HAND HYGIENE COMPLIANCE AMONG PAEDIATRIC NURSES IN EBONYI, NIGERIA: A MIXED METHODS STUDY

OKO CONSTANCE CHIOMA

UNIVERSITI SAINS MALAYSIA

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by

OKO CONSTANCE CHIOMA

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LIST OF ABBREVIATIONS

TPB	Theory of Planned Behaviour
AEFUTHA	Alex-Ekwueme Federal University Teaching Hospital, Abakaliki, Ebonyi State Nigeria.
SPSS	Statistical Package for Social Sciences
USM	Universiti Sains Malaysia
HCWs	Healthcare Workers
HAIs	Hospital Acquired Infections
WHO	World Health Organization
HH	Hand Hygiene
HHC	Hand Hygiene Compliance
FMHH	Five Moments of Hand Hygiene
MMS	Mixed Method Study
ABHR	Alcohol Based Hand Rub
IPC	Infection Prevention and Control
MCPDP	Mandatory Continuous Professional Development Program
	Neonatal Intensive Care Unit
NICU	Paediatric Outpatient Unit
CHOP	Paediatric Surgical Unit
PSU	Paediatric Medical Unit
PMU	New-Born Unit
NBU	Children Emergency unit
CHER	

KEPATUHAN KEBERSIHAN TANGAN DALAM KALANGAN JURURAWAT PEDIATRIK DI EBONYI, NIGERIA: KAJIAN KAEDAH CAMPURAN

ABSTRAK

Pesakit pediatrik lebih terdedah kepada jangkitan yang diperolehi di hospital (HAI). Pematuhan kebersihan tangan (HHC) dianggap sebagai cara yang menjimatkan kos untuk mencegah HAI. Pematuhan terhadap amalan ini tidak selalu dinilai di Nigeria dan dengan itu menimbulkan risiko penting kepada kualiti penjagaan dan keselamatan pesakit, terutamanya semasa COVID-19. Tujuan kajian ini adalah untuk mengenalpasti tahap HHC dan meneroka faktor yang mempengaruhi pematuhan dalam kalangan jururawat dalam persekitaran penjagaan pediatrik di Ebonyi, Nigeria. Reka bentuk penyelidikan kaedah campuran telah dijalankan dalam dua fasa: fasa 1a dan 1b terdiri daripada pengumpulan data menggunakan alat pemerhatian kebersihan tangan (HH) WHO pada HHC yang dinyatakan jururawat dan pemerhatian langsung terhadap amalan HHC mereka. Fasa 2 melibatkan temu bual mendalam meneroka faktor yang mempengaruhi pematuhan menggunakan panduan temu bual separa berstruktur. Pakej Statistik untuk Sains Sosial (v26) digunakan untuk menganalisis data kuantitatif manakala data kualitatif dianalisis secara tematik. Pengumpulan data bermula dari 26 Oktober 2020 hingga 5 Mac 2021. Dalam fasa 1a, 96 peserta terlibat dalam kaji selidik, dan semua jururawat bertugas pada hari pemerhatian telah diperhatikan untuk HHC dengann sejumlah 1417 peluang HH dalam fasa 1b. Fasa 2 melibatkan 17 jururawat dan lima pengurus wad. Analisis Chi kuasa dua menunjukkan bahawa pematuhan persepsi dikaitkan secara signifikan dengan pendidikan HH dan pendidikan HH terakhir

($p<0.001$). Ujian Chi kuasa dua mendedahkan bahawa pematuhan HH yang diperhatikan berbeza secara signifikan dengan unit, jenis syif dan lima momen HH (FMHH) ($p<0.005$). Kadar HHC yang dirasakan adalah tinggi berbanding dengan kadar pematuhan yang diperhatikan. Analisis data kualitatif adalah untuk mengenal pasti halangan organisasi dan kontekstual dan fasilitator kepada HHC. Empat tema utama muncul daripada faktor organisasi: kepimpinan, tanggungjawab pentadbiran, segera, dan pemantauan HH. Tiga tema muncul daripada faktor kontekstual: pengalaman, beban kerja, dan persepsi. Kajian ini menunjukkan bahawa HHC yang diperhatikan dalam kalangan jururawat dalam persekitaran pediatrik adalah rendah. Cabaran dalam persekitran menyumbang kepada pematuhan yang lemah yang dilihat dalam kajian ini. Dalam mereka bentuk program intervensi HH, pendekatan momen demi momen harus digunakan untuk meningkatkan daya ingatan merentasi semua momen. Dapatan hasil kajian ini mendedahkan keperluan strategi khusus seperti latihan dan latihan semula jururawat, penambahbaikan dalam kemudahan HH, dan pemantauan HH berterusan dengan maklum balas mengenai prestasi, terutamanya semasa pandemik COVID-19. Langkah-langkah ini akan menghalang HAI dalam kalangan populasi yang lemah disamping meningkatkan keselamatan pesakit dan kualiti penjagaan.

HAND HYGIENE COMPLIANCE AMONG PAEDIATRIC NURSES IN EBONYI, NIGERIA: A MIXED METHODS STUDY

ABSTRACT

Paediatric patients are more vulnerable to hospital-acquired infections (HAIs). Hand hygiene compliance (HHC) is considered a cost-effective way of preventing HAIs. Compliance with this practice is not often assessed in Nigeria and thus poses a significance risk to the quality of care and patient safety, especially during COVID-19. The purpose of this study was to determine the level of HHC and explore factors that influence compliance among paediatric in paediatric care setting in Ebonyi State, Nigeria. A mixed-method research design was conducted in two phases: phase 1a and 1b comprises data collection using the WHO hand hygiene (HH) observational tool on the nurse's perceived HHC and direct observation of their HHC practice. Phase 2 involved an in-depth interview exploring factors influencing compliance using a semi-structured interview guide. The Statistical Package for Social Sciences (v26) was used to analyze the quantitative data while the qualitative data were analyzed thematically. Data collection commenced from the 26th of October 2020 to the 5th of March 2021. In phase 1a, 96 participants were involved in the survey, and all duty nurses on duty on the observation days were observed for HHC giving a total of 1417 HH opportunities in phase 1b. Phase 2 involved 17 staff nurses and five ward managers. Chi-square analysis showed that perceived compliance was significantly associated with HH education and last HH education ($p<0.001$). Chi-square tests revealed that the observed HH compliance varied significantly with the units, type of shift, and the five moments of HH (FMHH) ($p<0.005$). The perceived HHC rate was high compared to the observed compliance rate. The analysis of qualitative data was to identify organizational and contextual barriers and facilitators to HHC. Four key themes emerged from

organizational factors: leadership, administrative responsibility, prompt, and HH monitoring. Three themes emerged from the contextual factor: experience, workload, and perception. This study showed that observed HHC among nurses in paediatric settings was poor. These challenges in this setup contributed to the poor compliance seen in this study. In designing HH intervention programs, a moment-by-moment approach should be employed to increase recall across all the moments. The findings of this study revealed the need for specific strategies such as training and retraining of nurses, improvement in HH facilities, and continuous HH monitoring with feedback on performance, especially during the COVID-19 pandemic. These measures will prevent HAIs among this vulnerable population as well as improve patient safety and quality of care.

CHAPTER 1

INTRODUCTION

1.1 Introduction

The purpose of this study was to determine hand hygiene compliance (HHC) and to explore factors responsible for compliance/noncompliance among nurses. The chapter commenced with the general background of the study followed by the background of the local context, the statement of the research problem, research questions, and research objectives both the general and specific objectives were outlined. Lastly, the significance of the study and the description of the operational definition used in this study were also described.

1.2 Background of the study

Hand hygiene (HH) has been suggested as the easiest and the most cost-effective strategy for preventing and controlling hospital-acquired infections (HAIs) among hospitalized patients across all healthcare delivery systems (Baccolini *et al.*, 2019; WHO, 2020). This is more important with the current Covid-19 pandemic which evidently could potentially cause in-hospital acquired infection to spread (Arshad Ali, Baloch, Ahmed, Arshad Ali, & Iqbal, 2020). HAIs are infections transmitted during care in a hospital or other healthcare facilities that are not manifested or incubated at the time of admission or after discharge and, are also associated with occupational infection among facility staff (Sartelli, Mckimm, & Bakar, 2018). The burden of HAIs in developing countries is estimated at around 5% to 15% among hospitalized patients in regular wards and as much as 50% or more patients in intensive care units (Sartelli *et al*., 2018).

With the adoption of the World Health Organization (WHO) five-moment of HH (FMHH) model, there has been a significant reduction in recorded HAIs (WHOb, 2017). Despite the importance of HH practice in infection prevention, it is regrettably underutilized (Salama, Jamal, Mousa, Al-AbdulGhani, & Rotimi, 2013; Muhumuza *et al*., 2015; Ogoina *et al*., 2015; Kingston, O'Connell, & Dunne, 2017). Poor HHC by healthcare workers (HCWs) has been reported as the primary cause of infection cross-transmission in any healthcare setting, according to evidence-based guidelines (Olena, Jones, Martello, Biron, & Lavoie-Tremblay 2017).

In developing countries, the burden of HAI is 2 to 18 times higher compared to developed countries (WHOa), 2017). HAIs are more common among hospitalized children owing to their immature immune systems and susceptibility to infections. A prospective study investigating 529 patients had shown an overall HAIs rate of 5.2/100 with the highest in paediatric ICU (25.9/100 admissions) (Hassan *et al.,* 2017). HAIs can be greatly reduced with a good and complete HHC. Every healthcare delivery facility must focus on HHC parallel to the WHO leadership and guidelines in healthcare and patient safety initiatives (Fan, 2017).

Hospitalized children are particularly prone to HAIs (Aelami *et al*., 2015). According to Krieger, Grjibovski, Samodova, & Eriksen, (2015) the prevalence rate of HAIs ranged from 7.1% to as high as 16.7% among hospitalized children. Similarly, Aelami *et al.,* (2015) found a prevalence rate of 5.2% per 100 admissions among paediatric intensive care patients. While a study by Venmugil & Kumar, (2018) among 588 children admitted to paediatric units found that 68 (11.56%) of the children developed one or more HAIs. Additionally, eight of them also developed more than one site of HAIs including one patient who had three different sites of infections,

contributing to a total of 77 sites of HAIs (Venmugil & Kumar, 2018). Similarly, Kuzdan *et al.*, (2014) found that a total of 16.5% of all hospitalized patients developed HAIs.

The risk of HAIs is particularly higher among children who had undergone some surgical and invasive procedures (Malhotra, Sharma, & Hans, 2014; Krieger, Grjibovski, Samodova, & Eriksen, 2015; Aelami Lotfi, & Zingg, 2015). Hassan *et al*., (2017) identified neonatal age, neutropenia, children admitted to ICU, and duration of hospital stay greater than 7 days were the significant risk factors associated with HAI among children. Salmonella, S. aureus, and P. aeruginosa species were identified as the most frequent pathogen isolates in HAIs (Pourakbari *et al*., 2012) while respiratory, gastrointestinal, urinary tract infections and bacteremia were the common sites of infections (Pourakbari *et al*., 2012; Malhotra *et al*., 2014; Hassan *et al.,* 2017; Hassan *et al*., 2017).

Figure 1.1 and figure 1.2 display the rate of HAIs in developed and developing countries respectively. Globally, HAIs are still a leading cause of death in neonates and children especially those under the age of 5 years (Kutit *et al.,* 2019). Pourakbari *et al.*, (2012) found that the fatality rate associated with HAIs was 10% among hospitalized children while in another study (Dramowski, Whitelaw, & Cotton, 2016), two-thirds of death among paediatric patients was associated with HAIs. Balaban *et al.,* (2012) study revealed that 47 deaths were recorded out of the 171 patients with HAIs.

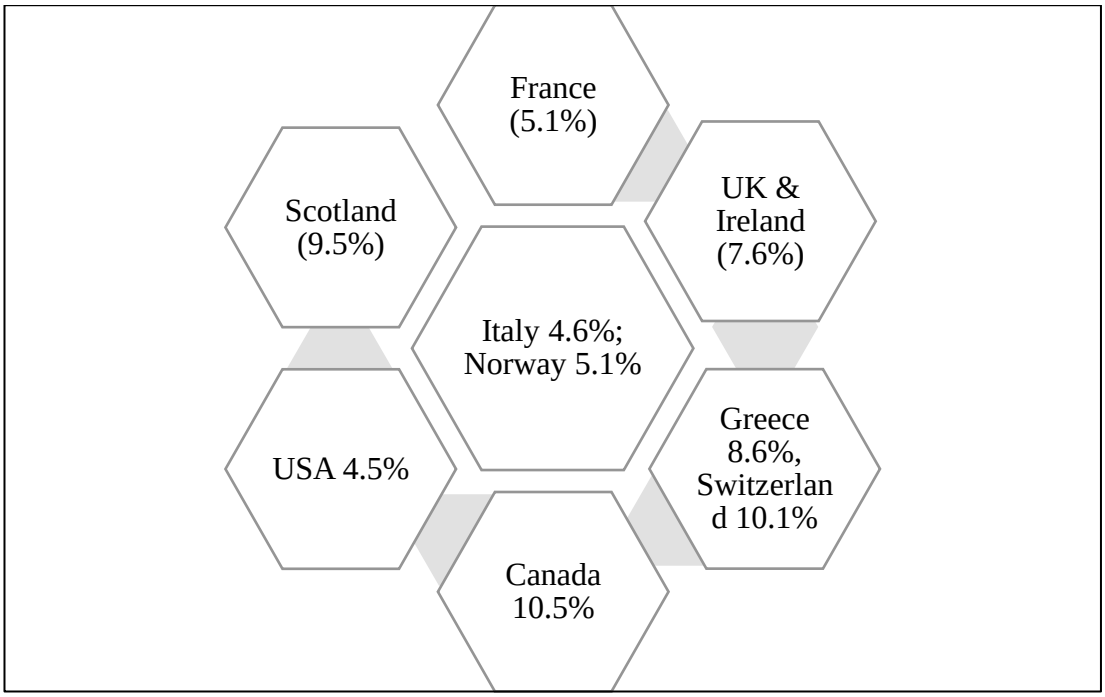

Figure 1.1 Prevalence of HAIs in developed Countries

(source: WHO, (2009)

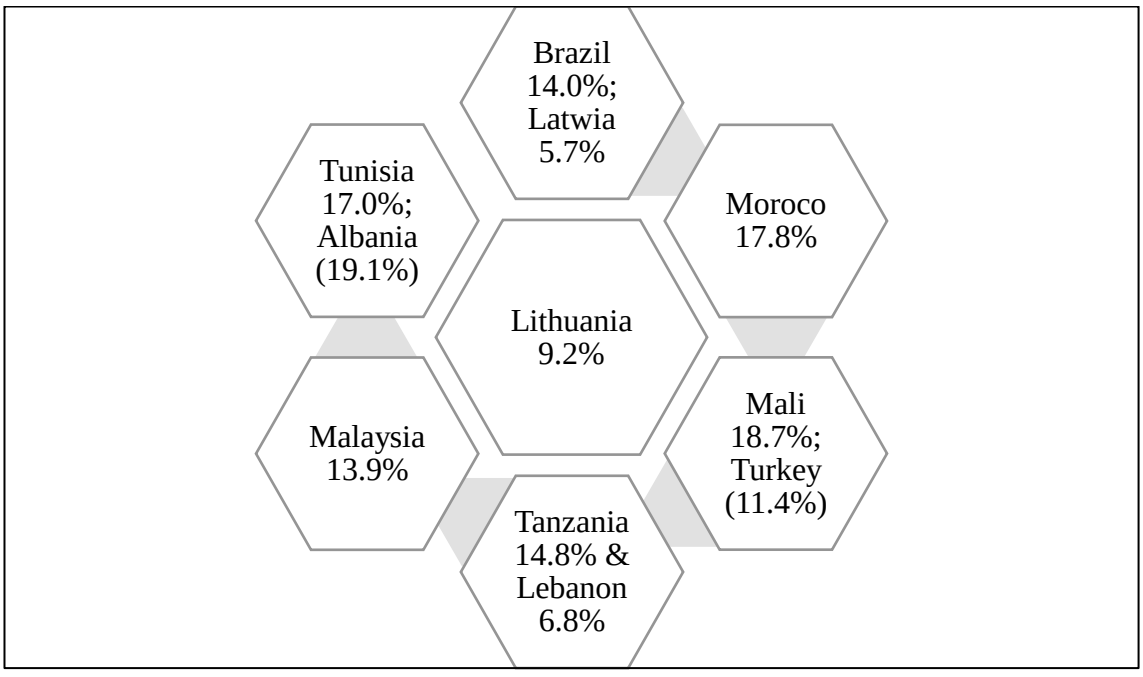

Figure 1.2 Prevalence of HAIs in developing countries

(source WHO, (2009)

Patient safety and HH practices have become an essential part of the healthcare system in reducing morbidity and mortality rates among hospitalized patients, particularly children (Goedken *et al.*, 2019; Baccolini *et al.*, 2019; WHO, 2020). Through modification in organizational HH practices, Florence Nightingale was able to achieve a large reduction in morbidity and mortality in the past (Barton, 2009).

A recent report from WHO (2019) revealed that 1 in every 10 patients receiving care developed HAIs. WHO has developed a program called Clean Care is Safe Care, which was geared at evaluating, understanding, and estimating the burden of HAIs globally. Assessing the rate of HAIs in developing countries at the national level seems difficult because of the paucity of data. However, a few institutional data showed a higher rate of HAIs among paediatric patients.

According to WHO, (2017) HAIs have remained a global concern. As shown in figure 1.3 below. HAIs have resulted in long-term disability, prolonged hospital stay, a massive additional financial burden to the hospital and patients, increased resistance of microorganisms to antimicrobials, and increased morbidity and mortality especially in hospitalized children (Pourakbari *et al*., 2012; Dramowski *et al*., 2016; Rahmqvist, Samuelsson, Bastami, & Rutberg, 2016;WHO, 2017), increased school absenteeism (Randle, Firth, & Vaughan, 2013) and emotional stress for patients and their families (WHO, 2017). HAIs surveillance and prevention have remained a major problem and this must be prioritized for any healthcare system to ensure quality care and patient safety (WHO, 2017).

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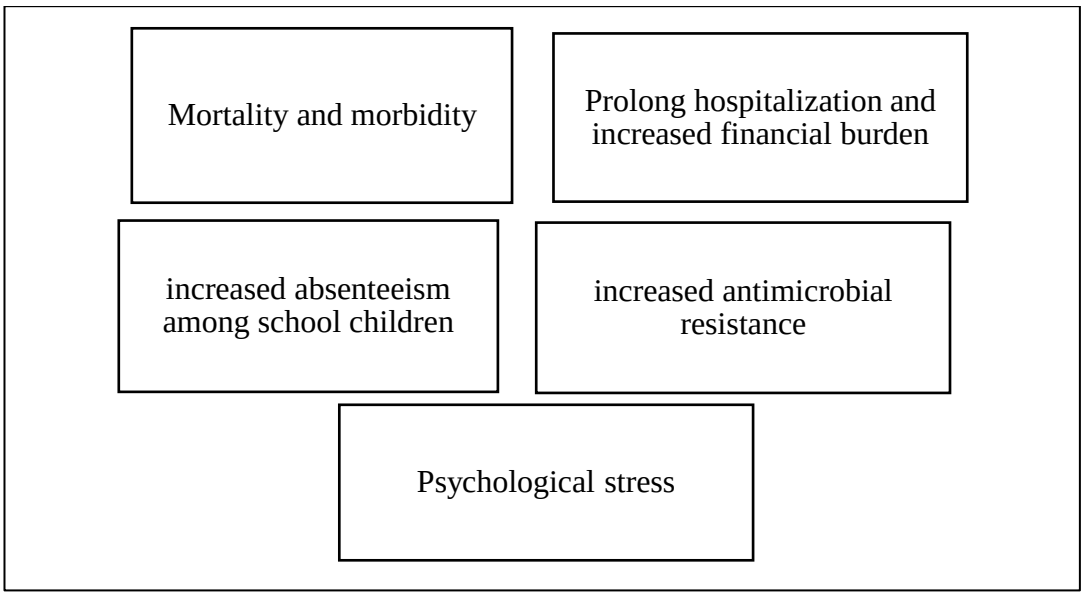

Figure 1.3 Complications of HAIs

(source: WHO, (2017)

Patient safety is the ability to prevent avoidable harm as well as risks when providing healthcare services within an acceptable minimum standard to patients receiving care in health facilities (WHO, 2019). HAIs have been a major global patient safety concern for healthcare professionals and their patients due to the impact of HAIs on the quality of care (WHO, 2019). Teker *et al*., (2015) and Dramowski *et al*., (2016) have suggested the need to improve surveillance and infection control practices. Among the infection and control programs (Teker *et al*., 2015), it was suggested that improvement in HH practices should be continued with feedback.

Furthermore, evidence from research had shown that compliance with HH was linked to a decrease in HAIs. Total compliance to HH is crucial in preventing most HAIs, since the hands of HCWs through direct contact transfer microorganisms

between individuals or between individuals and the environmental reservoir (Ekwere & Okafor, 2013).

Furthermore, compliance with HH recommendations is said to be very low (<50%) despite that it is the most cost-effective and simplest way of preventing infection (Ogoina *et al*., 2015). HCW HHC rate is variable with a baseline rate as low as 5% to 89% and an overall rate of 38.7% (WHO, 2009b; Welsh, 2010; Hakizimana, 2018). Buet *et al.,* (2013) evaluated HH opportunities among the HCWs in paediatric care facilities, out of the 865 HH opportunities only a 43% compliance rate was obtained indicating more opportunities for transferring infectious agents to paediatric patients. Contrastingly, Hakizimana, (2018) study reported a lower compliance rate of 6.25% among HCWs. Similarly, Alshammari, Reynolds, Verhougstraete, & O'Rourke, (2018) also found a very low HHC rate of 27% and 29% among physicians and nurses respectively.

The Federal Ministry of Health (FMoH) is the sole organization of the Nigerian federal government that is responsible by law to produce national health policy documents and ensuring that guidelines are being implemented. They conduct continuous monitoring, analysis, and evaluation of the health status and performance of the functions of all aspects of the national health system. The FMoH further ensures that appropriate mechanisms are set up for the implementation of national health policy by collaborating with the local and state governments.

From the developed policy and guidelines other health organizations can produce frameworks, protocols, and guidelines that are mainly derived from existing national health policies produced by the FMoH (http://www.pipnigeria.org). The primary healthcare system is at the base of the pyramid and is responsible for the

management of minor ailments, serves as the first point of contact, and is responsible to refer appropriate cases to secondary or tertiary care. The level 2 and 3 healthcare systems deal with more serious illnesses that cannot be managed by the primary healthcare system. The tertiary and secondary healthcare systems also refer patients back to the primary healthcare center after completing treatment for future follow-up. They run seamless and two ways referral processes. The three levels of the healthcare system are managed by the three tiers of government in the country. The tertiary healthcare system is managed by the Federal Government, the secondary healthcare system is managed by the State Government and the primary healthcare system is managed by the Local Government Area. The figure below shows the levels of the healthcare system in Nigeria.

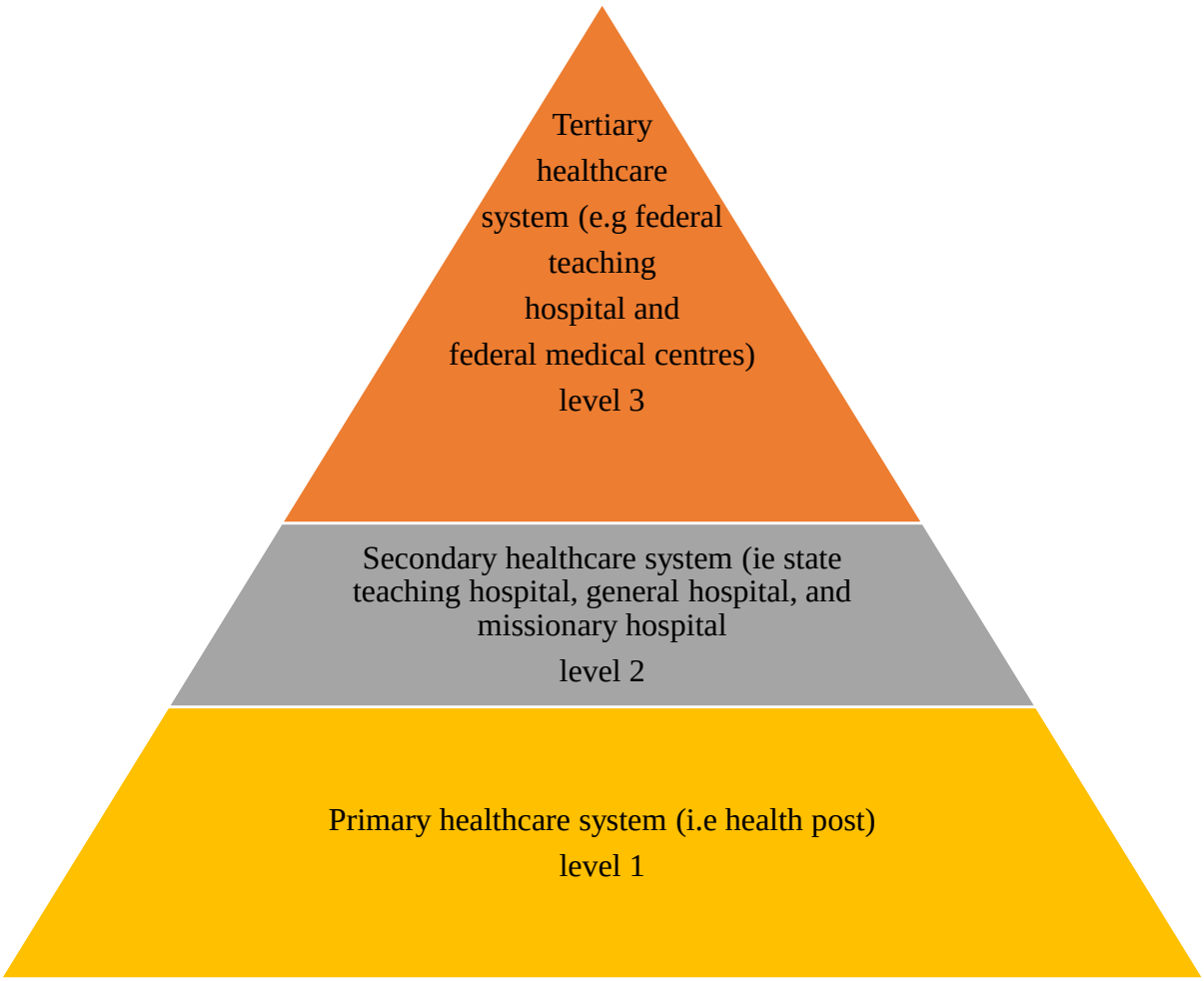

Figure 1.4 Levels of healthcare system in Nigeria.

Alex Ekwueme Federal University Teaching Hospital, Abakaliki (AE-FUTHA) Ebonyi State is a tertiary institution with 720 bedded capacity and possessing over 4,000 staff, under the provision of the Federal Government of Nigeria. Hence, most of the policies at AE-FUTHA were derived from the Federal Ministry of Health (FMoH) Nigeria (http://www.pipnigeria.org). The national protocols, guidelines, and frameworks were developed to suit the local context. Figure 1.2 and figure 1.3 below are the AE-FUTHA HH protocol and a sample HH station with the five moments and technique of HH posters.

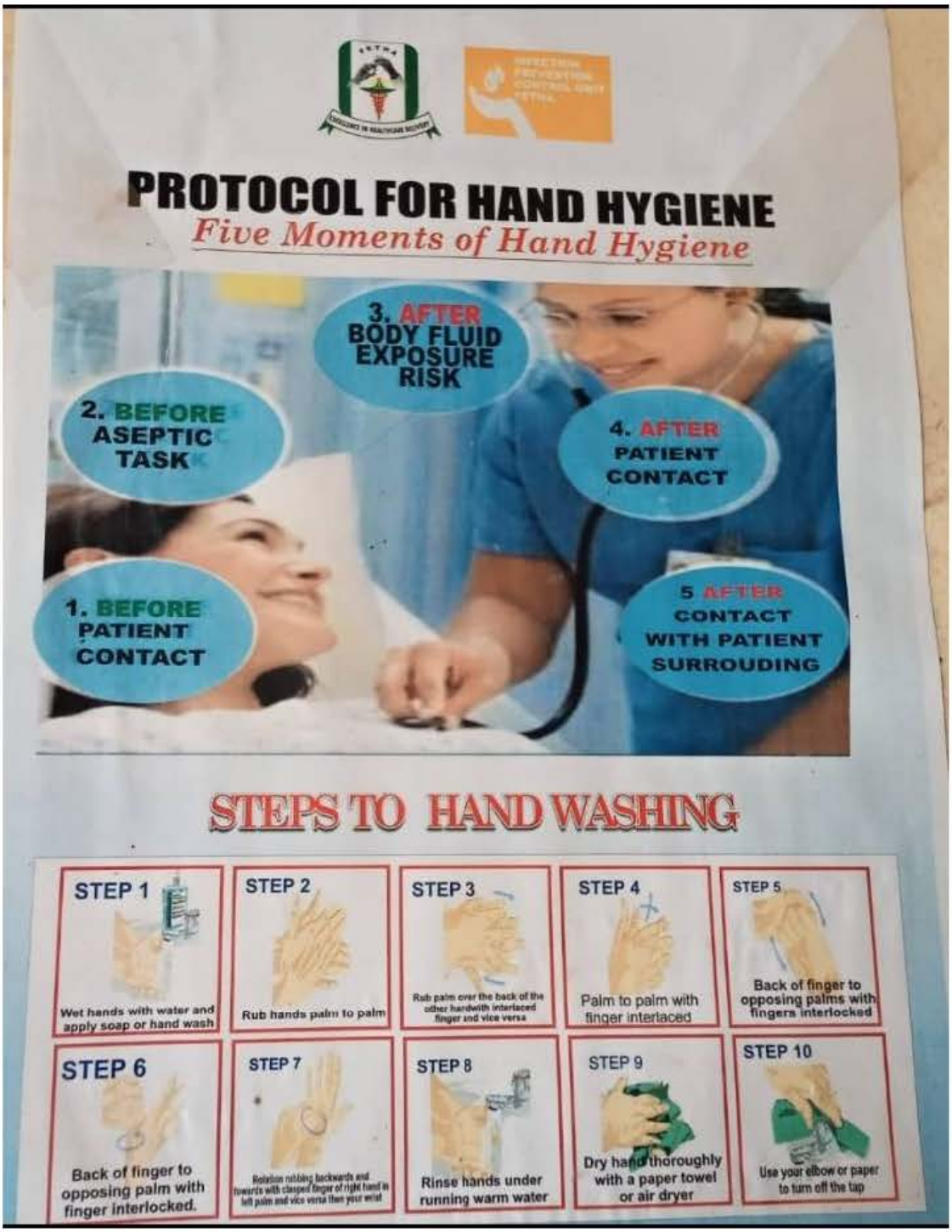

Figure 1.5 AE-FUTHA HH protocol

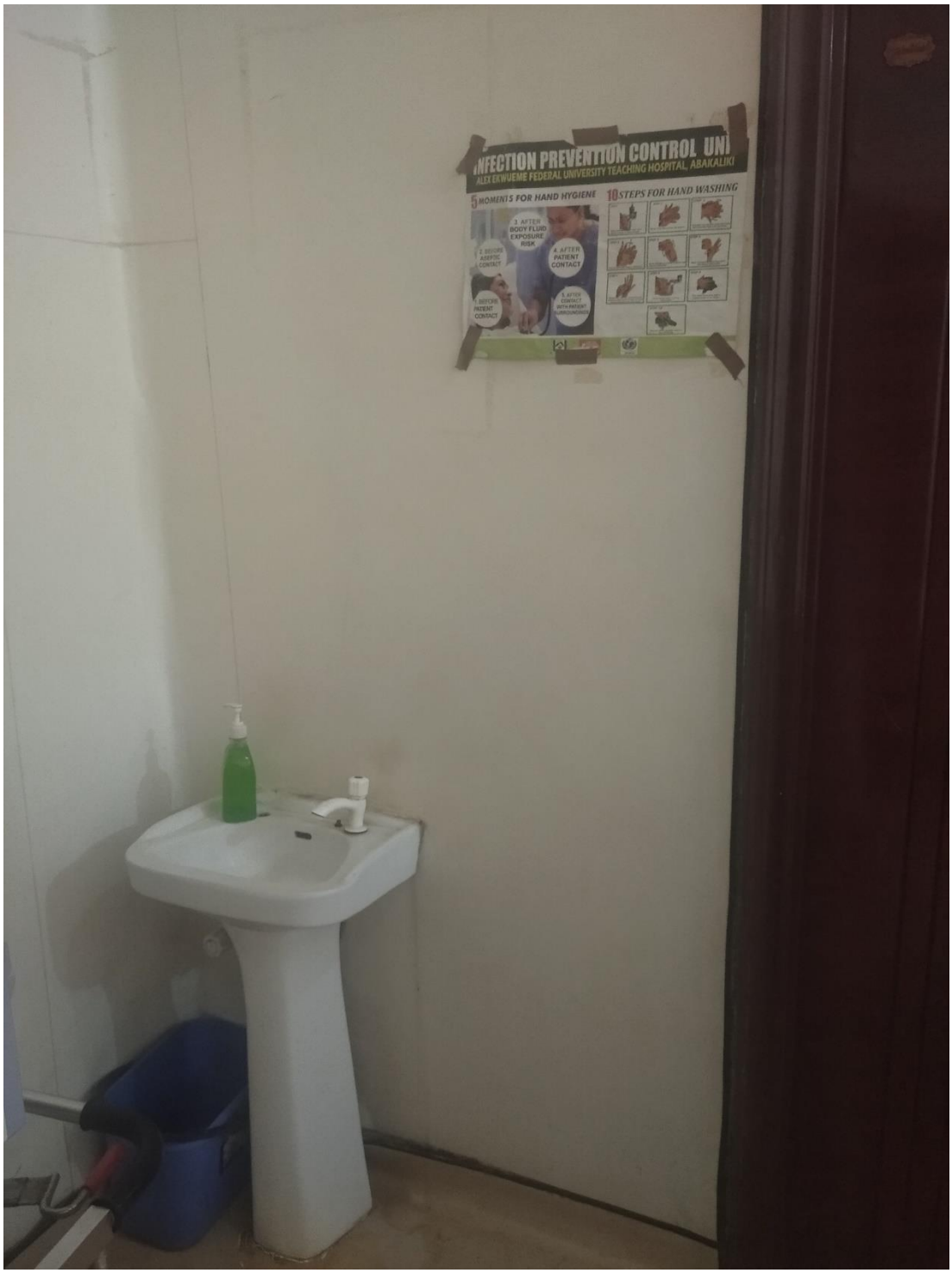

Figure 1.6 An example of AE-FUTHA HH station

1.3 Problem Statement

Globally the HHC rate has remained unacceptably below standard, a review of HH revealed that HCW's HHC rate varies between 40-60% despite a firm recommendation on the compliance provided by HH guidelines (Erasmus *et al*., 2010; Dai *et al*., 2015). Factors affecting HCW's HHC rate are not well understood. Despite years of efforts to ensure HCWs practice hand washing before and after patient care this practice has remained a significant problem worldwide (Schweizer *et al.,* 2014). New products, such as alcohol gel sanitizers, were developed to decrease the time required to participate in the HH procedure and to increase the compliance rate (Boyce, 2017). The emergence of the Ebola epidemic in Africa (Isakov, Jamison, Miles, & Ribner, 2014) the Middle East Respiratory Syndrome coronavirus (MERS-CoV) in Saudi Arabia (Arabi *et al*., 2014), cholera and Lassa fever outbreak in Nigeria (Elimian *et al*., 2019; Odegbemi *et al*., 2019) and recently the COVID-19 which has also become a nosocomial infection (Arshad, Baloch, Ahmed, & Iqbal, 2020) have highlighted the importance of HHC in the prevention of transmission of the dangerous communicable diseases. It is, however, difficult to get HCWs involvement for this level of protection when they are inconsistent with HH practices (Isakov *et al.,* 2014). Most of the HAIs are transmitted by direct transmission of the HCWs' hands to the paediatric patients, leading to HAIs.

More recently Niseteo, Hojsak, & Kolaček, (2020) reported that 5.7% of in-hospital children developed HAIs. Similarly, a study in Nigeria by Ige, Asuzu, & Adesanmi, (2011) reported a prevalence rate of 15.1% among paediatric patients. While Oli, Okoli, Ujam, Adje, & Ezeobi, (2016) also showed that the prevalence of HAIs was high, despite the lack of specification in the patient population.

Figure 1.7 shows that the HAIs rate in the infection prevention and control unit of AE-FUTHA, the prevalence of HAIs was 9.5% in adult medical, 19.8% in the surgical unit, and 18.9% among paediatric as shown in figure 1.7 (Infection Prevention and Control unit AE-FUTHA, 2019). Reduction of HAIs would involve increment of HHC and monitoring of the factors that could potentially influence the compliance rate and addressing it contextually.

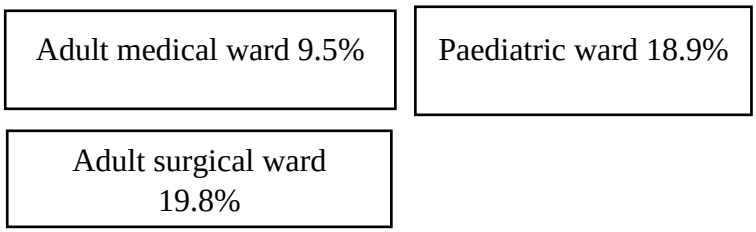

Figure 1.7 Showing the rate of HAIs at the study centre (AE-FUTHA).

HH monitoring is a standard requirement for every health facility concerned with patient safety, regrettably, this is not the practice in Nigeria since most of the studies reviewed were self-reported HH surveys (Ekaete *et al.*, 2013; Ogoina *et al.*, 2015), and only one study used direct observation (Uneke *et al.*, 2014).

Many HAIs episodes are amendable and preventable with total compliance with HH protocol compliance. There is substantial evidence that the burden of HAIs can be greatly minimized especially among children in developing countries with the adoption of HH practice. There was a significant relationship between complete HHC rate in decreasing device-associated infection rates with another study reporting zero rates for these infections among children (Sastry, Deepashree, & Bhat, 2017).

Similarly, Sartelli *et al*., (2018) also revealed that increasing HHC prevents HAIs, ensures patients' safety, reduces mortality and morbidity, and minimizes health care costs.

Improvement in HH habits invariably reduces the rates of HAIs and has many potential benefits. This includes limiting the length of hospitalization, fewer antibiotics prescriptions, reduction in multidrug-resistant organisms, reduction of healthcare costs, (Randle, Firth, & Vaughan, 2013; Schweizer *et al.,* 2014) (Rahmqvist *et al.,* 2016). Many of the identified factors that would have influenced HH in the literature are mostly cultural-unique and site-specific factors (Marques, 2017; Finerman *et al.,* 2017; Li, Jeffs, Barwick, & Stevens, 2018; Atif, Lorcy, & Dubé, 2019).

HH has been the key strategy to reduce HAIs in health care settings and to ensure patient safety according to WHO suggestions. To address the problems, ‘’My five moments’’ for HH was introduced to minimize problems related to HAIs and to address problems of noncompliance among HCWs.

Children are known to be more vulnerable to HAIs, but there has been minimal HHC research in this unique setting (Buet *et al*., 2013; Randle, Firth, & Vaughan, 2013). Despite the effectiveness of HH in reducing HAIs by at least 30%, regrettably, HH practice is suboptimal among the nurses working with these vulnerable populations (WHO, 2020). Reasons for lack of total adherence to HH are yet to be uncovered (Kurtz, 2017).

There is substantial evidence from research studies and WHO suggesting that multimodal strategies focusing on training/education, monitoring, survey, feedback, and system change, have a great potential for success in terms of HHC, and in the

reduction of HAIs (Jamal, *et al.* 2012; Helder, 2013; Diefenbacher, Fliss, Tatzel, Wenk, & Keller, 2019; Donati *et al*., 2020). To the best of the researcher's knowledge, there is no quality HH compliance study in Nigeria and this lack of crucial information hinders the formulation of effective policies on HH both at the national and local levels. Hence the current study aimed to assess HHC and the factors that influence compliance among paediatric nurses working in paediatric care settings in AE-FUTHA in Ebonyi State, Nigeria.

In this study, organizational and contextual factors were chosen because the WHO had identified factors such as lack of financial support, inadequate numbers of trained personnel working in infection control units, understaffed hospital units, insufficient equipment and supplies as barriers to infection control and prevention practices in low and middle-income countries were generally associated with poor HHC (WHO, 2009). Adherence to proper hand washing practices among the HCWs was also found to be associated with institution-specific factors (Garba and Uche, 2019). Hence, examining the organizational and the contextual factors are crucial in determining how a set of interventions may have worked effectively among this specialized population.

Therefore, investigating HHC among paediatric nurses and exploring factors associated with the compliance need to be assessed in the local context for the development of effective strategies and interventions suitable to subgroups, context, and setting, of a given working environment (Shah, Castro-Sánchez, Charani, Drumright, & Holmes, 2015).

1.4 Research questions

The research questions were stated as seen below:

Research questions for the quantitative strand

i. What is the level of perceived HHC to the five moments of HH among nurses in paediatric unit?
ii. Is there an association between the socio-demographic variables (age, sex, level of education, nursing category, HH training,) and perceived HHC?
iii. What is the observed compliance to the five moments of HH among nurses in paediatric unit?
iv. Is there a difference between observed HHC and the units, morning, and evening shift, five moments of HH?

Research questions for the qualitative strand

v. What are the organizational factors that have influenced HHC among nurses in paediatric unit?
vi. What are the contextual factors that have influenced HHC among nurses in paediatric units?

1.5 Research Objectives

Research objectives are based on the specific accomplishments of what the researcher expect to achieve by conducting the study (Polit & Beck, 2017).

1.5.1 General Objective

The general objective of this study is to determine the level of HHC and to explore factors that influence compliance among nurses in paediatric care setting in Ebonyi State, Nigeria.

1.5.2 Specific Objectives

The specific objectives of this study are to:

Phase 1 Quantitative strand

1. To determine the level of perceived HHC among nurses to the five moments of HH across the paediatric units in AE-FUTHA, Ebonyi State, Nigeria.
2. To determine the association between socio-demographic variables (age, sex, level of education, nursing category, years of experience, type of paediatric units, HH training, and last HH training) and perceived HHC among nurses in paediatric units in AE-FUTHA, Ebonyi State, Nigeria.
3. To determine the observed level of HHC to the five moments of HH among nurses across the paediatric units in AE-FUTHA, Ebonyi State, Nigeria.
4. To determine the association between the units, shifts, HH actions, the five moments of HH and observed level of HHC among nurses in paediatric units in AE-FUTHA, Ebonyi State, Nigeria.

Phase 2 Qualitative strand

5. To explore organizational factors that have influenced HHC among nurses across the paediatric units in AE-FUTHA, Ebonyi State, Nigeria
6. To explore contextual factors that have influenced HHC among nurses across paediatric units in AE-FUTHA, Ebonyi State, Nigeria.

1.6 Scope of the study

The scope of the study is to determine the perceived and observed HHC and factors influenced it among nurses working in a paediatric unit in Nigeria.

1.7 Research hypotheses

Hypothesis 1: There is a significance association between socio-demographic characteristics (age, gender, education level, nursing category, HH training) and self-reported HHC (H_A)

Hypothesis 2: There is a significance difference between socio-demographic characteristics (units, morning, and afternoon shift, five moments of HH) and observed compliance (H_A).

1.8 Significance of the study

According to the WHO ‘’Clean Care is a Safe Care’’ program for the year 2020. This program is focused on the responsibilities of nurses to protect the clinical environment from preventable diseases, eliminate harmful practices that can result in HAIs, and thus ensuring and promoting the overall safety of patients. Since nurses have more contact opportunities with patients, they can become champions and role models to others in HH practices by creating a better climate and quality nursing care.

Since paediatric patient population is more prone to HAIs, for example, gastrointestinal and acute respiratory infections, due to the less-developed immune systems, improved compliance to HH will significantly reduce these infections and other types of HAIs (Randle *et al.*, 2013). This will further ensure paediatric patients'

safety, reduction in hospital stay, cost reduction, school absenteeism, a decline in antimicrobial resistance episodes, and a decrease in patient morbidity and mortality (Kurtz, 2017). Monitoring HH practice is an important infection control policy. This should be implemented by regular audits with feedback to encourage consistent HH compliance. The results from this study will serve as a database for the infection and control units (ICP) of the setting under study.

1.9 Definition of key terms

Table 1.1 Definition of Operational Terms

Definition of term	Operational definition
Hand hygiene: Washing the hand with soap and water or the use of alcohol hand rub (World Health Organization, 2019).	Washing the hand with soap and water for (40-60secs) or the use of alcohol hand rub for (20-30secs.).
Compliance: Complying to the WHO five moments of HH (WHO, 2009)	Compliance means that the correct action (HH action) has been taken before touching a paediatric patient, before aseptic procedure, after contact with body fluids, after touching a paediatric patient and after contact with care environment during paediatric patient's care.
Observe HHC: Compliance with HH is the ratio of the number of performed actions to the number of opportunities (WHO, 2009)	All the HH actions and opportunities observe by the researcher that correspond to the five moments of HH in the paediatric units of AE-FUTHA.

Table 1.1 continued

Culture: Nurses behaviours, interactions with patients and colleagues, HH pattern in the clinical environment. (Helfrich, Sharp, & Sales, 2009)	Culture can be seen as beliefs, attitude, behaviour and values shared by members of the organization and emerge at both the macro and micro organizational level (Helfrich, Sharp, & Sales, 2009)
Organizational factors: these are the environmental and human characteristic that influences behaviour at work. It include; openness, trust, teamwork, delivery quality/professionalism, training and competences, resources, leadership, supervision, maintenance, respect and tolerance (Zidane, Hussein, Gudmundsson, & Ekambaram, 2016)	These are factors in the clinical area that influence HH behaviour at work. For example leadership, role model/champions, teamwork, reminders, resources, HH monitoring, feedback, and managerial responsibilities.
Contextual factors: they are special characteristics of a setting that need to be considered in understanding how set of interventions may work out it includes: knowledge of IPC, information access, self- efficacy, feedback, support. (*Charness, & Boot, 2016)*	This is the appearances of the clinical setting and managerial functions that need to be considered in understanding reasons for nurses HH compliance/noncompliance. hospital policy, attitude, dissemination of infection and control policy (communication/information), evaluation, staffing, workload. These factors may facilitate or hinder HHC.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter presents the review of literature that is related to HAIs, HHC, and factors influencing HH practices among nurses. The review was initially done with the purpose of becoming more familiar with the knowledge base on the phenomena under study and building the study on a foundation of existing knowledge. In addition, it was conducted to refine the research problem, helped in the discussion, interpretation of the research results, and utilization of the Theory of Planned Behavioural framework as the conceptual framework.

A literature search includes Journal of Paediatric Nursing, Science Direct, ProQuest, Wiley, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, Scopus, textbooks, and dissertations were explored and critiqued. The best available evidence was evaluated to answer the stated clinical questions. The search was limited to English and peer-reviewed publications only. Keywords search terms were used to identify appropriate publications for the literature review. While searching the databases, the following mesh terms and keywords were used which include “handwashing,” “hand hygiene,” “general precaution,” “compliance,” “five moments,” “infection control” “guideline adherence,” and “standard precaution,” “hospital-acquired infections,” “nosocomial infection.” Boolean operators were used to combining different keywords during the search in the different databases, i.e., the ‘OR/ AND’ command. The search was limited to English AND peer-reviewed publications. Keyword search terms were used to identify

appropriate publications for the review. The literature review was done according to the objectives of the study and studies published between 2010 to 2021 were included.

2.2 Concept of HAIs and paediatric patient safety

Hands can be contaminated by touching the skin of another person or by touching contaminated surfaces. If a contaminated surface is touched, the pathogen or organism picked up can be transferred to the next seven touched surfaces (McLaughlin & Walsh, 2011). HAIs occur if HCWs picked up the organisms by the hands and transmit the pathogen onto a patient. As a result of that, the patient develops an infection from the ancillary care, this is labelled as HAIs (McLaughlin & Walsh, 2011). Many factors had been identified as the source of micro-organism transmissions such as person-to-person transmission (hand decontamination, personal hygiene, clothing, masks, gloves, and safe injections), transmission from the environment (cleaning of the hospital environment, use of hot/superheated water), urinary tract infections, surgical site infections (SSI), pneumonia, and vascular device infections.

HAIs have remained a major problem in developing countries and the prevalence of HAIs among paediatrics patients can be reduced effectively following the adoption of basic infection control procedures (Khan, Ahmad, & Mehboob, 2015; Ogwang *et al.*, 2013; & Ekaete, Danny, Ikponwonsa, & Grace, 2013). A systematic review by Allegranzi *et al.,* (2011) had shown higher rates of HAIs in developing countries. Allegranzi and colleagues suggested improving surveillance and infection control practices as key to HAIs reduction. However, the transmission of HAIs among paediatric patients continues to constitute a major challenge for healthcare leaders as they seek out comprehensive strategies targeting paediatric patients' safety and the

global patient safety collaborative goal and thus fulfilling the United Nations (2017) Sustainable Development Goal 3.

The Agency for Healthcare Research and Quality (AHRQ) is a body responsible for improving paediatric patients' safety and quality. The Agency conducted a review in 1997 using a kids' database and found that hospitalized children who experienced a patient safety incident had 2 to a 6-fold longer hospital stay, 2 to 18-fold greater hospital mortality, and 2-to-20-fold higher hospital charges (S. Lacey, Smith, & Cox, 2008).

In response to the patient safety issues highlighted by the WHO, several initiatives were articulated together with the fundamental elements of the global patient safety strategy (WHO, 2019). One of the initiatives is the 'SAFE LIFE-Clean your hands' initiative which was developed due to the global impact of HAIs (Sallami, 2016; WHO, 2019). The WHO declaration in the year 2020 draws the nurses' and midwives' attention to the fact that clean care lies in their hands (WHO, 2020). WHO has set aside 5th May of every year to remind HCWs of the clean care campaign. It also focuses on the nurses' and midwives' central role in achieving clean care, which includes HH practices (WHO, 2020). This also recognizes the crucial contribution of the nurses and midwives to patients' safety, quality of care, and HAIs reduction among paediatrics patients (WHO, 2020).

2.3 HAIs among paediatric patients

It is estimated that 1 out of 10 patients will acquire an infection while receiving treatment from a healthcare facility (WHO, 2020). Children are prone to developing HAIs due to low and less developed immune systems. In a literature search, from January 2010 to December 2020, the prevalence of HAIs in children was found to