinjiri and Getso (2021).

However, in this present study, almost every respondent claimed to perform hand hygiene after touching a patient (moment 4); 44.7% for ‘always’, 30.4% for ‘often’, 22.9% for ‘sometimes’ and only 1.8% respond6ing to ‘never’. This spread bears a resemblance with the 54% of respondents that were reported to always wash their hands between direct contact

with a patient in the study done in Southeast Nigeria by Okanu et al. cited in Jinjiri and Getso (2021).

Results from this study reveal that only 3 nurse-midwives (1.8%) never perform hand hygiene after touching a patient's surrounding (moment 5) but this contrasts with the study done by Zohoun et al. (2020) in Benin Republic which showed 72.3% positive response among participants to hand hygiene performance after contact with a patient environment.

5.1.4 Factors affecting the Practice of the WHO 5 moments of hand hygiene.

Findings from this study showed that about half of responding nurses-midwives (51.5%) confirmed that the provision of hand washing materials at the point of care strongly encourages the practice of hand hygiene suggesting that they experienced availability of hand hygiene materials at the point of care just like Engdaw et al. (2021) reported that adequate provision of materials for hand hygiene in easily accessible forms and locations were significant for hand hygiene compliance. Again, this corresponds with findings from the study by Maniriho et al. (2021) where nurses submitted that provision of alcohol-based hand rub, availability of safe continuous water supply, soap and towels encouraged hand hygiene practice 78.6%, 77.4% and 61.9% of the times respectively.

Results from this study showed that 'heavy workload in the clinical area' was mostly (35.4%) an encouraging factor for hand hygiene performance. This suggests that nurses-midwives considered that with increased workload comes more opportunities for hand hygiene. This is however a divergent report from the study by Engdaw et al. (2021) in Northwest Ethiopia where 66.3% of healthcare providers gave that there was insufficient time for hand hygiene, probably due to the workload.

40.4% of respondents in this study were indifferent about the effect that confidence in glove protection had on the practice of hand hygiene. This is probably because one's hands seem and feel protected when sheathed by a glove, thus the desire to perform hand hygiene or not

was really up to the individual at that time. However, 16.1% of respondents thought that glove protection sufficed for hand hygiene. This bears resemblance the report by Engdaw et al. (2021) where over half (53.1%) of respondents which included midwives, were confident in their glove protection.

In this present study, almost a third of nurse-midwives (31.0%) submitted that the practice of the WHO 5MOHH among their superior was a strongly encouraging factor. This suggests that it was adequate to spur hand hygiene practice at the stipulated times. This compares positively with the report by Maniriho et al. (2021) where 97.7% of responding bedside respondents were prompted to perform hand hygiene on the account of leaders and senior managers who support and openly promoting hand hygiene.

In this study, 41.6% of nurse-midwives submitted that provision of picture reminders around the work area did not make any impact on their practice of the 5 moments of hand hygiene. This may suggest that they had become accustomed to the visual reminders for hand hygiene at the clinical area. This is however at variance with the study conducted in Rwanda by Maniriho et al. (2021) which reported 92.9% of nurses found the provision of visible, clear and straightforward instructions for hand hygiene to be an encouraging factor for the practice of hand hygiene.

5.2 Summary

Summarily, this study was specifically aimed at assessing the knowledge of the WHO 5 moments of hand hygiene among nurse- midwives in UBTH, evaluating the practice of the WHO 5 moments of hand hygiene among nurse-midwives in UBTH and relating intervening factors with the practice of the WHO 5 moments of hand hygiene among nurse-midwives in UBTH.

The report on the study was presented in a five-chapter outlined. Chapter one of this study

offered an introduction to the topic, gave a clear statement of problem, identified the objectives of the study, posed relevant research questions, made a guess of hypothesis delineated the scope of the study, projected the significance of the study and gave operational definition of terms. Recent and relevant literature was reviewed in chapter two on the subject under discussion, from which an empirical review of related studies was presented. A conceptual review on the subject matter and a suitable theoretical framework on which to base findings were also discussed in chapter two. Chapter three dealt with research methodology which applied a non-experimental descriptive research design and total sampling technique was used to capture all members of the population the wards of interest. Of the 173 members in the sample size, a total of 161 respondents were gotten. A well-structured questionnaire was used as instrument of data collection. Chapter four discussed analysis and interpretation of data in tables with percentage and means used to present the data. Pie-charts were used to show a pictorial representation of the analysed data. Findings showed that that there is no significant association between level of knowledge and level of practice of the WHO 5 moments of hand hygiene.

5.3 Implications of findings to Midwifery

- Findings from this study could prompt midwifery scholars on the need to lay emphasis on the WHO 5 moments of hand hygiene when standard precautions are taught. This is as a way of keeping up with the trend and because the WHO 5 moments of hand hygiene serve as a well-defined code for hand hygiene performance for patient care.
- Results from this study could inform midwifery authorities on the need to encourage optimum and improved research consumption amongst nurse-midwives in Nigeria.

This is so that newer approaches in healthcare that have been tested are quicker and better adopted, as there is always room for improvement.

5.4 Limitations of the study

- Authenticity of responses: There is the likelihood of respondents cheating in their responses by conducting quick research on the WHO 5 moments of hand hygiene. Hence, their responses on knowledge at the time of retrieving the questionnaire, may have differed from the time of administration of the data collection tool.
- Nonresponse: Few members of the population intentionally did not complete the questionnaire and failed to return it
- Biased response: There is the chance that a few responses, especially to questions on factors affecting hand hygiene practice, may be skewed to favor the institution's image or even their professional ranking.

5.5 Conclusion

This was a descriptive study delineated to staff nurse-midwives of selected wards in the University of Benin Teaching Hospital and set in Benin City. It assessed the knowledge and practice of the WHO 5 moments of hand hygiene and considered factors that affect practice. The results from the study show that there is good level of knowledge of the WHO 5 moments of hand hygiene among nurse-midwives of selected wards in UBTH and a good level of practice of the hand hygiene according to the WHO 5 moments. Results also showed that availability of materials, fear of contracting infection, heavy workload, modelling of hand hygiene by superiors and the desire for best patient outcomes were statistically significant factors that affected the practice of the WHO 5 moments of hand hygiene among

nurse-midwives. The good level of practice of the WHO 5 moments of hand hygiene shows that most instances for performing hand hygiene are acted on as a means of infection prevention and control even if these instances are not known as formally stipulated moments.

5.6 Recommendations

- The hospital should send nurses out to refresher courses on current hand hygiene practices and modalities to boost the good knowledge of hand hygiene to a better percentage.
- Midwife managers in the hospital can set out special recognition for junior midwives with the best adherence to the prescribed moments of hand hygiene.
- Provision of hand hygiene materials at key locations at the point of care should be maintained.

5.6 Suggestions for further studies

In conducting further studies on this topic, it is suggested that:

- Interviews be used as data collection tool to assess knowledge. This would provide real time responses to the questions.
- Observation be used to assess the level of practice.
- The effect of professional training and years of experience on the knowledge and practice of the WHO 5 moments of hand hygiene should be explored.

REFERENCES

Aledeilah, R. D. I., Abo el-Fetoh, N. M., Albaker, A. F., Aljabbab, A. A., Alkhannani, S. J., Alkhannani, S. J., Almahroos, T. S., & Ali, A. M. B. (2018). Assessment of Knowledge, Attitude and Practice of Hand Hygiene among Health Care Workers in Arar City, Saudi Arabia. *The Egyptian Journal of Hospital Medicine, 70*(3), 491-498.

Alhassan, A. R. (2020). Nurses Hand Hygiene Compliance: An Observational Study in Tamale Teaching Hospital, Ghana. *ARC Journal of Nursing and Healthcare, 6*(2), 28-34. https://doi.org/10.20431/2455-4324.0602005

Alzyood, M., Jackson, D., Aveyard, H & Brooke, J. (2020). COVID-19 reinforces the importance of handwashing. *Journal of Clinical Nursing, 29*(15-16), 2760-2761. https://doi.org/10.1111/jocn.15313

Amed, B. Naeem, I. Malik, S. A. & Naeem, A. (2017). Hand Hygiene Practices among undergraduate medical students in Tertiary Care Unit, Gujrat Pakistan. *American Based Research Journal, 6*(5), 23-49.

BaderAldeen, R. M. & Kheder, S. I. (2020). The Knowledge and Perception of Hand Hygiene Among Health Care Workers in Clinical Settings in Khartoum State – Sudan. *Journal of Medical Informatics and Decision Making, 1*(2), 15-28. https://doi.org/10.14302/issn.2641-5526.jmid-20-3248

Ban, H. & Kim, H. (2020). Applying the Modified Health Belief Model (HBM) to Korean Medical Tourism. *Int J Environ Res Public Health, 17*(10), 3636. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7277940/#__ffn_sectitle

Berman, A., Snyder, S. J. and Frandsen, G. (2016). Kozier & Erb's Fundamentals of Nursing.

Boskey, E. and Snyder, C. (2022, Jan 27). *What is the Health Belief Model?* Verywellmind. https://www.verywellmind.com/health-belief-model-3132721

Buković, E., Kurtović, B., Rotim, C., Svirčević, W., Friganović, A. & Važanić, D. (2021). Compliance with Hand Hygiene Among Healthcare Workers in Preventing Healthcare Associated Infections – A Systematic Review. *Journal of Applied Health Sciences, 7*(1), 57-69. https://doi.org/10.24141/1/7/1/6

Butler, R., Monsalve, M., Thomas, G. W., Herman, T., Segre, A. M., Polgreen, P.M. & Suneja, M. (2018). Estimating Time Physicians and Other Health Care Workers Spend with Patients in an Intensive Care Unit Using a Sensor Network. *The American Journal of Medicine, 131*(8), 972.E9-972.E15. https://doi.org/10.1016/j.amjmed.2018.03.015

Centers for Disease Control and Prevention (CDC). (2016, March 01). *Hand hygiene.* https://www.cdc.gov/oralhealth/infectioncontrol/faqs/hand-hygiene.html

Centers for Disease Control and Prevention (CDC). 2020, September 10). *Handwashing: Clean hands save lives.* https://www.cdc.gov/handwashing/why-handwashing.html

Concepts, Process, and Practice. (10th ed.). Pearson Australia.

Engdaw, G.T., Gebrehiwot, M., and Zewudu Andualem, Z. (2019). Hand hygiene compliance and associated factors among health care providers in Central Gondar zone public primary hospitals, Northwest Ethiopia. *Antimicrobial Resistance and Infection Control, 8*(190). https://doi.org/10.1186/s13756-019-0634-z

Garba, M. B., & Uche, L. B. (2019). Knowledge, attitude, and practice of hand washing among healthcare workers in a tertiary health facility in northwest Nigeria. *Journal of Medicine in the Tropics, 2019*(21), 73-80. DOI: 10.4103/jomt.jomt_16_19

Global Handwashing Partnership. (2017). *History*. https://globalhandwashing.org/about-handwashing/history-of-handwashing/

Global Handwashing Partnership. (2017). *Global handwashing day*. https://globalhandwashing.org/global-handwashing-day/about-ghd/

Gonzalo, A. (2021, March 5). *Florence Nightingale: Environmental Theory*. Nurseslabs. https://nurseslabs.com/florence-nightingales-environmental-theory/

Gould, D.J., Moralejo, D., Drey, N., Chudleigh, J. H, & Taljaard, M. (2017). Interventions to improve hand hygiene compliance in patient care. *Cochrane Database of Systematic Reviews, 2017*(9). DOI: 10.1002/14651858.CD005186.pub4.

Hammerschmidt, J., & Manser, T. (2019). Nurses' knowledge, behaviour and compliance concerning hand hygiene in nursing homes: a cross-sectional mixed-methods study. *BMC Health Services Research, 19*(547). https://doi.org/10.1186/s12913-019-4347-z

Icm. (n.d.-b). *ICM Definitions*. ICM. https://www.internationalmidwives.org/our- work/policy-and-practice/icm-definitions.html#:~:text=The%20midwife%20is%20recognised%20as,the%20newborn%20and%20the%20infant

Interdisciplinary Perspectives on Infectious Diseases, 2016. doi:10.1155/2012/679129

Jemal, S. (2018). Knowledge and Practices of Hand Washing among Health Professionals in Dubti Referral Hospital, Dubti, Afar, Northeast Ethiopia. *Advances in Preventive Medicine Volume 2018*, https://doi.org/10.1155/2018/5290797

Jinjiri, S. & Getso, A. M. (2018). Handwashing Practices Toward the Prevention of Hospital Acquired Infections Among Health Care Providers in The Hospitals of Kano State, Nigeria. *Journal of Research in Health and Sports Sciences, 17*(1), 107-119.

Kadi, A. & Salati, S. A. (2016). Hand Hygiene Practices among Medical Students.

Kirk, J., Kendall, A., Marx, J. F., Pincock, T., Young, E., Hughes, J. M. & Landers, T. (2016). Point of care hand hygiene—where's the rub? A survey of US and Canadian health care workers' knowledge, attitudes, and practices. *American Journal of Infection Control, 2016*(44), 1095-1101. http://dx.doi.org/10.1016/j.ajic.2016.03.005

Kolola, T. & Gezahegn, T. (2017). A twenty-four-hour observational study of hand hygiene compliance among healthcare workers in Debre Berhan referral hospital, Ethiopia. *Antimicrobial Resistance and Infection Control, 6*(109). DOI 10.1186/s13756-017-0268- y

Linberg, M, Skytt, B. & Lindberg, M. (2020). Continued wearing of gloves: a risk behaviour in patient care. *Infection Prevention in Practice, 2020*(2). https://doi.org/10.1016/j.infpip.2020.100091

Løyland, B., Master, A. M. P., Hessevaagbakke, E., Taasen, I. & Master, K. L. (2019). Students' observations of hand hygiene in nursing homes using the five moments of hand hygiene. *Journal of Clinical Nursing, 29*(5-6), 821-830. https://doi.org/10.1111/jocn.15136

Majeed, P. D., Salah, H. A. & Umeed, A. H. (2018). Hand Hygiene Practices Among Health Care Workers in Rizgary Teaching Hospital. *Polytechnic Journal, 8*(3), 190-202. https://doi.org/10.25156/ptj.2018.8.3.279

Maniriho, F., Rajeswaran, L., Collins, A. & Chironda, G. (2019). Assessment of Nurses' Perceptions and Adherence to Five Moments of Hand Hygiene in Selected Units at a University Teaching Hospital in Rwanda. *Rwanda Journal of Medicine and Health Sciences, 2*(2), 160-171. https://dx.doi.org/10.4314/rjmhs.v2i2.12

Martínez-Mesa, J., González-Chica, D.A, Duquia, R.P., Bonamigo, R.R. & Bastos, J.L. (2016). Sampling: how to select participants in my research study?. *Anais Brasileiros de Dermatologia 91*(3). 326–330. doi: 10.1590/abd1806-4841.20165254

Mfuh, A. Y., Lukong, C. S. & Haruna, A. (2019). Assessment of knowledge, attitudes and practice of hand hygiene among Bachelor of Nursing Science students at Ahmadu Bello University Teaching Hospital, Zaria. *Pacific International Journal, 2*(1), 60-69.

Morán, N., Hernandez, V. & Sutton, C. (2020, Nov 12). Improving Frequency of Hand Hygiene Education from Providers to Patients. *Master's Projects and Capstones.* https://repository.usfca.edu/capstone/1124

Nguyen, H. V., Tran, H. T., Khuong, L. Q., Nguyen, T. V., Ho, N. T. N., Dao, A. T. M & Hoang, M. V. (2020). Healthcare Workers' Knowledge and Attitudes Regarding the World Health Organization's "My 5 Moments for Hand Hygiene": Evidence from a Vietnamese Central General Hospital. *Journal of Preventive Medicine & Public Health, 2020*(53), 236-244. https://doi.org/10.3961/jpmph.19.319

Northeast Texas Public Health District. (2020). *The importance of washing your hands.* Net Health https://www.nethealthcovid19.org/handwashing

Oxford learner's dictionary. (2021). *Knowledge.* https://www.oxfordlearnersdictionaries.com/definition/english/knowledge?q=knowledge

Paludan-Müller, A.S, Boesen, K., Klerings, I., Jørgensen, K.J., Munkholm, K., (April 2020). "Hand cleaning with ash for reducing the spread of viral and bacterial infections: a rapid review". *The Cochrane Database of Systematic Reviews*. *4* (7): CD013597. doi:10.1002/14651858.cd013597. PMC 7192094. PMID 32343408.

Passaro, L., Harbarth, S. & Landelle, C. (2016). Prevention of hospital-acquired pneumonia in non-ventilated adult patients: a narrative review. *Antimicrobial Resistance and Infection Control, 5*(43). DOI 10.1186/s13756-016-0150-3

Pfäfflin, F., Tufa, T.B., Getachew, M., Nigussie, T., Schönfeld, A., Häussinger, D., Feldt, T. & Schmidt, N. (2017). Implementation of the WHO multimodal Hand Hygiene Improvement Strategy in a University Hospital in Central Ethiopia. *Antimicrobial Resistance and Infection Control, 6*(3). https://doi.org/10.1186/s13756-016-0165-9

Robles, A. (2020). Handwashing in healthcare settings in low- and middle-income countries: Literature review on handwashing in maternal care. Handwashing in healthcare settings in low- and middle-income countries: Literature review on handwashing in maternal care - Theseus

Rusli, N. T., Mansyur, M., Kekalih, A., Sulistomo, A. & Werdhani, R. A. (2020). Assessment of compliance to standard precautions among nurses using the Health Belief Model. *Universa Medicina, 39*(3), 199-206. http://dx.doi.org/10.18051/UnivMed.2020.v39.199-206

Shaw, K. (2016). Prevention by breaking the chain of infection. *Nursing Times, 112*(39/40), 12-14. https://www.nursingtimes.net/clinical-archive/infection-control/prevention-by-breaking-the-chain-of-infection-10-10-2016/

Shehu, N. Y., Onyedibe, K. I., Igbanugo, J. S., Okolo, M. O., Gomerep, S. S., Isa, S. E., & Egah, D. Z. (2019). Hand Hygiene Knowledge, Training and Practice: A Cross-sectional Study in a Tertiary Health Institution, North-central Nigeria. *Nigerian Journal of Clinical Practice, 22*, 1008-13. DOI: 10.4103/njcp.njcp_204_18

Shobowale, E. O., Adegunle, B. & Onyedibe, K. (2016). An assessment of hand hygiene practices of healthcare workers of a semi-urban teaching hospital using the five moments of hand hygiene. *Nigerian Medical Journal : Journal of the Nigeria Medical Association, 57*(3), 150-154. DOI: 10.4103/0300-1652.184058

Soesanto, D. (2018). The influence of Nurse's Knowledge Level on Behaviour Changes, Attitude and 5 Moments of Hand Hygiene Compliance. *Indian Journal of Public*

Health Research and Development, 9(11), 127-131.

Ugwu, M. C., Muoka, O., Okezie, U., Chimezie, C., John, D., Ilo-Nnabuife, E., Stanley, C., & Ogwaluonye, U. (2019). Perceptions, Attitude and Knowledge of Five Moments of Hand Hygiene Practices among Healthcare Workers in Awka Anambra Nigeria. *Journal of Infectious Diseases and Diagnosis, 4*(2). Perceptions, Attitude and Knowledge of Five Moments of Hand Hygiene Practices among Healthcare Workers in Awka Anambra Nigeria | Abstract (longdom.org)

World Health Organization. (2021). *Nursing and midwifery.* https://www.who.int/health-topics/nursing#tab=tab_1

World Health Organization. (2021). *Save lives: Clean your hands!* https://www.who.int/campaigns/world-hand-hygiene-day

Zohoun, L., Degbey C., Lajoumo, C. & D'Almeida, M. (2020). Hand Hygiene in Pediatric Emergency Care Unit in a Teaching Hospital in Benin. *Open Journal of Pediatrics, 2020*(10), 678-687. https://doi.org/10.4236/ojped.2020.104070

APPENDIX 1

QUESTIONNAIRE

FACULTY OF NURSING SCIENCES COLLEGE OF MEDICAL SCIENCES UNIVERSITY OF BENIN. BENIN CITY.

KNOWLEDGE AND PRACTICE OF W.H.O 5 MOMENTS OF HAND HYGIENE AMONG NURSE-MIDWIVES WORKING IN A NAMED TERTIARY HOSPITAL IN BENIN CITY.

Dear Respondent,

I am a student of the above-named institution, carrying out a study on the knowledge and practice of the WHO 5 moments of hand hygiene (5MOHH). The study is aimed at assessing the knowledge and practice of the 5 moments of hand hygiene among nurses-midwives in the University of Benin Teaching Hospital. I pledge that personal information that is directly traceable to you will not be required for this hence a high level of anonymity and confidentiality will be maintained. I humbly request your wilful and kind participation in this study, by filling out the questionnaire.

INSTRUCTIONS: Please tick (√) where appropriate in the spaces provided.

SECTION A (SOCIODEMOGRAPHIC DATA)

1. Age (years): 21-25 [ ] 26-30 [ ] 31-35 [ ] 36-40 [ ] 41-45 [ ] 46 and above [ ]
2. Sex: Male [ ] Female [ ]
3. Religion: Christianity [ ] Islam [ ] Traditional [ ] Others (please specify)
4. Tribe: Edo [ ] Esan [ ] Yoruba [ ] Igbo [ ] Hausa [ ] Others (please specify)
5. Highest level of education: Registered Nurse (only) [ ] Registered Nurse and

Registered Midwife [ ] Bachelor of science [ ] Master of Science [ ] Ph.D [ ]

6. Professional ranking: Nursing officer **II** [ ] Nursing officer **I** [ ] Senior Nursing Officer [ ] Principal Nursing Officer [ ] Assistant Chief Nursing Officer [ ] Chief Nursing Officer [ ] Assistant Director of Nursing Service

SECTION B (Nurse-midwives' knowledge of the WHO 5 moments of hand hygiene). Please tick (√) where appropriate in the boxes provided.

	QUESTION	**TRUE**	**FALSE**
8	Hand washing is an infection control measure		
9	The WHO 5 moments hand hygiene occur at the same time		
10	All the moments require hand hygiene		
11	Moment 1 is 'before clean/aseptic procedure'		
12	Moment 2 is 'before touching a patient'		
13	Moment 3 is 'before body fluid exposure/risk'		
14	For moment 5, it is necessary to perform hand hygiene if the patient's surroundings look clean		
15	You can skip hand hygiene at moment 1 for a patient if you most recently performed it at moment 5 for a previous patient		
16	It is not necessary to perform hand hygiene if you will don a glove		
17	You need to clean your hands with water EVERY TIME		

SECTION C (Nurse-midwive's practice of the WHO 5MOHH). Please tick (√) for the frequency of practice of 5MOHH where appropriate in the boxes provided.

18. Do you perform hand hygiene before clean/aseptic procedures? Never [ ]

Sometimes [ ] Often [ ] Always [ ]

19. Do you perform hand hygiene between patients? Never [ ] Sometimes [ ] Often [ ] Always [ ]
20. Do you perform hand hygiene before donning gloves during patient care? Never [ ] Sometimes [
21. Do you perform hand hygiene after doffing gloves during patient care? Never [ ] Sometimes [ ] Often [ ] Always [ ]
22. Do you perform hand hygiene before touching a patient? Never [ ] Sometimes [ ] Often [ ] Al
23. Do you perform hand hygiene after touching a patient's surroundings (e.g bed or side table? Never [ ] Sometimes [ ] Often [ ] Always [ ]
24. Do you perform hand hygiene after fluid exposure/risk? Never [ ] Sometimes [ ] Often [ ] Al
25. Do you perform hand hygiene after touching a patient? Never [ ] Sometimes [ ] Often [ ] Always [ ]

SECTION D (Factors affecting the practice of the WHO 5 moments of hand hygiene (5 MOHH). Please tick (√) appropriately, how these factors affect your practice of the WHO 5 MOHH

Key: **SE**: Strongly encourages practice,

E: Encourages practice, **NE:** No effect on practice **D:** Discourages practice,

S: Strongly discourages practice.

	VARIABLE	**SE**	**E**	**NE**	**D**	**SD**
26	Provision of hand washing materials at point of care					
27	Fear of contracting a nosocomial infection					
28	Perception of the severity of nosocomial infections					

29	Confidence in glove protection					
30	Practice of the WHO 5 MOHH among superiors					
31	Provision of picture reminders around the work area					
32	Heavy workload in the clinical area					
33	The need to avoid official query (for defaulters)					
34	Desire to achieve best outcomes for patients					
35	Prompt feedback on hand hygiene from superiors					
36	Peer to peer reminders on hand hygiene (5 MOHH)					

HEALTH RESEARCH
ETHICS COMMITTEE (HREC)

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PROTOCOL NUMBER: ADM/E 22/A/VOL.VII/2025/23

PROPOSAL TITLE: **"KNOWLEDGE AND PRACTICE OF W. H. O 5 MOMENTS OF HAND HYGIENE AMONG NURSES-MIDWIVES WORKING IN A TERTIARY HOSPITAL IN BENIN CITY"**

PRINCIPAL INVESTIGATOR(S): **ONI FAITH EKATA**

DEPARTMENT/INSTITUTION: **DEPARTMENT OF NURSING SCIENCE, SCHOOL OF BASIC MEDICAL SCIENCES UNIVERSITY OF BENIN, BENIN CITY, EDO STATE**

DATE CONSIDERED: APRIL 25TH, 2025

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 25/4/2025 TO 24/4/2026. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI **SIGNATURE & DATE**..April 25/4/2025

SUPERVISOR (S): MRS. C. C. EDO-OSAGIE

DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual re-port to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification

Signature & Date.....2/5/2025