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ADHERENCE TO HAND HYGIENE PROTOCOLS IN TWO HOSPITALS IN THE VOLTA REGION

BY

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DECLARATION

I, Esi Yacoba Bart-Plange, hereby declare that this dissertation is a result of my independent work produced from research done under supervision. References to other works have been duly acknowledged. I further declare that this dissertation has not been submitted for award of any degree in this institution and other university elsewhere.

…….. …….

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DR BENEDICT CALYS-TAGOE **DATE**

SUPERVISOR

DEDICATION

I give thanks to God Almighty for His grace and favour which has brought me this far. I dedicate this work to my mother, Madam Rosamond Ahene, whose continuous sacrifice and resilience in the face of great hardships has always been a great example to me.

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ABSTRACT

Background: Hand hygiene has been proven to be an effective way of ridding the hands of harmful pathogens which can be transmitted from person to person resulting in infection leading to morbidity and mortality. Newborns are particularly susceptible to infections due to their under developed immune system, a third of all neonatal mortality being due to infections. In Ghana, neonatal mortality remains high with the Volta Region having the highest neonatal mortality among the regions. National guidelines have been developed for Infection Prevention and Control which outline the objectives, techniques and benefits of hand hygiene in the health care setting and also include monitoring guides and schedules. However, adherence remains low among health care workers worldwide. This study aimed to evaluate adherence to hand hygiene of health care workers in two hospitals in the Volta Region of Ghana.

Methods: The study was a cross sectional study centred on wards which handled neonates and involved a self-administered questionnaire on hand hygiene, observations of hand hygiene and ward infrastructure surveys using the WHO tools.

Results: A total of 119 respondents from both maternity wards and neonatal units were surveyed and observed comprising doctors (11%), nurses (40%), midwives (28%) and students of all categories (21%). There was no difference in mean compliance from the maternity units from the mean compliance from the neonatal units ($t(117) = 1.28$, $p > 0.05$). There was no statistically significant difference between the mean adherence levels between the different categories of staff [$F(2, 116) = 0.05$, $p > 0.05$]. There was no relationship between knowledge and adherence ($\chi^2 = 24$, $p > 0.05$). The main reasons for non-adherence were forgetfulness, inadequate supplies and because of emergencies or high workload. The overall hand hygiene

adherence score in Battor Catholic Hospital of 69.29% and that of Ho Teaching Hospital was 71.13%. The most used method of hand hygiene was hand washing with exposure to body fluids being the most adhered to reason for hand hygiene.

Conclusion: Provision of hand hygiene supplies may increase hand hygiene adherence and more reminders in the workplace may increase hand hygiene compliance in the wards. Although frequent training in hand washing is useful, the knowledge gained does not translate into increased adherence to the hand hygiene protocols.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

A&D – Admissions and discharges

BCH – Battor Catholic Hospital

DHIMS – District Health Information Management System

GDHS – Ghana Demographic and Health Survey

GHS – Ghana Health Service

GMHS – Ghana Maternal Health Survey

HAI – Hospital acquired infection

HCAI – Health care associated infection

HCW – Health care workers

HH – Hand Hygiene

HTH – Ho Teaching Hospital (formerly Volta Regional Hospital)

ICU – Intensive Care Unit

IPC – Infection Prevention and Control

KMC – Kangaroo mother care

MOH – Ministry of Health

NICU – Neonatal Intensive Care Unit

NNS – Neonatal sepsis

UHAS – University of Health and Allied Sciences

WHO – World Health Organization

CHAPTER ONE

INTRODUCTION

1.1BACKGROUND

Hand hygiene is any action performed with the aim of physically and mechanically removing dirt, organic material and/or microorganisms from the hands (World Health Organization, 2009b). It includes social hand washing, antiseptic hand washing and hand rubbing (using alcohol based hand rubs) and surgical hand scrubbing (Ministry of Health, 2015). The evidence for hand hygiene dates back to the mid-1800s when Ignaz Semmelweis and Oliver W. Holmes established that hospital acquired infections (HAIs) was transmitted by the hands of healthcare workers (HCWs) (Vermeil et al., 2018; World Health Organization, 2009b).

In response to the growing problem of HAIs, the World Health Organization (WHO) came up with guidelines on hand hygiene to ensure that there was uniformity across the world with regard to techniques and solutions used (World Health Organization, 2009a). WHO also identified 5 moments for hand hygiene in clinical practice: before patient contact, before aseptic procedures, after contact with body fluids, after patient contact and after contact with patient surroundings (World Health Organization, 2009b).

Although hand hygiene has proven to be effective against transmission of health care associated infections, adherence of health care workers to recommended hand hygiene practices has remained low worldwide (Asare, Enweronu-Laryea, & Newman, 2009; Owusu-Ofori et al., 2010; Blencowe et al., 2011) and especially in developing countries (World Health Organization, 2009b).

In the labour ward and neonatal unit, hand hygiene is of even more importance due to the susceptibility of newborns to infections which lead to prolonged hospital stays and mortality.

1.2 PROBLEM STATEMENT

Neonatal infections are responsible for a third of all neonatal mortality in Ghana (Ghana Statistical Service, 2011; Unicef, 2015) with most of the deaths occurring in the first week of life. According to Welaga et al. (2013), most of the deaths that occur in the first three days (early neonatal mortality) can be attributed to asphyxia and prematurity while most of those that occur after those three days are mainly due to infection. Neonatal sepsis can be prevented by strict adherence to infection control measures especially hand hygiene in the hospital setting. In the Volta Region, the neonatal mortality has remained above the national average with a bottom position in the national league table i.e. 33 per 1000 live births versus 25 per 1000 live births (Ghana Statistical Service, 2018)

Studies show that adherence to hand hygiene among health workers is generally low but varies based on category of staff and by wards (Boyce & Pittet, 2002; Owusu-Ofori et al., 2010; Murni, Duke, Kinney, Daley, & Soenarto, 2015). However most of these studies conducted were done in large teaching hospitals though the Ministry of Health (2015b) reports that about 90% of hospital attendance is through lower level centres thus missing a larger portion of service delivery areas. Also, most interventions in Ghana are made through the Ghana Health Service through the regional and district health facilities, so monitoring and feedback in these settings is of essence. In 2015, Ghana adopted a National Policy and Guidelines for Infection Prevention and Control of which hand hygiene is a component. This policy includes

training of health workers and the development of a framework for monitoring, however, few reports have been generated to assess the success of the policy, especially the hand hygiene component. With this in mind, this study sought to assess adherence to hand hygiene protocols in units that handle newborns.

1.3 RESEARCH QUESTIONS

- Does knowledge of hand hygiene affect adherence to hand hygiene?
- Is there any difference in hand hygiene practices among various categories of health workers in the maternity and neonatal unit?
- What are the reasons for non-adherence to hand hygiene practices?

1.4 GENERAL OBJECTIVE

To assess adherence to hand hygiene protocols in two hospitals in the Volta region.

1.5 SPECIFIC OBJECTIVES

- To assess awareness about hand hygiene protocols among healthcare workers who handle newborns
- To assess adherence to hand hygiene protocols among health care workers who handle newborns
- To compare the adherence to hand hygiene among categories of healthcare workers and between the staff of the maternity and neonatal units
- To explore the challenges to hand hygiene among healthcare workers who handle newborns

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

In light of emerging antibiotic resistance worldwide, prevention of sepsis has become the main goal rather than treatment as severe sepsis has become difficult and more expensive to treat and associated with high morbidity and mortality (Didier Pittet, Allegranzi, Boyce, Health, & World, 2009; World Health Organization, 2009b) People at the extremes of age (infants and the aged) are more susceptible to sepsis and indeed severe sepsis. In the neonatal unit and labour wards, newborns can be exposed to a number of pathogens and when health care workers are not careful, the neonate can become infected. Seale et al., (2014) found that there are 6.2% of neonates at risk of sepsis worldwide, with a possible case fatality of about 56% (Global Hand washing Partnership, 2017) but ranging from 5% to 61% (Aiken et al., 2011; Seale et al., 2014).

2.2 WHY HAND HYGIENE?

Hand hygiene and indeed hand washing has proved to be the most effective means of preventing transmission of pathogens especially in the healthcare setting (World Health Organization, 2009b). Since the time of Semmelweis and Holmes, some form of hand hygiene protocol was developed by various countries for their local settings based on their experiences and research (D. Pittet & Allegranzi, 2018). In 2009 however the WHO sought to set standards for hand hygiene considering the high burden of HCAI (especially infections with highly resistant pathogens) – about 15.5% incidence in developing countries (WHO & UNICEF, 2015; Global Hand washing Partnership, 2017) and the cost, morbidity and mortality associated with such

infections (World Health Organization, 2009b; Allegranzi, Nejad, & Pittet, 2017). The increasing anti-microbial resistance has made infection prevention and control (IPC) and indeed hand hygiene an even more urgent matter.

The use of plain soap and running water and the use of alcohol-based hand rub with a standard technique is the recommended (Ministry of Health, 2015a; Didier Pittet et al., 2009) Alcohol-based hand rub is recommended for routine hand antisepsis and hand washing for when hands are visibly soiled or contaminated with body fluids or after using the toilet (Pittet, Allegranzi, Boyce, Health, & WHO 2009). Pittet et al., 2009 and World Health Organization, 2009b also recommended that hand washing and hand rubbing are NOT supposed to be performed in combination as it increases the occurrence of skin irritation and gives no added benefit. Also, the use of gloves does NOT eliminate the need for hand hygiene. HCWs are also supposed to be bare beyond the elbows during hand hygiene with no rings, watches or other jewellery and no artificial nails as these have shown to increase the risk of bacterial transmission due to the persistence of bacteria on these objects even after hand hygiene has been performed (World Health Organization, 2009b). Natural nails are to be kept short (less than 0.5cm) and the duration of hand washing should be between 40-60 seconds and 20-30seconds for hand rubbing (Ministry of Health, 2015a; Didier Pittet et al., 2009; World Health Organization, 2009b)

The WHO also identified some key moments for hand hygiene in health practice: before contact with a patient, before an aseptic procedure, after contact with a patient, after contact with body fluids and after touching a patient surroundings (World Health Organization, 2009b). Hand hygiene upon entering and exiting the health facility, after using the toilet and before (and after) eating are also recommended (citation

needed). Studies done so far on compliance to hand hygiene shows the most frequently missed opportunity for hand hygiene is after contact with patient surroundings (Fitzgerald, Moore, & Wilson, 2013; Santosaningsih et al., 2017).

In Ghana, the Ministry of Health in 2015 developed its own guidelines for IPC which includes schedules for monitoring of compliance. It was accompanied by training of healthcare workers across the country in the various aspects of IPC and the appointment of local IPC committees in the various facilities to see to the implementation of the policy and to continually train the other workers in the facility to ensure compliance (Ministry of Health, 2015).

2.3 HEALTH CARE ASSOCIATED INFECTIONS AND NEONATAL SEPSIS

Health care associated infections include infections that may be acquired by patients or health workers in the process of giving or receiving health care and are a grave concern with an estimated global prevalence of 5.7 to 19.1% (World Health Organization, 2011) which is an underestimation as poor surveillance systems exist worldwide especially in low and middle income countries. Health care associated infections lead to an increase in length of hospital stay of about 5-29 extra days and an average crude mortality of about 25% (Allegranzi et al., 2017). This is an even weightier matter in low-middle income countries where there is widespread poverty and availability of medicines is often hindered by high costs (Allegranzi et al., 2011). There are very limited studies on the exact burden of health care infections worldwide and most of these studies tend to look more at surgical site infections and infections associated with invasive equipment such as catheters and central lines which have a standard case definition (Murni et al., 2015; World Health Organization, 2009b). In low and middle income countries, such studies are virtually non-existent and national

surveillance programs which could provide data for such analysis may exist only on paper. Exact estimation of infections that may be caused by poor hand hygiene may be very difficult to establish especially in lower income countries as most of these infections occur after discharge and follow up is difficult (Allegranzi et al., 2017). HCAIs are known to be more common in patients in the intensive care unit (ICU) mainly due to invasive instruments or procedures and in neonates who have a weaker immune systems.

The increase in HCAIs leads to an increase in antibiotic resistance as the organisms responsible thrive in the midst antibiotic therapy that most patients in the ICU are likely to be on. Aiken et al. (2011) in a study done in Kenya found that most of the HCAIs found in children were from Gram-negative organisms most of which were resistant to the standard antibiotics used for treatment. In 2016, a study done in one of the study sites (Ho municipality) showed very high resistance of the common organisms implicated in neonatal sepsis to the WHO recommended antibiotics for treatment (Aku, 2016). These statistics do not bode well for developing countries where even the standard antibiotics are inaccessible to patients because of cost.

Neonatal sepsis or septicaemia (NNS) is a clinical syndrome characterized by systemic signs of circulatory compromise caused by invasion of the bloodstream by bacteria in the first month of life and up to four weeks beyond the expected date of delivery in a preterm baby (Bedford Russell, 2015; Edmond & Zaidi, 2010). The organisms that cause neonatal sepsis are usually acquired perinatally (before, during, and after delivery) and can either be acquired from the mother or from the environment where the child is born. According to Edmond & Zaidi (2010), neonates have a functionally immature immune system with low immunoglobulin levels except

those passed passively from mother to baby and low neutrophil numbers with poor function. These make the baby and more so the preterm baby prone to infections from organisms including those considered as normal flora on the skin of the mother or birth attendant. Preterm low birth weight infants have been found to have a 3–10 times higher incidence of infection than full-term normal birth weight infants (Shane, Sánchez, & Stoll, 2017).

NNS can be divided into early onset (within 48 to 72 hours after birth) or late onset (Bedford Russell, 2015; Vergnano, Sharland, Kazembe, Mwansambo, & Heath, 2005). The classification usually indicates the source of the infection with early onset NNS usually being acquired through the placenta or from the genital tract of the mother and late onset NNS usually from the environment, in this case the hospital. According to Bedford Russell (2015) and Shane, Sánchez, & Stoll (2017), late onset NNS is more common in low birth weight or preterm babies and meningitis is a more common feature than in early onset NNS. Shane et al. (2017) found that term male babies have a higher incidence of neonatal sepsis than term female babies however this is not the case in preterms; the cause of this phenomenon is unknown. Shane et al., 2017 also found that contaminated hands are the most common source of post-natal infections in neonates admitted in hospital emphasizing the importance of hand hygiene.

Challenges exist in diagnosing NNS worldwide but even more in developing countries where access to microbiological investigations is uncommon outside of research centres (Seale et al., 2014). Precise estimates of neonatal sepsis burden vary by setting, with differing estimates of burden between countries of different income levels (Shane et al., 2017). Unicef (2018) found that babies born to mothers with no

education face almost twice the risk of dying during the neonatal period as babies born to mothers with at least a secondary education.

2.4 CHALLENGES TO HAND HYGIENE IN THE HEALTH CARE SETTING

The world over, compliance to hand hygiene especially in health facilities has remained a challenge. WHO & UNICEF, 2015 reports that in an assessment of health facilities in 54 countries (including Ghana), 35% failed to offer soap and water for hand washing. Adherence to hand hygiene among health workers ranges between 5-60% (World Health Organization, 2009b) but averages at about 30% and vary based on category of staff, sex, shift and ward/unit (Barahona-Guzmán et al., 2014; Boyce & Pittet, 2002; Chhapola & Brar, 2015; Fitzgerald et al., 2013; Murni et al., 2015; Owusu-Ofori et al., 2010). Risks for low compliance include being a doctor, male sex, increased hand hygiene opportunities, high level of patient care (ICU settings) (Barahona-Guzmán et al., 2014; Santosaningsih et al., 2017). Methods of measurement of adherence also affects the results and until the WHO's observation tool, there were various non-standardized observation tools that were used which may have affected the reporting of adherence (Boyce & Pittet, 2002). Dhar et al. (2010) also found that adherence to hand hygiene was over-reported by as much as 20% when reported by a member of staff rather than an external observer.

Adherence has been found to improve by using a multi modal systems approach to tackle the problem – training and education, reminders in the workplace and monitoring with feedback (Global Hand washing Partnership, 2017; World Health Organization, 2009b); and also by ensuring availability of hand hygiene facilities at vantage points (WHO & UNICEF, 2015). Other approaches have included involving HCWs in the decision making regarding materials provided for hand hygiene and

getting feedback from them as well, involving patients in hand hygiene and changing the training approach to more of an education where the health workers acknowledge the personal benefit of hand hygiene (Chhapola & Brar, 2015; Didier Pittet et al., 2009). A study done by Santosaningsih et al. (2017), showed an increase in compliance in hand washing by training of role models in the facilities. Others still have proposed the use of behavioural techniques that involve amplifying feelings of disgust associated with dirty hands to help increase compliance to protocols (Mccay, 2015).

CHAPTER THREE

METHODS

3.1 STUDY AREA

Volta Region has a total population of 2,118,252 as at the 2010 population census with an average annual growth rate of 2.5% and a projected population of 2,580,885 for 2018. The Volta region has a neonatal mortality rate of 33 per 1000 live births above the national average of 25 per live births according to the 2017 Ghana Maternal Health Survey (GMHS 2017) (Ghana Statistical Service, 2018). The study was carried out in the Ho Teaching Hospital in Ho and the Battor Catholic Hospital in Battor.

The Ho Teaching Hospital (HTH) is located in the Ho Municipality of the Volta region which is an urban setting with population of 214, 612 as at 2010 and an annual growth rate of 1.9%. The projected population for 2018 is 249,487. The hospital serves the municipality and also acts as the main referral point for the other districts within the region. The hospital also serves as a teaching point for students of the University of Health and Allied Sciences (UHAS) and the Ho Nursing Training College. In April this year, the hospital was given teaching hospital status and is now called the Ho Teaching Hospital. It has a 30 bed capacity maternity unit with an average of 160 deliveries per month. There are 38 midwives/nurses and 6 doctors (house officers and specialists) and 10 auxiliary nursing staff who run the maternity unit. It also has a 30 bed capacity neonatal intensive care unit (NICU) with 12 incubators, 2 radiant warmers and 16 cots. There is also a 24 bed capacity neonatal unit (Ward F9) with 3 incubators, 1 radiant warmer and 20 cots. Average number of

admissions at the NICU is 57 babies per month with an average length of stay of 7 days. The staff of the unit comprise 20 nurses, 6 doctors and 3 auxiliary nursing staff.

The Battor Catholic Hospital (BCH) is located in Battor which is in the North Tongu district of the Volta region with an estimated population of 89,777 as at 2010 with an annual growth rate of 2.7% with projected population of 111,104 in 2018. It is mainly a rural setting (60%). The hospital serves its district as well as the surrounding districts. The facility, although better known for its work in cervical cancer, is the only other facility in Volta region with both an obstetrician and a paediatrician apart from the regional hospital. The NICU has a 25 cot capacity with 2 incubators with expansion underway to include more cots and incubators and also a Kangaroo Mother Care (KMC) area. The staff of the unit consist of 23 nurses, 5 doctors (includes the paediatrician) and 11 auxiliary staff. The maternity ward has a 25 bed capacity with an average monthly delivery of 185 with a total staff strength of 42 made up of 20 midwives/ nurses, 7 doctors (includes 2 obstetricians) and 15 auxiliaries.

The study was conducted among the staff of the maternity and neonatal units who come into contact with the newborns in these two hospitals where both specialist obstetric and neonatal care are provided in the Volta region.

3.2 STUDY DESIGN

The study was a cross sectional study.

3.3 STUDY POPULATION

The data was taken from clinical staff of the neonatal units and the maternity wards (including labour ward) who come directly in contact with newborns (nurses/midwives of all ranks, doctors and students (medical/nursing/midwifery) who

were doing clinical work in June 2019). The students were classified with their respective professions.

3.4 SAMPLING

Since the study was limited to the staff of the maternity and neonatal units of the two hospitals, all the staff at post who handle newborns were invited to participate in the study.

3.5 EXCLUSION CRITERIA

- Those who do not come into direct contact with the newborns (e.g. orderlies) and do not handle newborns.
- Laboratory personnel, phlebotomists and other auxiliary staff who may be visiting the ward and are unlikely to be ever stationed in a neonatal/maternity unit.

3.6 TOOLS AND TECHNIQUES FOR DATA COLLECTION

Data was collected via a self-administered questionnaire, an inspection of hand hygiene facilities in the wards using the WHO Ward Infrastructure survey as well as observations of hand hygiene among the staff of the units using the WHO hand hygiene observation tool (WHO | World Health Organization, 2019)which was modified slightly for the local setting (omission of the space for country as the study sites were in the same country, Ghana, omission of the period number as no intervention was done/ being tested and restricting the wars to either paediatric or obstetric as these were the only wards under consideration).

The questionnaire was designed based on the WHO Hand Hygiene self-assessment framework which sought to explore the participants' knowledge on hand

hygiene. The questions included source and route of transmission of healthcare associated infections, when use of hand rubbing or handwashing was appropriate based on scenarios posed, time needed for handwashing and actions to be avoided to prevent colonisation of hands despite hand hygiene. The questionnaire also sought to examine the attitude (ability to perform hand hygiene, taking pride in good hand hygiene and their perception of their hand hygiene behaviours in patient care) as well as potential barriers to hand hygiene (forgetfulness, tiredness, lack of facilities, lack of reminders, lack of motivation) using a Likert scale to rate their experiences with hand hygiene in the workplace.

The WHO hand hygiene observation tool was developed as part of the framework for assessing adherence to hand hygiene. The form on top of the sheet was filled stating the ward, shift, date of the observation; duration of the observation and the name of the observer. Each participant was monitored for about twenty minutes without interfering in their activities to see their response (HH performed or omitted) to hand hygiene opportunities that came up during the course of their work. The opportunities were before patient contact, before aseptic procedure, after exposure to body fluids, after patient contact and after contact with patient surroundings with the responses being hand washing, hand rubbing, use of gloves or a missed opportunity. The adherence score was calculated as per the scoring sheet as number of appropriate responses versus number of opportunities (calculated as a percentage).

3.7 DATA SUMMARY/ANALYSIS

The data was summarized using frequency distribution tables and appropriate graphs and analysed using the STATA software. The student's T test was used to compare the difference in means between staff of maternity and staff of neonatal unit, ANOVA

to compare the mean adherence level between categories of staff and chi square test of association was used to test the relationship between knowledge and adherence.

3.8 VARIABLES

- **Independent variables**
    - Characteristics of health care worker (age, sex, religion, category, rank)
    - Knowledge of hand hygiene protocols (ranked scores to questions on when and how hand hygiene should be performed)
- **Dependent variable**
    - Adherence to hand hygiene protocols (observations use of hand washing and alcohol-based hand rub at the right time)

3.9 ETHICAL CONSIDERATIONS

VOLUNTARY PARTICIPATION

Participation in the study was purely voluntary.

Informed consent was sought from all participants.

Participants of the study were free to opt out at any point in time during the study

CONFIDENTIALITY AND PRIVACY

- The participants were asked to fill the questionnaire at a secluded place to ensure privacy.

- The questionnaire and observation tools had no space for names but initials only to ensure anonymity.
- The data collected were carried in sealed envelopes and kept under lock and key.
- The data were available only to the investigator(s) and collaborator(s) of the study.
- The filled data collection tool(s) would be kept for a year after which it will be shredded.

RISKS

- The observations may have caused unease to the participants of the study due to the discomfort of being watched. Participants were reassured and encouraged to carry on their usual activities and the observer was also encouraged to avoid staring.

BENEFITS

- There were no personal benefits/remuneration for the study.

ETHICAL CLEARANCE/PERMISSIONS

- Ethical clearance was sought from the Ghana Health Service Ethical Review Committee and permission sought from the Volta Regional Health Directorate and also from the head of the institutions.

CHAPTER FOUR

RESULTS

4.1 CHARACTERISTICS OF RESPONDENTS

There were a total of 119 respondents, 35 from Battor Catholic Hospital (BCH) and 84 from Ho Teaching Hospital (HTH). Out of the respondents from BCH, 18 were from the Babies' unit and 17 from the maternity wards. Of the participants from the HTH, 38 were from maternity and 46 from the neonatal units.

The mean age of the respondents was 28.5 ($^{+}$/- 5.6) years. Over two-thirds of the respondents were females. The majority of respondents were nurses (40%) and the doctors and midwives comprised 11% and 28% respectively. The students (nursing, midwifery, medical) comprised 21%. Table 4.1 below shows the age breakdown and the characteristics of the respondents in the facilities.

Table 4.1: Characteristics of respondents by facility

	HTH (n= 84)	BCH (n=35)	TOTAL (n=119)
Age in years *M(SD)*	28.5 (5.6)	28.6 (5.8)	28.5 (5.6)
Age groups *n(percentage)*			
20 – 29 years	58 *(48.74%)*	23 *(19.33%)*	81 *(69.06%)*
30 – 39 years	24 *(20.16%)*	9 *(7.56%)*	33 *(27.73%)*
40 – 49 years	2 *(1.68%)*	2 *(1.68%)*	4 *(3.36%)*
50 – 59 years	0 (0.00%)	1 *(0.84%)*	1 *(0.84%)*
Total	84 (*70.59%)*	35 *(29.41)*	119

Sex of respondent *n(percentage)*			
Male	27 (*32.14%)*	9 (25.71%)	36 (30.25%)
Female	57 (*67.86%)*	26 (74.29%)	75 (69.75%)
Category of staff *n(percentage)*			
Nurse	38 (45.24%)	10 (28.57%)	48 (40.34%)
Midwife	21 (25.00%)	12 (34.29%)	33 (27.73%)
Doctor	6 (7.14%)	7 (20.00%)	13 (10.92%)
Students	19 (22.61%)	6 (17.14%)	25 (21.00%)
Religion *n(percentage)*			
Christianity	79 (94.05%)	34 (97.14%)	113 (94.96%)
Islam	5 (5.95%)	1 (2.86%)	6 (5.04%)

4.2 KNOWLEDGE, ATTITUDES AND PRACTICES

About 95% of respondents had received formal training in hand hygiene and about 90% reported routine use of alcohol based hand rub. More than eighty per cent of respondents agreed that the main route of cross-transmission of germs between patients was healthcare workers' hands when not clean. However, a further 10 per cent cited patient's exposure to colonised surfaces as the main route of cross-transmission of germs between patients.

About half of the respondents (50.4%) said that the most frequent source of health care associated infections was from germs already present on or within the patient, however, a significant proportion of respondents (47.1%) reported that the most frequent source is from the hospital environment. Most respondents (84%) recognized

that hand rubbing was faster than hand washing, caused more skin dryness (87%) and was not more effective than hand washing (87.39%) as depicted by Table 4.2 below.

Table 4.2 Answers of respondents comparing hand rubbing to hand washing

	True	False
Hand rubbing more rapid than hand washing	100 (84.03%)	19 (15.97%)
Hand rubbing causes more dryness	103 (86.55%)	16 (13.45%)
Hand rubbing more effective	15 (12.61%)	104 (87.39%)
Hand rubbing and hand washing performed in sequence	81 (68.07%)	38 (31.93%)

The answers on the minimal time duration for alcohol-based hand rub were quite varied but two-thirds of the respondents knew that it was for 30 seconds. The other responses are shown in Figure 4.1.

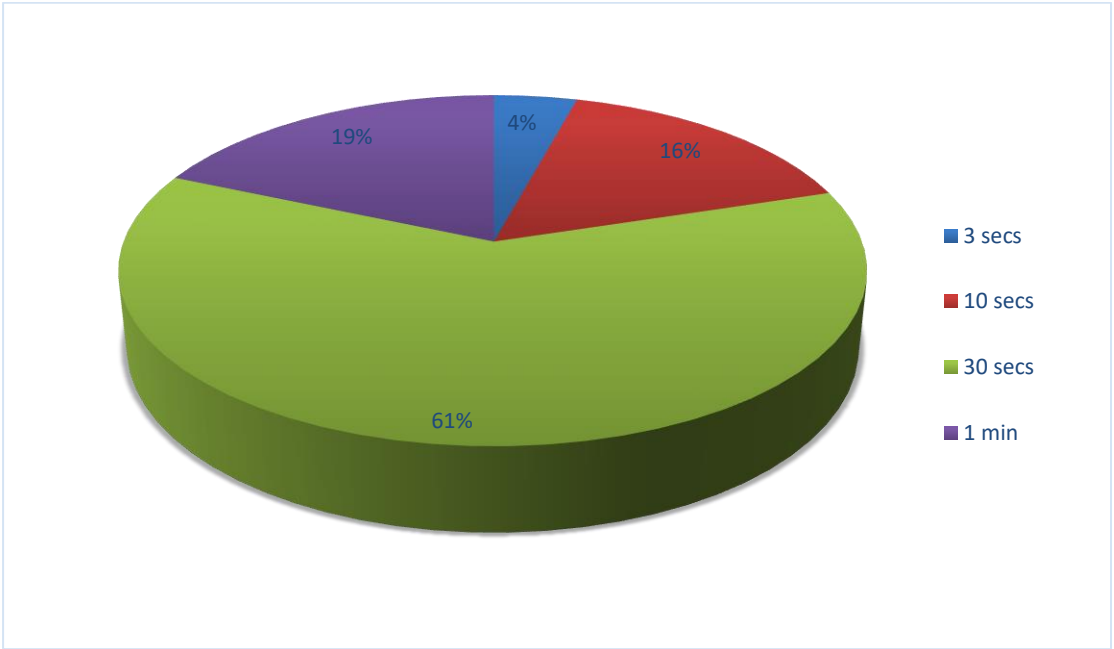

Fig 4.1 Responses for the duration of hand rubbing

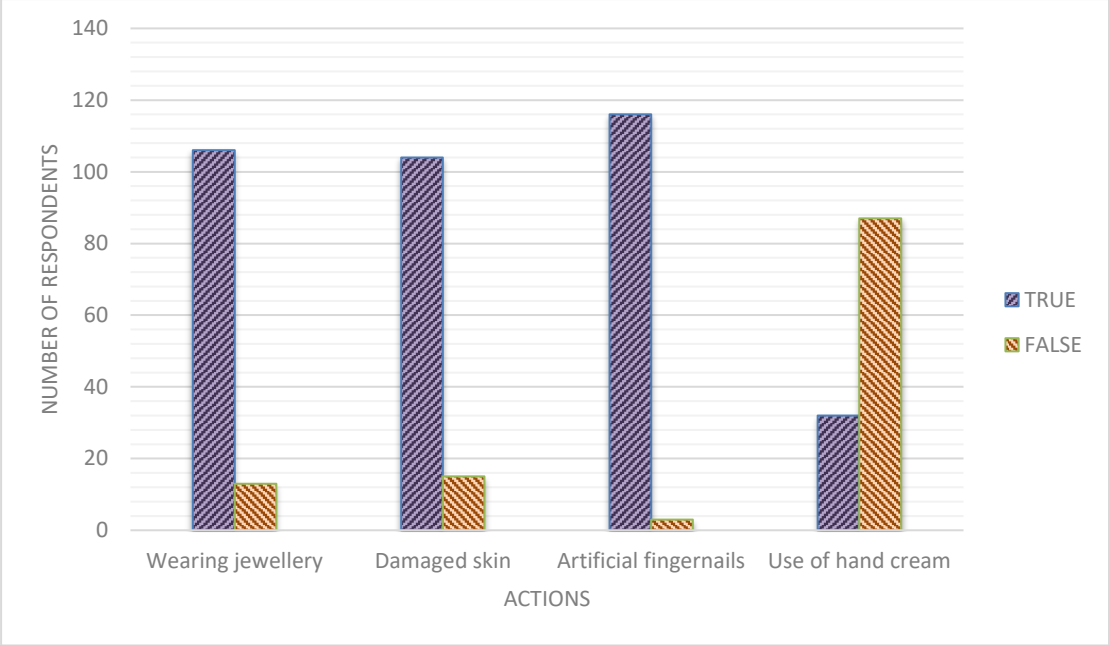

Fig 4.2 Responses regarding actions to be avoided in hand hygiene

Figure 4.2 depicts the responses given by respondents on actions to be avoided in hand hygiene. Almost all respondents recognized that wearing jewellery, having damaged skin and wearing artificial fingernails increases the likelihood of colonisation of the hands with bacteria.

Over 98 per cent of respondents recognized that hand hygiene was required before palpating an abdomen, before giving an injection, after emptying a bedpan , after removing examination gloves, after making a patient's bed and after visible exposure to blood. All respondents agreed that hand washing was the method of choice after visible exposure to blood and after emptying a bedpan.

One hundred and twelve out of the one hundred and nineteen respondents (94%) agreed that they had sufficient knowledge in hand hygiene and a further 111 (93%) were confident of their ability to perform hand hygiene properly. Most respondents (96%) were certain that hand hygiene was embedded in their professional practice and

92% took pride in their hand hygiene practices. There was an equal split between those who agreed that the frequency of hand hygiene made it difficult for them to carry it out versus those who were neutral or disagreed. Eighty-five per cent (101 out of 119) disagreed that they were too busy for hand hygiene and another 80% (95 respondents) denied missing hand hygiene because they simply forgot. Those who admitted that they omitted hand hygiene because they forgot were more likely to forget because they were busy (χ^2 =28.48, p<0.001). About three-quarters of respondents (77%) reported feeling guilty if they omitted hand hygiene. Half of the respondents did not agree that they performed hand hygiene out of respect for their patients and also did not think their hand hygiene was encouraged by others. 60% agreed to feeling annoyed when hand hygiene was not carried out properly by others and 64% reported a difficulty in prompting senior staff about hand hygiene. Out of 119, 69 (58%) agreed that emergencies and other priorities made hygiene more difficult at times. Respondents were split about availability of facilities for hand hygiene. 99 out of 119 (83%) respondents disagreed that there was no motivation for hand washing. The most common reasons stated for omitting hand hygiene were no water, unavailable supplies, forgetfulness and attending to an emergency. Three quarters of those who reported water shortage were from HTH.

4.3 ADHERENCE STATISTICS

Table 4.3 Observations and adherence of the maternity unit and babies ward/NICU in the two hospitals

Facility	HTH		BCH	
Ward	Maternity	Neonatal	Maternity	Neonatal
Observations	38	46	17	18
Overall adherence	72.04%	70.38%	68.38%	70.14%
Total adherence	71.13%		69.29%	

The mean compliance from the maternity units of 71.81% $^{+}$/- 16.35% was not statistically different from the mean compliance of 68.35% $^{+}$/- 13.17% from the neonatal units ($t(117) = 1.28$, $p > 0.05$). There was no statistically significant difference between the mean adherence levels between the different categories of staff [$F(2, 116) = 0.05$, $p > 0.05$]. There was no relationship between knowledge and adherence ($\chi^2 = 24$, $p > 0.05$).

The opportunity frequently missed was after touching patient's surroundings (42.7% adherence). The most observed opportunity was after body fluid exposure risk (100% adherence) with hand washing being the preferred action taken. The use of gloves was mainly before aseptic procedures and comprised about a third of the action taken for this opportunity, usually without the hand washing or the use of alcohol-based hand rub. The overall adherence was 82%, hand washing comprised about two thirds of the actions of hand hygiene.

4.4 WARD INFRASTRUCTURE SURVEY

A total of **7** wards were assessed from the two facilities; 3 neonatal wards and 4 maternity wards. The survey was completed by a senior staff within the unit (head of the unit or a staff appointed by the head of the unit. The permanent staff strength of the units are in the table below. Each ward may have an average of about 6 students at any point in time depending on the time of the year.

Table 4.4 Staff strength of the units

Unit	Facility	HTH	BCH	Total
Neonatal	Nurses/Midwives	20	23	43
	Doctors	6	5	11
	Auxiliaries	3	11	14
Total		**29**	**39**	**68**
Maternity	Nurses/Midwives	38	20	58
	Doctors	6	7	13
	Auxiliaries	10	15	25
Total		**54**	**42**	**96**
Grand Total		**83**	**81**	**164**

In Battor Catholic Hospital, the neonatal unit is divided into two wards, the aseptic unit and the septic unit, with a glass partition. Each unit has a sink which had clean water, soap and towels at the time of visit. The towels are single use and washed after use. The hand rub dispenser available in the unit was filled but located on a trolley which was moved around the beds during rounds. The same bottle was shared

between the septic and aseptic wards. There were however filled wall mounted hand rub dispensers on the corridor in front of the unit. The bed to sink ratio for the unit is 13:1.

The dispensers are intermittently filled when empty but there is no one assigned to ensuring that this is done. Staff rarely carry pocket bottles of alcohol based hand rub. None of the staff encountered during the survey had pocket dispensers. There were posters and illustrations of hand hygiene techniques and indications displayed at the sinks, hand rub dispensers and other areas of the ward but there were no other reminders apart from these. Examination gloves were always available for use by personnel. No hand hygiene audits have been performed on this ward.

The labour ward also had two sinks with running water, soap and towels at the time of the visit. There was a hand rub dispenser affixed to the wall as well as a dispenser located on the trolley which was almost empty. The labour ward has 6 delivery beds with 2 lying-in beds. The maternity ward has a total of 25 beds with two sinks located in the ward which had running water, soap and towels at the visit. All the sinks and wall mounted dispensers had posters on hand rub or hand washing technique as well as the opportunities for hand hygiene displayed.

In Ho Teaching Hospital, the maternity ward (E4) and the labour ward were assessed as well as the Neonatal Intensive Care unit and the babies' unit (F4). Their water supply was intermittent and there was no running water at the time of the visit so staff were fetching from a receptacle on the ward filled for such purposes. However soap was always available. The supply of alcohol-based hand rub was intermittent, usually via wall dispensers or dispensers located on or affixed to trolleys. Staff rarely carry

pocket bottles and very few beds on the wards have alcohol-based hand rub within arm's reach. Filling of hand rub bottles is assigned to a specific person. There are posters and reminders for hand hygiene placed at vantage points especially near sinks or hand rub dispensers. Also, hand hygiene audits are performed in the wards at least once a year. The bed to sink ratio at the maternity unit is 6:1 and the neonatal units 4:1.

CHAPTER FIVE

DISCUSSION

Out of a possible 125 respondents (excludes auxiliaries), there were only 94 (excludes the students) which represents a proportion of about 75%. These were mainly young people aged between 20 years and 29 years which is reflective of the working population in Ghana (Statistical Service Accra, 2015). There is a general reluctance of health workers to participating in health research especially when there is no remuneration or personal benefit to the HCW which reflected in the response rate seen possibly due to fear of being victimised by superiors or being found wanting in some area. The majority of the respondents were nurses and midwives which is representative of the workforce of health facilities in Ghana and were also mainly female which still shows the dominance of females in the nursing and midwifery professions.

Training on hand hygiene is quite widespread with 95% of respondents having been trained in the past three years. Regular training should be conducted for emphasis and to help HCWs embed HH in their practice. Although a lot of respondents (90%) answered that they routinely use alcohol based hand rub in their practice, hand washing was found to be the preferred method of hand hygiene and thus shortages in supplies for hand washing (running water, soap, and hand towels) could affect the compliance of staff to the hand hygiene protocols. Allegranzi, Memish, Donaldson, & Pittet (2009) found that aversion to alcohol by some religions may affect acceptability of alcohol hand rub as a method of hand hygiene. About 20% of the HCWs interviewed were unaware that their contaminated hands were the main route of transmission of hospital acquired infections; this is a grave concern especially

considering the vulnerable clientele of our respondents. Murni et al., (2015) stated that irrational use of antibiotics and transmission of infectious particles between patients by health workers are two avoidable causes of HCAIs. Half of the respondents also did not recognize that the hospital environment was the main source of pathogens that caused HCAIs but rather thought they came from organisms within the patient. This affects the way "non-infectious" equipment (stethoscopes, sphygmomanometers, thermometers etc.) and surfaces (beds, bedside cabinets, etc.) are handled and cleaned and was evident in the observation that the most missed opportunity for hand hygiene is after contact with patient surroundings which corresponds with the findings of Fitzgerald et al. (2013) and Santosaningsih et al., (2017).

Hand rubbing is a more rapid way of HH than hand washing and though this seems to be a well-known fact, hand rubbing is still not a popular method of hand hygiene. This may be due to the unavailability or unpredictable supply of hand rubs as seen in the ward infrastructure surveys especially in BCH where the alcohol hand rub dispensers were mainly those affixed to the wall or on the trolley. Personal hand rub dispensers attached for staff have been proposed to increase adherence (World Health Organization, 2009b) but none of the staff surveyed had access to those. Alcohol hand rubs are also known to cause skin dryness which may also account for the unpopularity of this method of HH but can be mitigated by the routine use of hand cream which a number of respondents were not aware of. Hand washing and hand rubbing are not recommended to be performed in sequence (one after the other) as it promotes skin irritation and the damaged skin that could result promotes the colonization of skin with bacteria (World Health Organization, 2009b). There is a

general practice of attempting to dry off water on the skin with the alcohol hand rub (or plain methylated spirit) usually due to the unavailability of single use towels in health facilities. The practice has almost become a norm but is ultimately detrimental to provision of clean care.

Respondents had knowledge on when hand hygiene was needed with visible exposure to blood being the most well-known reason for hand washing. This was reflective of the observation of hand washing after visible exposure to body fluids seen in all the units. Mccay (2015) suggested that feelings of disgust may influence compliance in health workers more than just knowledge which would account for universal adherence to hand washing after exposure to body fluids (which is likely to elucidate feelings of disgust) seen in this study. Bed making, which would be considered as an exposure to patient surroundings, required hand hygiene usually hand rubbing, it was not seen in practice. This goes to support the analysis made that knowledge of the protocols has no effect on adherence to the protocols.

The adherence levels seen in the study in the two facilities exceeds the expected range of 5-60% (World Health Organization, 2009b). This could be explained by the phenomenon observed by Dhar et al., (2010), where a higher compliance/adherence was recorded when the observations were done by someone affiliated to the facility/ward being observed as was the case in this study. Santosaningsih et al., (2017) in a study done in Indonesia also found that staff who are considered as leaders or role models (especially doctors) influence the hand hygiene practices of the unit and may account for the high adherence levels seen among all categories of staff in both units. It could also be due to the change in behaviour by staff knowing that they were being watched (Hawthorne effect). There was however no significant

difference between the mean adherence in the various categories of staff (doctors, nurses and midwives) and between the staff of the two units.

The most common causes of non-adherence to hand hygiene include forgetfulness, emergencies/being too busy/high workload and water shortages/inadequate supplies. Looking at the staff strength of BCH and the average deliveries and admissions at the neonatal unit compared to that of HTH, it can be inferred that there is indeed a higher workload at BCH than HTH which may have resulted in the lower compliance seen. Also, the bed to sink ratio of 13:1 at BCH versus 6:1 at HTH reflects a lack of adequate hand hygiene facilities in Battor which may also account for the lower adherence seen. Water supply is a problem in both facilities but was more strongly voiced out by the staff at HTH. This is sadly in line with the 2015 WHO WASH report which found that 35% of health facilities in an assessment of 54 countries (including Ghana), failed to offer soap and water for hand washing (WHO & UNICEF, 2015).

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

Knowledge of hand hygiene has no effect of adherence to hand hygiene. Current models of training in hand hygiene compliance suggest the use of behavioural methods to increase compliance to the protocols.

There was a high level of adherence to hand hygiene seen in both facilities which may be from the Hawthorne effect or observer bias in reporting. There were no significant differences between the hand hygiene of the staff of the different units or the various categories of staff.

Reasons for non-adherence to hand hygiene protocols as reported by staff include forgetfulness, high workload or being too busy and inadequate hand hygiene supplies including water.

6.2 LIMITATIONS

The study was done over a short period of time which did not allow for adequate observations of staff. Moreover, the staff was informed of the observations through the participant information sheet and may have modified their behaviour (Hawthorne effect).

6.3 RECOMMMENDATIONS

1. Provision of adequate hand hygiene supplies by the management of the hospitals is key in increasing adherence to hand hygiene in the two hospitals.

2. Also, reminders of hand washing made by the management of the hospitals with catchy slogans or captions, apart from the posters provided by the MOH or GHS may help to curb the forgetfulness of staff.
3. Frequent hand hygiene audits with feedback may also help to identify the gaps and implement changes in the siting of hand hygiene facilities for easy access to help improve compliance of staff to hand hygiene protocols.
4. The revision of the case definition of sepsis backed by laboratory support (culture and sensitivity testing) is very essential in ensuring uniformity of diagnosis which aids the rational use of medicines especially antibiotics to prevent the resistance to antibiotics that is plaguing the world currently.
5. There is more work to be done in assessing hand hygiene in other wards within the same facility in places like the theatre and emergency which have high opportunities of hand hygiene and higher opportunities for cross-transmission of infections. Other facilities in the region and indeed the entire country could be also assessed to give better regional and national estimates that informs interventions and can be used as a reference for further evaluation.

6.4 CONCLUDING REMARKS

Hand hygiene should be an ingrained habit of every healthcare worker, ensuring that they and their clients as well as every visitor to the hospital is protected and goes back home at the right time without acquiring any infections that could prolong their stay and also increase their bills and increase their chances of death. Clean care should be non-negotiable.

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APPENDICES

APPENDIX 1

PARTICIPANTS' INFORMATION SHEET

ADHERENCE TO HAND HYGIENE PROTOCOLS IN TWO HOSPITALS IN THE VOLTA REGION

INTRODUCTION

I am Dr. Esi Yacoba Bart-Plange, a medical officer currently pursuing a Masters in Public Health at the School of Public Health at the University of Ghana, Legon. I currently work at HAG Medical Centre at Adjirigano in Accra and can be reached on mobile phone number **+233244583418** or **+233209570357** and my email address is **esyacobart@gmail.com**.

VOLUNTARY PARTICIPATION

I would like to invite you to take part in a research study titled ***"Adherence to hand hygiene protocols in two hospitals in the Volta region"***. Before you decide, you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully. Ask questions if anything you read is not clear or if you would like more information. Please take time to decide whether you want to participate in the study or not. Also take note that you can opt out of the study at any point in time without any penalty.

BACKGROUND AND PURPOSE OF STUDY

The research seeks to explore the hand hygiene (hand washing and use of alcohol based hand rub) knowledge, attitudes and practices of healthcare workers who handle

newborns. The Volta region has the highest neonatal mortality rate in Ghana (33 per 1000 live births vs 25 per 1000 live births). Great strides have been made in reducing this figure including training of health workers in various aspects of newborn care and infection prevention and control. Hand washing has been shown to be the single most effective means of preventing infection and limiting its spread especially in the health facility setting.

PARTICIPANT'S INVOLVEMENT

The study will require you to fill a questionnaire which will not take a lot of time to complete. You will also be observed during your regular activities on the ward for performing hand hygiene properly during the WHO five moments of hand hygiene. You will not be told when these observations are being done and the observer will not interrupt your duties or make any comments to you during the observations. You will be given feedback at an appropriate time (either at the end of your shift or when you have a break). You will be given a copy of this information sheet and the consent form to keep as proof of your participation and for reference.

PARTICIPANT'S PRIVACY

You will be asked to fill the questionnaire away from everyone so your responses are not scrutinized. Both the questionnaire and the observation sheet will have a unique number for identification and your initials but no names will be used. The data collected will be used only for the purpose of this study.

CONFIDENTIALITY

The completed questionnaire and observation tool will be kept under lock and key in my office and the data entered on the software will be password protected and the password will be kept confidential. The filled questionnaires and observation tool will be destroyed after a year. You will be given a copy of the signed information sheet to take home.

RISKS

The observation may cause you some discomfort or unease (the sense of being watched). There are no other known risks involved in the study.

REMUNERTION/ BENEFITS

There is **no** remuneration however you would be contributing a great deal to science and to help policy makers address the challenges to hand hygiene that exist in practice.

FUNDING

This study is fully funded by me and I bear all cost associated with the study.

Thank you.

For further questions or clarifications about the research, please contact

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For questions regarding the ethics of the study or your rights as a participant, please contact

Madam Hannah Frimpong

GHS ERC Administrator

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APPENDIX 2

CONSENT FORM

ADHERENCE TO HAND HYGIENE PROTOCOLS AND ITS EFFECT ON THE OCCURRENCE OF NEONATAL SEPSIS IN TWO HOSPITALS IN THE VOLTA REGION

PARTICIPANT'S STATEMENT

I acknowledge that I have read the purpose and contents of the Participant's Information Sheet. I fully comprehend the contents written therein and any potential implications as well as my right to withdraw from the study at any point in time without any penalty even after I have signed this form. I have had the opportunity to ask questions and they have been answered satisfactorily. I voluntarily agree to be part of this study.

Initials of Participant …… ID Code ……

Signature of Participant …… Date …….

INVESTIGATOR'S STATEMENT AND SIGNATURE

I certify that the participant has been given ample time to read and learn about the study. All questions and clarifications raised by the participant have been duly addressed.

Researcher's name: ……

Signature: …….

Date: ……

APPENDIX 3

QUESTIONNAIRE **ID NUMBER……**

DEMOGRAPHIC DATA

1. **Initials**:……...
2. **Age (years)** ……
3. **Sex**

☐ Male ☐ Female

4. **Religion**

☐ Christianity ☐ Islam ☐ Traditional religion

☐ Other (please specify) …….

5. **Category of staff**

☐ Nurse ☐ Midwife ☐ Doctor

☐ Student nurse ☐ Student midwife ☐ Medical student

☐ Other (Please specify)…….

6. **Rank** ……
7. **Ward**

☐ Maternity ☐ Babies' unit/NICU

☐ Other (Please specify) ……

KNOWLEDGE, ATTITUDE AND PRACTICE OF HAND HYGIENE

8. Did you receive formal training in hand hygiene in the last three years?

a. ☐ **Yes** ☐ **No**

9. Do you routinely use an alcohol-based hand rub for hand hygiene?

a. ☐ **Yes** ☐ **No**

10. Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility? (*tick one answer only*)

a. ☐ Health-care workers' hands when not clean

b. ☐ Air circulating in the hospital

c. ☐ Patients' exposure to colonised surfaces (i.e., beds, chairs, tables, floors)

d. ☐ Sharing non-invasive objects (i.e., stethoscopes, pressure cuffs, etc.) between patients

11. What is the most frequent source of germs responsible for health care-associated infections?

(tick one answer only)

a. ☐ The hospital's water system

b. ☐ The hospital air

c. ☐ Germs already present on or within the patient

d. ☐ The hospital environment (surfaces)

12. Which of the following statements on alcohol-based hand rub and hand washing with soap and water are true?

a. Hand rubbing is more rapid for hand cleansing than hand washing

☐ True ☐ False

b. Hand rubbing causes skin dryness more than hand washing

☐ True ☐ False

c. Hand rubbing is more effective against germs than hand washing

☐ True ☐ False

d. Hand washing and hand rubbing are recommended to be performed in sequence

☐ True ☐ False

13. What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands?

(Tick one answer only)

a. ☐ 3 seconds

b. ☐ 10 seconds

c. ☐ 30 seconds

d. ☐ 1 minute

14. Which type of hand hygiene method is required in the following situations?

a. Before palpation of the abdomen ☐ Rubbing ☐ Washing ☐ None

b. Before giving an injection ☐ Rubbing ☐ Washing ☐ None

c. After emptying a bedpan ☐ Rubbing ☐ Washing ☐ None

d. After removing exam gloves ☐ Rubbing ☐ Washing ☐ None

e. After making a patient's bed ☐ Rubbing ☐ Washing ☐ None

f. After visible exposure to blood ☐ Rubbing ☐ Washing ☐ None

15. Which of the following should be avoided because it increases likelihood of colonisation of hands with harmful germs?

a. Wearing jewellery ☐ Yes ☐ No

b. Damaged skin ☐ Yes ☐ No

c. Artificial fingernails ☐ Yes ☐ No

d. Regular use of a hand cream ☐ Yes ☐ No

Please consider your own hand hygiene. Then tick the number between 1 and 5 that best reflects your opinion at present

NB: STRONGLY *DISAGREE* (1 – 5) STRONGLY *AGREE*

16. I have sufficient knowledge about hand hygiene

☐ 1 (strongly **disagree**) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (strongly **agree**)

17. I am confident in my ability to perform hand hygiene properly

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

18. Hand hygiene is embedded into my professional practice

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

19. I take pride in my hand hygiene

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

20. There are posters about hand hygiene in my workplace

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

21. The frequency of hand hygiene required makes it difficult for me to carry it out

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

22. Sometimes I am too busy for hand hygiene

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

23. Sometimes I miss out hand hygiene simply because I forget it

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

24. I am more likely to forget hand hygiene if I am tired

☐ 1 ☐ 2 ☐3 ☐ 4 ☐ 5

25. When I perform hand hygiene it irritates my hands

☐ 1 ☐ 2 ☐3 ☐ 4 ☐ 5

26. I perform hand hygiene out of respect for my patients

☐ 1 ☐ 2 ☐3 ☐ 4 ☐ 5

27. I feel guilty if I omit hand hygiene

☐ 1 ☐ 2 ☐3 ☐ 4 ☐ 5

28. My hand hygiene is encouraged by others

☐ 1 ☐ 2 ☐3 ☐ 4 ☐ 5

29. I feel annoyed when hand hygiene is not carried out properly by others

☐ 1 ☐ 2 ☐3 ☐ 4 ☐ 5

30. It is difficult to prompt senior staff when they miss out hand hygiene

☐ 1 ☐ 2 ☐3 ☐ 4 ☐ 5

31. Emergencies and other priorities make hand hygiene more difficult at times

☐ 1 ☐ 2 ☐3 ☐ 4 ☐ 5

32. Facilities for hand hygiene are unavailable/inadequate

☐ 1 ☐ 2 ☐3 ☐ 4 ☐ 5

33. There is NO motivation to perform hand hygiene

☐ 1 ☐ 2 ☐3 ☐ 4 ☐ 5

34. I may omit hand hygiene because

……..**……**

……

Thank you very much for taking the time to fill this questionnaire!

APPENDIX 4

WHO HAND HYGIENE OBSERVATION FORM

Facility:		**Shift (M/A/N):**		**Session Number:**	
Department:		**Date:** (dd/mm/yy)	/ /	**Observer:** (initials)	
Ward:		**Start/End time:** (hh:mm)	: / :	**Page N°:**	
		Session duration: (mm)			

Prof.cat		**Prof.cat**		**Prof.cat**		**Prof.cat**	
Initials		**Initials**		**Initials**		**Initials**	
ID N°		**ID N°**		**ID N°**		**ID N°**	

Opp.	**Indication**	**HH Action**	**Opp.**	**Indication**	**HH Action**	**Opp.**	**Indication**	**HH Action**	**Opp.**	**Indication**	**HH Action**
1	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**1**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**1**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**1**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves
2	☐ bef-pat. ☐ bef-asept.	☐ HR ☐ HW	**2**	☐ bef-pat. ☐ bef-asept.	☐ HR ☐ HW	**2**	☐ bef-pat. ☐ bef-asept.	☐ HR ☐ HW	**2**	☐ bef-pat. ☐ bef-asept.	☐ HR ☐ HW

	☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	○ missed ○ gloves		☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	○ missed ○ gloves		☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	○ missed ○ gloves		☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	○ missed ○ gloves
3	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**3**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**3**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**3**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves
4	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**4**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**4**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**4**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves
5	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**5**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**5**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**5**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves
6	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**6**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**6**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**6**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves
7	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**7**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**7**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**7**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves

8	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**8**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**8**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	**8**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves

KEY

Shift (M/A/N) – Morning/Afternoon/Night

Prof. cat – Professional category (Nurse/Midwife/Doctor)

Bef-pat – Before patient contact

Bef-asept – Before aseptic procedure

Aft-b.f. – After exposure to body fluids

Aft-pat – After patient contact

Aft.p.surr – After contact with patient surroundings

HR – Hand rubbing

HW – Hand washing

Missed – Missed opportunity

APPENDIX 5

BASIC COMPLIANCE CALCULATION

	Facility/Ward:						Period:			Date:					
	Prof.cat.			Prof.cat.			Prof.cat.			Prof.cat.			Total per session		
Session N°	Opp (n)	HW (n)	HR (n)	Opp (n)	HW (n)	HR (n)	Opp (n)	HW (n)	HR (n)	Opp (n)	HW (n)	HR (n)	Opp (n)	HW (n)	HR (n)
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
Total															
Calculation	Act (n) = / Opp (n) =			Act (n) = / Opp (n) =			Act (n) = / Opp (n) =			Act (n) = / Opp (n) =			Act (n) = / Opp (n) =		

Compliance					

$$\text{Adherence (\%)} = \frac{\text{Actions}}{\text{Opportunities}} \times 100$$

APPENDIX 6

INDICATION-RELATED COMPLIANCE WITH HAND HYGIENE

	Facility:						Period:			Setting:					
	Before touching a patient			Before clean/ aseptic procedure			After body fluid exposure risk			After touching a patient			After touching patient surroundings		
Session N°	Indic (n)	HW (n)	HR (n)	Indic (n)	HW (n)	HR (n)	Indic (n)	HW (n)	HR (n)	Indic (n)	HW (n)	HR (n)	Indic (n)	HW (n)	HR (n)
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
Total															

Calculation	Act (n) = / Indic1 (n) =	Act (n) = / Indic2 (n) =	Act (n) = / Indic3 (n) =	Act (n) = / Indic4 (n) =	Act (n) = / Indic5 (n) =
Ratio act / indic*					

APPENDIX 7

WARD INFRASTRUCTURE SURVEY

Period Number*

Date: **Facility:**

Ward:

4. **Department (please select the department which best represents yours):**

☐ Obstetrics ☐ Paediatrics ☐ Other

5. **Position of the person completing this questionnaire: ……**

6. **Number of health-care workers on this ward:** ☐ Nurses ☐ Physicians ☐ Auxiliaries

7. **Is water regularly available?** ☐ Always ☐ Intermittently ☐ Rarely ☐ Never

8. **Is running water available?** ☐ Yes ☐ No

9. **Is water visibly clean?** ☐ Yes ☐ No ☐ Don't know

10. **What kind of taps is available?** ☐ Hand-operated ☐ Elbow/wrist-operated

☐ Foot-operated ☐ Automatic

11. Are disposable towels available at all sinks? ☐ Always ☐ Intermittently ☐ Rarely ☐ Never

12. Is soap available at all sinks? ☐ Always ☐ Intermittently ☐ Rarely ☐ Never

13. Is an alcohol-based hand rub available? ☐ Always ☐ Intermittently ☐ Rarely ☐ Never

14. If yes, what type of hand rub dispensers are available? (select all applicable answers)

☐ Pocket bottle ☐ Bottle affixed to trolley/tray ☐ Bottle affixed to bed

☐ Wall dispenser ☐ Dispenser located on bedside table/trolley

15. If wall dispensers are available, are they placed at the point of care*?

☐ Yes ☐ Yes, but not at each point of care ☐ No

16. Does every health-care worker have easy access to hand rub pocket bottles?

☐ Always ☐ Intermittently ☐ Rarely ☐ Never ☐ Not applicable

17. Is there an assigned person responsible for the refilling or replacement of empty dispensers?

☐ Yes ☐ No

18. Are hand rub dispensers replaced when empty?

☐ Always ☐ Intermittently ☐ Rarely ☐ Never ☐ Not applicable

19. Are posters illustrating hand wash technique displayed beside each sink? ☐ Yes ☐ No

20. Are posters illustrating hand rub technique displayed close to the dispensers and in multiple areas of the ward?

☐ Yes ☐ No

21. Are posters illustrating indications for hand hygiene displayed in multiple areas of the ward?

☐ Yes ☐ No

22. Is any other type of reminder on hand hygiene displayed/available on this ward?

☐ Yes ☐ No

23. Are examination gloves available on this ward?

☐ Always ☐ Intermittently ☐ Rarely ☐ Never

24. Are audits on hand hygiene compliance periodically performed on this ward?

☐ Yes ☐ No

25. If yes, how frequently?

☐ At least once a year ☐ At least once every 2 years ☐ Less frequently

	Room N°/ID	Total N° of beds in this room/area	N° of beds with hand rub within arm's reach	N° of sinks in this room/area	N° of sinks with clean water	N° of sinks with soap	N° of sinks with disposable towel	N° of sinks with clean water, soap, disposable towel	Total N° of hand rub dispensers in this room/area	N° of fully-functioning and filled dispensers	N° of health-care workers encountered	N° of health-care workers encountered with hand rub bottle in their pocket
A) Patient rooms on this ward												
1												
2												
TOT	/											
B) Treatment rooms (ambulatory, day hospital, etc.)												
1												
2												
3												
TOT	/											
C) Corridors and other areas with points of care*												
1												
2												
3												
TOT	/											
TOT												

TOT = total; N° = number *Point of care: the place where three elements occur together: the patient, the health-care worker, and care or treatment involving contact with the patient and his surrounding

APPENDIX 8

TIMELINES

ACTIVITY	**DATES**
Proposal presentation	27th October, 2018
Development of literature review and revision of protocol	November 2018 – February 2019
Development of study tool (questionnaire and checklist)	December 2018
Submission of protocol for ethical clearance	March 2019
Training of research assistants	April 2019
Pretesting	April/May 2019
Corrections made to study tool based on pre-test	April/May 2019
Data collection and write up	June 2019
Submission of comb-bound dissertation to School of Public Health for clearance for Viva voce	1st-6th July, 2019
Presentation at School of Public Health (Viva voce)	13th July, 2019

Submission of revised dissertation to department	17th-22nd July, 2019
Presentation at study areas	December 2019

APPENDIX 9

EXPENSES

ACTIVITY	**COST**
Ethical clearance (including printing/binding of protocol)	GHC 250.00
Printing of questionnaires	GHC 400.00
Transportation	GHC 800.00
Food and drink	GHC 250.00
Printing and binding of dissertation	GHC 500.00
Remuneration for research assistants	GHC 800.00
Possible donation to Neonatal unit and/or Maternity	GHC 750.00
Total	*GHC 3,750.00*

APPENDIX 10

ETHICAL CLEARANCE

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.

MyRef. GHS/RDD/ERC/Admin/App 19/217
Your Ref. No.

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
GPS Address: GA-050-3303
Tel: +233-302-681109
Fax + 233-302-685424
Email: ghserc@gmail.com
20th June, 2019

Esi Yacoba Bart-Plange
University of Ghana
School of Public Health
Legon

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	**GHS-ERC 025/03/19**
Project Title	Adherence to hand Hygiene Protocols and its Effect on the Occurrence of Neonatal Sepsis in two Hospitals in the Volta Region
Approval Date	20th June, 2019
Expiry Date	19th June, 2020
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.
- Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....
Dr. Cynthia Bannerman
(GHS-ERC CHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra