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EVALUATING THE USE OF CHLORHEXIDINE GEL IN THE MANAGEMENT OF NEWBORNS' UMBILICAL CORD IN THE GREATER ACCRA REGIONAL HOSPITAL

BY

MAAME AKOSUA OWUSU ASANTE

STUDENT ID: 10933531

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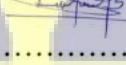
DECLARATION

I hereby declare that this thesis is the result of my original work and that no part of it has been presented for another degree in this University or elsewhere. All references used in this work have been fully acknowledged.

I bear sole responsibility for any shortcomings.

Signature of student: ……..…… Date **28/04/2023** ……..

Name of student: Maame Akosua Owusu Asante



Signature of Supervisor: …… Date…… **28/04/2023** …..

Name of Supervisor: Dr. Leonard Baatiema

DEDICATION

I dedicate this work to God Almighty for being the pillar of it all and to my husband Mr. Benjamin Ofotsu Maccarthy for being a source of inspiration, guidance, and support.

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ABSTRACT

Introduction: Good umbilical cord care is paramount in the reduction of incidences of neonatal tetanus and omphalitis. Various public health interventions have demonstrated effectiveness in reducing the incidence and fatalities from these infections. The use of chlorhexidine gel decreased the incidence of omphalitis by an appreciable 75% and reduced overall neonatal mortality by 26% as compared to dry cord care. Despite this, the uptake and application of the gel in the management of the umbilical cord are less known, especially in Ghana and other SSA countries.

Objective: This study evaluated the use of chlorhexidine gel in managing the umbilical cords of newborns in the Greater Accra Regional Hospital.

Methods: This study adopted an exploratory case study design to determine the use of chlorhexidine gel in newborns at Greater Accra Regional Hospital. A purposive sampling technique was used to identify and select the participants. The data were collected until saturation was attained. The study population, hence, comprised 8 midwives, 2 nurses, and 8 post-natal mothers. In-depth interviews were conducted by the principal investigator using an interview guide and audio-recorded with permission from the study participants. The audio-recorded interviews were transcribed verbatim and analyzed using the ATLAS software. Thematic analysis was done, and quotations were used to illustrate the results.

Results: All the midwives and nurses confirmed that Ridge Hospital has instituted guidelines and conducts workshops for the use of chlorhexidine gel which addresses the prevention of sepsis and other neonatal infections by advocating for a sterile procedure and providing details on the steps to follow in applying the gel. Also, on the comparison of the use of the Methylated spirit and Chlorhexidine gel, the midwives and nurses stated that the gel is the preferred method

of cord care due to its antibacterial properties and reduced risk of infection, however, it has a slower drying time. In this regard, some post-natal mothers stated that they prefer the use of the spirit to the gel as the spirit makes the cord heal faster. Further, the majority of the care providers indicated that the use of methylated spirit has been phased out and replaced with Chlorhexidine gel as the primary method of cord care. While the benefits of the chlorhexidine gel over methylated spirit are well established as the gel contains antibiotics, which reduces the risk of infection in newborns, some post-natal mothers maintained that the use of the gel leads to cord infections. Other side effects with regards to the use of the gel as stated by both healthcare providers and post-natal mothers include; delayed cord drying off, cord stump, delayed cord fall off, and adverse reactions when the gel touches other parts of the baby. On the side of the midwives and nurses, they explained that cord infections resulting from the use of the gel arise from improper use of the gel and excessive gel application. Some symptoms of an infected umbilical cord as revealed by this study include redness and swelling, the base of the cord may also be warm to the touch a strong, unpleasant odour coming from the umbilical cord, and other discharges coming from the cord.

Conclusion: There is a perception that the use of Chlorhexidine gel for cord care in the Greater Accra Regional Hospital in Ghana is an effective method of reducing the risk of neonatal infections. There are, however, some setbacks associated with the use of Chlorhexidine gel, such as delayed cord drying time and a higher rate of stumps, these are outweighed by its benefits in reducing the risk of infection. It is, therefore, recommended that the hospital consider educating mothers on the benefits of Chlorhexidine gel and the potential drawbacks to alleviate any concerns they may have. Additionally, continuous monitoring of the use of Chlorhexidine gel and evaluate its long-term effects on the health of newborns.

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WHO	World Health Organisation
MoH	Ministry of Health
GHS	Ghana Health Service
CBD	Central Business District
USAID	United States Agency for International Development
ILO	International Labour Organisation

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Globally, about three million newborns die annually. Out of this number, the WHO (2020) estimates that about 15% of these newborns' deaths are attributed to infection. Poor hygiene and lack of antisepsis at birth, especially within the first week of life increases the risk of fatal but preventable infections. Chlorhexidine Digluconate was added to the WHO's (2018) essential list of medicines for children's use, particularly for umbilical cord care.

The cord links the baby and the placenta during pregnancy. The umbilical cord consists of blood vessels and connective nerve cells submerged in amniotic fluid. According to Fahmy (2018), the umbilical cord is covered by amniotic fluid which is constant with the outer epithelial layer of the embryo to the accessory of the umbilicus. After delivery, the umbilical cord is expurgated splitting the mother and the baby. A stump is left which is expected to dry and fall off, which will naturally lead to the healing of the wound due to the cut. Nonetheless, the wound/opening could be a portal of entry for pathogenic microorganisms. According to (WHO, 2020), this ~~by~~ microorganisms potentially leads to site infections or bloodstream infections, such as septicemia. In effect, the cord must be kept clean. Pathogenic microorganism sources could be from a variety of factors, such as the mother's canal, the caregiver/health worker's hand, or the environment of delivery (Karumbi et al., 2013). Essentially, the umbilical cord is a vital point of entry for microorganisms which potentially lead to mortalities. (Muriuki et al., 2017).

Studies by Walker (1999) concluded that sound and good umbilical cord care is paramount in the reduction of incidences of neonatal tetanus and omphalitis. Various public health activities have demonstrated effectiveness in reducing the incidence and fatalities from these infections. Studies

in Nepal undertaken by Zupan and Garner (2019) revealed that the use of chlorhexidine gel decreased the incidence of omphalitis by an appreciable 75%. Additionally, overall neonatal mortality was reduced by 26% as compared to dry cord care or non-use of the gel. There is inadequate proof to support the usage of topical antimicrobials on cord stumps to practically prevent sepsis (Claris 2021). Ultimately, studies undertaken globally have been scoped only in advanced and developed settings, which does not show evidence of the probability of effectiveness when such interventions are adopted in less developed settings. Essentially, a systematic review undertaken by Zupan and Garner (2019) using randomized measured trials and quasi-measured trials revealed zero studies from developing countries about cord care.

Claris (2021) asserted that until 2015, the Kenyan guidelines on cord care recommended dry cord management with the use of "crude" methods such as the use of methylated spirit, alcohol, and povidone-iodine. A systematic review was undertaken to standardize practices and assess existing indications on paramount cord practices whose fallouts informed the formulation of the current procedures on cord care that were outdoors in 2016. The prevailing guidelines for Kenya for newborn cord care direct the use of chlorhexidine gel should be used to prevent cord sepsis (MoF, 2016). Before its overall implementation, it was piloted in one county to assess its impact on cord care. Another study was carried out during the pilot stage to define the view of the healthcare workers as well. The study revealed that chlorhexidine gel use was appreciable to both the health workers and the community but suggested that before scale-up, community awareness, and sensitization, health care workers training and distribution of guidelines and protocols to workers be done effectively (Miriuki et al. 2017).

According to WHO (2020), guidance about the care of the umbilical cord has evolved, which necessitates continuous training and sensitization of the workforce/healthcare staff on the best

and current practices. Many developing countries have encountered challenges adjusting to the use of the gel with constant reports of crude methods such as the use of antibiotics, antiseptics, and dry cord care. The WHO (2020) attributed this to inadequate training and sensitization of health staff. WHO (2013) revealed that chlorhexidine gel is a comprehensive spectrum antiseptic that is safe and effective for plummeting bacterial annexation on the skin and umbilical cord remains of newborns. Studies by Kangundo (2018) revealed that chlorhexidine gel use has helped in the general reduction of infection among newborns by 68%, with reduced neo-natal mortality by 23%. WHO (2013) concluded that, in most African settings, clean dry cord care is recommended for newborns at home and health facilities with a record of low neo-natal mortalities. Hence, the adoption and use of chlorhexidine gel may be considered to replace the use of crude cord care methods, such as cow dung application on newborns.

Research conducted by Kangundo (2018) and the Pharmacy and Poisons Board of Kenya did not address the misgivings that some healthcare personnel may have on the use of chlorhexidine gel. This lack of confidence and apathy exhibited in the gel use and personal beliefs of the staff have also added to the non-use or poor use by staff and maternal mothers. Moreover, Okpaleke et al. (2019) concluded that the lack of training and sensitization upon mass adoption of chlorhexidine gel has also contributed to the knowledge gap of its use. The conclusions from Okpaleke et al. (2019) on neonatal mortalities in Zimbabwe also revealed a surge in complaints and misgivings of umbilical cord care at the hospital, causing the urgency to document all complaints and concerns and accordingly assess the level of knowledge of health care workers on the use of the chlorhexidine gel, purposely to address the gap of both knowledge and complaints.

Ghana is a lower-middle-income country in Sub-Saharan Africa with neonatal mortality rates ranging from 21 to 25 deaths per 1,000 live births in the last decade (WHO, 2019). The current infant neonatal mortality rate for Ghana in 2023 is 30.802 deaths per 1000 live births, a 3.04% decline from 2022 (MacroTrends, 2023). The infant neonatal mortality rate for Ghana in 2022 was 31.768 deaths per 1000 live births, a 2.95% decline from 2021 (Abdul et al.,2021)

In Ghana, the Ministry of Health (MoH) and the Ghana Health Service (GHS) undertook extensive research in 2016 on the adoption and use of chlorhexidine gel for the umbilical cord. Cord care in newborns, geared towards the formulation of the country's implementation policy on chlorhexidine gel adoption. Based on the conclusions from the research, the MoH and GHS recommended the adoption and daily application of chlorhexidine gel (chlorhexidine digluconate 7.1% gel) to the umbilical cord of newborns, until the cord cascades and the wound is entirely healed. Subsequently, the gel was added to the list of essential medicine lists in 2017 for use in Ghanaian settings. The Ghana Health Service (GHS, 2018) indicated that the primary cause of neonatal mortalities was infections, leading to 31%, pre-term complications at 29%, and intrapartum-associated events at 27%. The use of the gel has been widely accepted and used in various health facilities in Ghana. This study, therefore, sought to explore the uptake of the gel in the management of umbilical cords in newborns in Greater Accra Regional Hospital. The study sought to gather qualitative data from Greater Accra regional hospital, Ridge Hospital in Accra to shed light on the uptake and the application of the chlorhexidine gel.

1.2 Problem Statement

Upon the adoption and use of chlorhexidine gel globally through the direction of the World Health Organization (WHO), it has become the standard practice for cord care in newborns. Despite this, the uptake and application of the gel in the management of the umbilical cord are less known,

especially in Ghana and other SSA countries. For example, in Ghana, neonatal deaths are as high as 30.802 deaths per 1000 live births (MacroTrends, 2023). Neonatal mortality constitutes a high proportion of the global infant mortality. Each year 3 million newborns die globally; approximately 13% of these deaths are caused by infections. Other common causes of neonatal mortality include complications of prematurity, low birth weight, and adverse intrapartum events (including birth asphyxia).

In Ghana, according to the GHS (2018), the primary causes of neonatal deaths could be attributed to traditional methods of umbilical cord care, such as the use of shea butter, rat faeces, cow dung, toothpaste, etc. Studies by Claris (2021) in other African countries concluded that chlorhexidine gel usage on newborns has an unblemished and safe record, and is cost-effective and feasible. The studies by Claris (2021) also showed that, with adequate training and sensitization of healthcare staff on the safe use of chlorhexidine gel, it can be effortlessly administered by healthcare staff.

Despite the growing body of evidence about the safety, effectiveness, and cost-effectiveness of this gel, research to explore the uptake and use of the chlorhexidine gel in the management of the umbilical cord after delivery remains under-researched, and this knowledge gap is more pervasive in less-advanced countries within the sub-Saharan region. In Ghana, although neonatal deaths continue to be a major public health threat, with the GHS recommending the use of the gel in the management of the umbilical cord, there is a very limited understanding of the uptake and application of the gel in clinical and home-based settings.

There is an apparent gap in our understanding of how the gel is accepted and applied since its adoption in 2017, particularly from the main users, thus health care staff; to solicit their feedback and knowledge on how the gel has contributed to the reduction of newborn sepsis and mortalities. The study, therefore, sought to explore the experiences and views of health workers on the uptake

of the Chlorhexidine gel in the management of umbilical cord in newborn babies in the Greater Accra Regional Hospital, Ridge Accra.

1.3 General Objectives

To evaluate the use of chlorhexidine gel in managing the umbilical cords of newborns in the Greater Accra Regional Hospital.

1.3.1 Specific Objectives

The following specific objectives were pursued:

1. To identify measures and systems put in place by health facilities to support the use of chlorhexidine gel in managing the umbilical cords of newborns.
2. To explore the views of healthcare providers about their acceptability and use of chlorhexidine gel in managing the umbilical cords of newborns
3. To understand the perspectives of mothers of newborns about the use and potential benefit of chlorhexidine gel in the prevention of neonatal sepsis and mortality among newborns.

1.4 Research Questions

The study was guided by the following research questions:

1. What are the measures and systems put in place by health facilities to support the use of chlorhexidine gel in managing the umbilical cords of newborns?
2. What are the views of healthcare providers about their acceptability and use of chlorhexidine gel in managing the umbilical cords of newborns?
3. What are the perspectives of mothers of newborns about the use and potential benefit of chlorhexidine gel in the prevention of neonatal sepsis and mortality among newborns?

1.5 Scope of the Study

The scope of the study was grouped into two (2). These are the contextual scope and geographical scope.

a. Contextual Scope

Contextually, the study seeks to evaluate the use of chlorhexidine gel in managing the umbilical cords of newborns in the Greater Accra Regional Hospital., in the management of umbilical cords in newborn babies.

b. Geographical Scope

The study was conducted at the Greater Accra Regional Hospital, one of the leading referral facilities in the capital. The Hospital is situated within the Accra metropolis, within the Central Business District (CBD). The Hospital has carved a niche for itself as one of the highly regarded and diligent health facilities in the country. The hospital, which has undergone major rehabilitation works to be one of the prominent referral facilities in the country undertakes major surgical and other intensive care remedies to the general public. It has a school that trains various disciplines in the health sector, to facilitate the provision of quality health care to the citizenry.

1.6 Study Justification

The study objective was to evaluate the use of chlorhexidine gel for the management and care of the umbilical cord of newborns in Greater Accra Regional Hospital, Ridge Hospital. According to Draiko et al., (2021), a substantial portion of infections such as sepsis, tetanus and omphalitis were as a result of exposure of the umbilical cord stump to invasive pathogens. In other words, poor handling of the umbilical cord stump leads to infections which can result in infection in babies. Chlorhexidine cord application has been found to significantly reduce neonatal sepsis and mortality in developing countries such as Ghana (Berhe et al., 2017). Thus, there is the need to

stress the importance of including chlorhexidine cord application as an essential newborn care in any health setting. However, the use of chlorhexidine gel in managing the umbilical cords of newborns is low (Gelano et al., 2019). This could be associated with significant factors such as the level of education of mothers, awareness level as well as attitudes and perceptions of mothers and healthcare givers (Israel et al., 2023). This is an indication that the use of chlorhexidine gel in managing the umbilical cords of newborns is influenced by what is known about the gel and the unknown as well.

Based on this, the study seeks to identify measures and systems put in place by health facilities to support the use of chlorhexidine gel, the views of healthcare providers about their acceptability and use of chlorhexidine gel in managing the umbilical cords of newborns and the perspectives of mothers of newborns about the use and potential benefit of chlorhexidine gel in the prevention of neonatal sepsis and mortality among newborns.

Through this study, policy formulators, makers, and decision-makers will have an idea about the knowledge and perceptions healthcare workers and mothers have about the use of the gel. This will then inform policymakers on the effective strategies that can be used to encourage its use among mothers and healthcare workers. The results of the study are significant to the GHS and its development partners as they provide empirical evidence to support the development of strategies for cord care training of staff and other professionals to impart the method of application to mothers. Finally, the study will also fuse into the expansion of existing literature on the evaluation of Chlorhexidine, particularly in Ghana.

1.7 Structure of the Study

The study was organised into five (5) chapters. The first chapter discussed the introduction of the research or study which highlighted the cause and reason for researching this particular topic. The

second chapter encompasses a literature review, key concepts, definition of terms, and review of studies. The literature review has been developed in such a way as to match it with the research objectives. The third chapter was the development of a suitable methodology for the study. Here, details about the selection of the study area, sample techniques and sample size, methods of data collection, and methods of data analysis were identified. Chapter four presents the results obtained from the study. Chapter five presents the discussions of the results obtained from the study. Chapter six presents the conclusion of the study as well as recommendations that are based on the findings from the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

A literature review was undertaken in this study to unearth suitable concepts and theories geared towards laying a solid spine for easy comprehension and concise analysis of data that will be sourced. According to Mouton (2001), a review of literature is essential to research as it explains what has been studied previously or verified with emphasis on a research purpose. This literature review aims to place a specific research question within the current intellectual body of knowledge and thereby identify research gaps this study seeks to fill. As a result, the literature review conducted in this chapter of the study relates to the study's objectives and provides a detailed overview of the subject.

The topic under study was to evaluate the use of chlorhexidine gel in the management and care of umbilical cords of newborns in Greater Accra Regional Hospital, Ridge Hospital. Reviews were made from literature to explore the various concepts, under chlorhexidine, sepsis, traditional methods of umbilical cord care, and its performance in the prevention of some anomalies in cord care and management. Subsequently, the chapter ends with a general overview of how conceptually, the study intends to arrive at meeting all study objectives with the amalgamation of all relevant theories, concepts, reviews, and application of chlorhexidine gel in cord care.

2.2 Definition of Key Concepts

Definitions of salient concepts underpinning the use of chlorhexidine gel were discussed to appreciate the knowledge, performance, and impact on newborn sepsis.

2.2.1 Concept of Chlorhexidine Gel

The WHO (2013) explains chlorhexidine gel as an antiseptic broadly used for wound care. Generally, the gel can be used for hand washing, oral hygiene, pre-operative body shower, and for general disinfection purposes (United States Agency for International Development [USAID], 2014). The study precisely looks at the use of chlorhexidine gel in the management of umbilical cords in newborns, geared towards the reduction of sepsis and other infections.

2.2.2 Concept of Neonatal Sepsis

Imdad et al. (2013) asserted that sepsis in neonates is a life-threatening syndrome that occurs when the body's response to an infection results in injury to its tissues and organs. Ordinarily, the infection of sepsis is bacterial, however, it may also be initiated by fungi, viruses, or parasites (WHO, 2013). According to Uririoghene et al. (2020), neonatal sepsis is a clinical condition in the infant in its first 28 days or younger, demonstrated by systemic signs of infection and seclusion of a microbial pathogen from the bloodstream. Neonatal sepsis accounts for 38% of 3.4 million neonatal mortalities annually.

2.2.3 Concept of Newborns

The WHO (2013) explains a newborn as an infant under 28 days of age. During such a tender age, the neonate is at high risk of losing their life. The WHO (2013) further asserted that the vast majority of newborn mortality occurs in developing countries, where access to quality health care is limited.

The promotion of newborn survival demands building formidable health services, guaranteeing that every newborn is attended to by skilled personnel, and making hospital services available for emergencies. It is vital to ensure that early essential neonate care is provided, such as instant and persistent skin-to-skin contact and early exhaustive breastfeeding, to enhance the likelihood of

Survival and accordingly lay the fundamentals for a healthy life.

2.2.4 Concept of Healthcare Worker/Personnel

A healthcare worker/personnel is a person who provides healthcare services to the sick and unwell either directly as Doctors, Midwives, and general Nurses or indirectly as advisors, aides, laboratory experts, and even medical waste handlers (Bobby & Joseph, 2016). The WHO (2013) recognized the vital role of healthcare workers as the most valuable resource for health. The health sector could be one of the most hazardous settings to work in. Players in this sector are continuously exposed to a multifaceted variety of health and safety threats in the course of their work. This assertion is corroborated by Bobby and Joseph (2016) who added that hazards in the form of biological exposure to disease-causing organisms such as tuberculosis and HIV. The exposure could also be in the form of chemicals such as ethylene dioxide and glutaraldehyde. Again, Bobby and Joseph (2016) add physical hazards to the complex nature of health workers such as radiation and noise.

2.2.5 Concept of Evaluation

The concept of evaluation as explained by the International Labour Organisation (ILO) (2011) refers to the process that steadily and factually assesses the rudimentary elements of programs, policies, guidelines, and projects (thus design, implementation, and actuals/results) to define its overall value or significance. In effect, the motive is to provide reliable evidence for decision-makers to ascertain ways to attain more of the desired outcomes. The study seeks to evaluate how the guidelines have impacted surgical site infection prevention and control in Ridge Hospital, hence the adoption of the process evaluation type to effectively achieve study objectives.

Process Evaluation

According to Bess et al. (2004), this type of evaluation primarily focuses on how a program is implemented and operated. It identifies the decisions made and procedures undertaken in the development of a program or a policy. In essence, it documents a program's development and operation, assesses reasons for successful or unsuccessful implementation or performance, and offers information for likely replication. The OECD (2001) posited that process evaluation assists in the comprehension of the planning process of a guideline. This predominantly qualitative approach explains how and why decisions are made and activities are undertaken. The import of process evaluation is to retort to the inquiry of whether a program, policy, or guideline is functioning or not, and accordingly assist in decision-making about scaling up or not.

2.3 Guidelines on the Application of Chlorhexidine Gel among Healthcare Workers

The use of chlorhexidine gel, after being adopted for use by the WHO (2013) for all member states has been well implemented. This is evidenced in studies by Claris (2021) which concluded that 80% of member states of the WHO have subscribed to the use of gel in cord care. Studies by Fahmy (2018) revealed that 58% of health facilities in developing countries use the gel, whilst 30% still subscribe to the use of methylated spirit. The report further revealed that 12% also subscribe to other sources such as shea butter and cow dung. According to Zupan et al. (2019), health personnel are guided by the following guidelines in the application of the gel which includes ensuring the availability of chlorhexidine gel in both the labour and delivery rooms, using of counselling sessions for mothers before and after delivery. This will assist in easing any form of trauma or tension the mother has or is experiencing to ensure full concentration. There is also observing hand hygiene is imperative and should be done with soap and under running water 13

before piercing the tube, the use of a sharp protuberance is recommended to pierce the tube. Zupan et al. (2019) further add that health personnel should ensure that the bay is warm and wrapped accurately with only the naval area being exposed, the application of chlorhexidine gel should immediately be applied after the cord is severed (It should be applied on the umbilical stump and spread using the index finger throughout the abdominal section that ever came into contact with the umbilical stump). Muriuki et al. (2017) further assert that the application should be a single application is enough to cover the umbilical stump and the chlorhexidine gel takes a maximum of three minutes to dry up. In effect, the stump should be covered with a light cloth to avoid spreading. Also, keep the baby in a designated cot after the gel has dried up, if a delivery is not done in the health facility or the mother is not attended to by a trained midwife, subsequent visits to the home of the mother should be done within 24 hours to check the use of the chlorhexidine gel. Moreover, the application of chlorhexidine gel to the cord should be recorded in a designated maternal women checklist and submission of monthly reports on the application of chlorhexidine gel for cord care must be done and submitted on time.

2.4 Post-Natal Activities for Cord Care by Healthcare Worker and Mother

According to the USAID (2014), the healthcare worker should adhere to the following guidelines in cord care:

a. Inquiry if a mother has any concerns about the cord. This is done to ascertain if there have been any complications as a result of the chlorhexidine application.
b. Inquire how cord care is done by herself and demonstrate how hand hygiene is done before cord care.
c. Insist how dressing of the cord is done through a demonstration by the mother.

According to the USAID, (2014), the mother is obligated to adhere to the following guidelines in

the application of the Chlorhexidine gel to the umbilical cord of the newborn:

a) Application of the cord once daily. This should be done till the cord falls off completely and the wound is fully healed.
b) The chlorhexidine gel should be the only antiseptic to be applied to the umbilical cord and no other substance. This directive should be insisted on by healthcare workers on the first day of delivery, with maximum sensitization to the mother on how the gel is applied.
c) The use of napkins or diapers should be folded below the level of the umbilical cord. This should be done to prevent interfering with the gel rubbed on the cord. Essentially, it should be left dry and clean. Additionally, mothers should put loose or light clothing on the baby to allow the aeration of air around the umbilical cord.
d) Healthcare workers should ensure that sensitization of mothers should be strict on certainly not forcing the cord to fall off. This action could be either detrimental or lethal.

2.5 Evidence on the Effectiveness of Chlorhexidine Gel Application for Cord Care

Clinical trials conducted by Uririoghene et al. (2020) in Nepal, Nigeria, Zambia, Pakistan, and Bangladesh revealed an increase in the use of chlorhexidine gel, from the pattern of using methylated spirit. The study revealed some common factors, thus high neonatal mortality, and balanced deliveries in both the home and the hospital. Essentially, the study revealed that all countries have instituted guidelines on the application of chlorhexidine gel in the care of umbilical cords in newborns.

For instance, in Nepal, the study revealed that Chlorhexidine gel reduced newborn mortality by 24%, as compared to dry cord care. Also, newborn mortality was decreased by 35% due to the application of chlorhexidine gel within 24 hours after delivery. Also in Bangladesh single application of chlorhexidine gel on the first day after delivery reduced newborn deaths by 25%,

and also moderately decreased the rate of omphalitis and other bacteria cord colonization. Seven-day chlorhexidine use reduced intense cord infection by 60% and decreased bacterial colonization; newborn mortality was 6% lower in this cluster. In Pakistan, newborn deaths were reduced by 37% in the group that applied chlorhexidine gel as compared to the group that applied methylated spirit. Severe umbilical cord infection was decreased by 42% for the use of chlorhexidine gel, as compared to methylated spirit.

Furthermore, in Zambia, the use of chlorhexidine gel did not reduce the rate of newborn deaths as compared to methylated spirits. This was due to conclusions arising within the context of high delivery rates (65%) and lower neonatal deaths within the sample population for the study.

2.6 Performance of Chlorhexidine Gel over Methylated Spirit

According to USAID (2014), there are no negative feedbacks or side effects from the use of chlorhexidine gel for cord care and management. This was also corroborated by studies from Claris et al. (2021) which concluded that the application of chlorhexidine gel has neither gross nor net effect on the neonate. Claris et al. (2021) however indicated that the application of chlorhexidine gel can delay umbilical cord separation, nonetheless, this delay has no bearing effect on the newborn. Mullany et al. (2006); UNICEF (2013) and Sazawal et al. (2016) concluded four main beneficial performances of chlorhexidine gel over methylated spirit, thus the mechanism of action, spectrum of efficacy, safety profile, and application.

Table 2.1: Spectrum of Efficacy

Chlorhexidine gel	Methylated Spirit
Chlorhexidine gel has an extensive spectrum activity. Hence, it is Vigorous against gram-positive, gram-negative facultative anaerobes, aerobes and yeast.	Has a very narrow spectrum of activity.
Efficient relative to bactericidal activity at lower concentration	
Instantaneous bactericidal action	
Long duration of action	

Source: Adopted from Mullany et al. (2006); UNICEF (2013) & Sazawal et al. (2016)

Table 2.2: Mechanism of Action

Chlorhexidine gel	**Methylated Spirit**
An antiseptic that works effectively by absorbing bacteria cell tissues triggering a rupture	
The rupture of the cell wall causes seepages of minor molecules and precipitation of cytoplasmic proteins.	Works as a dehydrating agent that dislocates the osmotic equilibrium across cell tissues.

Source: Adopted from Mullany et al. (2006); UNICEF (2013) & Sazawal et al. (2016)

Table 2.3: Safety Profile

Chlorhexidine gel	Methylated Spirit
Presents no burning sensation to the cord	Umbilical cord Burning sensation
Has less toxicity	Highly combustible
Its potency is intact in high-temperature	Potency is lost when exposed to high-temperature
Evaporation does not occur at room temperature	At room temperature, evaporation occurs

Source: Adopted from Mullany et al. (2006); UNICEF (2013) & Sazawal et al. (2016)

Table 2.4: Application

Chlorhexidine gel	Methylated Spirit
Easy to apply on the umbilical cord of the neonate	Only applicable with cotton wool
Have a positive residual impact on the skin	Has no relative positive residual impact on the Skin

Source: Adopted from Mullany et al. (2006); UNICEF (2013) & Sazawal et al. (2016)

2.7 Importance of Good Umbilical Cord in Newborns

To ensure suitable umbilical cord care at delivery till the cord drops off and the wound heals, it is imperative to adopt an approach that averts life-menacing sepsis and cord contaminations (Mullany et al. 2006). The freshly expurgated umbilical cord is a common path of entry for aggressive bacteria that cause newborn sepsis and mortality (UNICEF 2013). According to Hodgins et al (2009), bacteria speedily colonize the wet cord remnant and gain direct contact with the bloodstream via umbilical channels that remain obvious for the initial few days after delivery.

Further, Snow (2013) asserted that bacterial colonization may result in cord infection with the likelihood of spreading to the immediate membranes. Sources of these bacteria comprise the mother's birth vessel, the environment in which the newborn was delivered, and the hands of the individual assisting with childbirth. Application of substances that are not suggested for umbilical cord care, such as methylated spirit and poor hygienic practices by healthcare workers are other inputs of infections (Snow 2013).

2.8 Symptoms of an Infected Umbilical Cord

According to PATH (2011), an infected cord in the neonatal period of a newborn is generally ascribed to a bacterial infection. These infections are usually caused by *Staphylococcus aureus* and *Escherichia coli*. According to PATH (2011); and Sazawal et al (2016), the symptoms include inflammation of the umbilical cord stump, soreness around the base of the cord, discharge from the umbilical cord stump, usually pungent discharge, haemorrhage from the stump and general symptoms like fever, fast heart rate, and jaundice.

2.9 Complications of an infected Umbilical Cord

Omphalitis, a primary complication arises from improper management of the umbilical cord, which is likely to progress to sepsis. According to Bobby & Joseph (2016), sepsis is a lethal condition that occurs when a body's reaction to infection leads to wounds to its identifiable tissues and organs. Ordinarily, the infection is bacteriological, but it may also be initiated by fungi, viruses, or parasites Coffey (2013). Further complications may consist of *necrotizing fasciitis* of the intestinal walls and genitalia, thus infection of the membrane, hypodermic fat, superficial and *deep fascia*; myonecrosis, thus contagion of the muscles; pneumonia, liver swelling and ultimately death (PATH, 2011).

2.10 Inappropriate Cord Care Practices in Ghana

The Health, Research, and Development Directorate of the Family Health Directorate of the Ghana Health Service (GHS, 2018) undertook a knowledge, social and practices study on cord care in neonates across the 3 ecological regions of Ghana.

The study included 100 caregivers. The caregivers were both healthcare workers and mothers. Furtherance to methylated spirit, caregivers testified to the usage of the extensive variety of substances applied to the umbilical cord to expedite its separation by the close of the third day. These comprised shea butter, salt, chalk, cola nuts, toothpaste, snail shell, ash, lizard excreta, and a range of herbs.

2.11 Conceptual Framework

To better appreciate the underpinning concepts and theories as well as the linkages that exist among them, it was useful in deriving critical variables or factors that were collected and analyzed during the research. Additionally, it served as the road map for the entire research process. The conceptual frame in Figure 2.1 illustrates these relationships in detail.

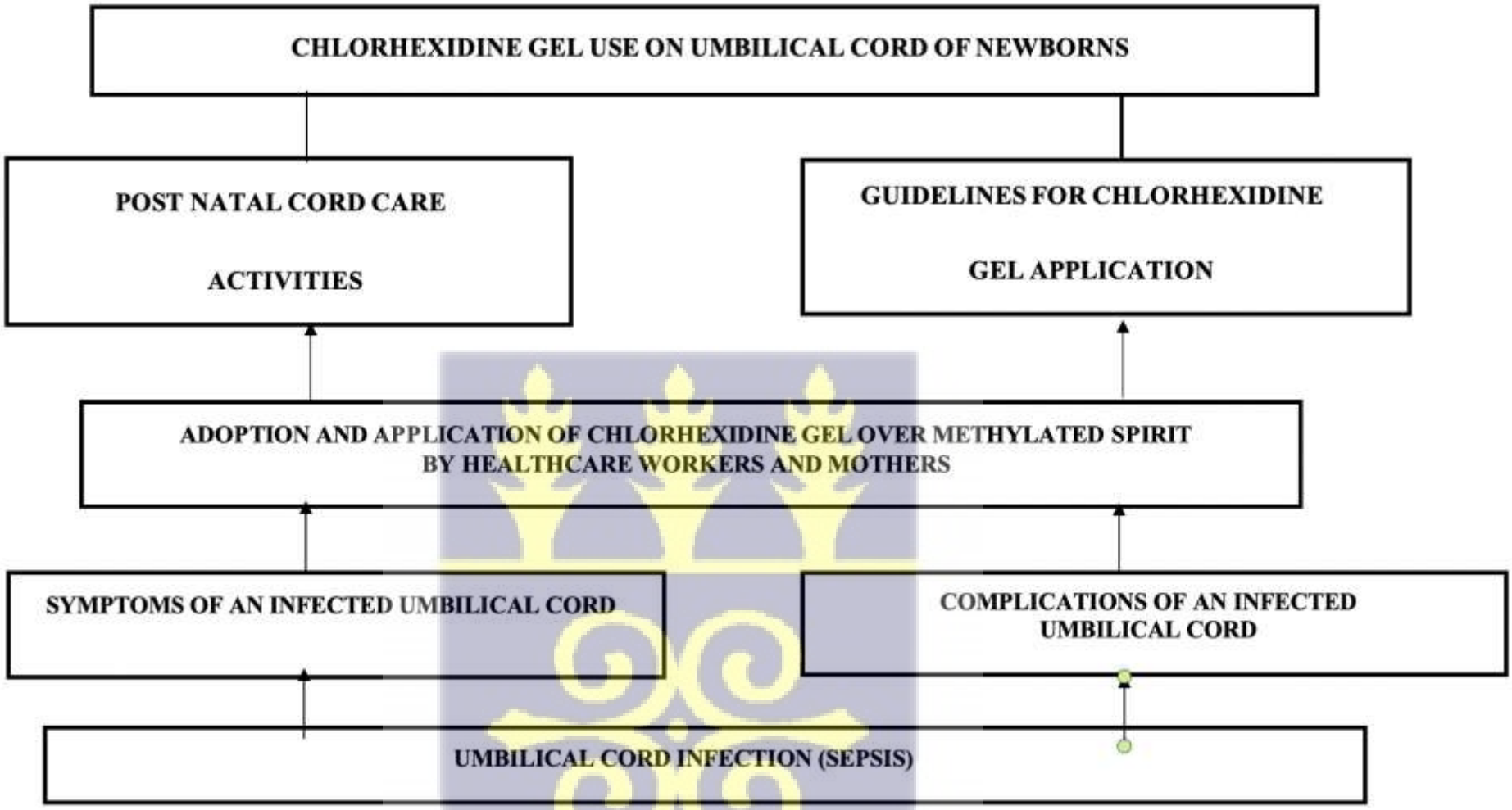

Figure 2.1: Conceptual Framework (Source: Author's construct, July 2022)

The conceptual framework of the study depicts the various components of the study, thus the application of chlorhexidine gel on the umbilical cord of a newborn. The symptoms of infected cord care will lead to complications, which assepsis in the newborn. The symptoms and adjoining complications are linked as the major indicators of sepsis due to the absence of good post-natal cord care and failure to adhere to the guidelines for chlorhexidine application.

The effective adherence and implementation of the guidelines, post-natal activities, and adoption of chlorhexidine gel over dry cord care are geared towards the prevention of sepsis and the promotion of good and appropriate chlorhexidine gel use on the umbilical cord of newborns, which is easy to apply, have no side effect and safe to all newborns.

2.12 Conclusion

The earlier discussion on issues related to chlorhexidine use and its application on the umbilical cords of newborns is a significant variable that ought to be of interest to health policy makers as it has the prospective to influence an effective assessment of gel use. The dialogue puts into view how the successful application of chlorhexidine gel will ultimately lead to the reduction and prevention of neonatal sepsis and other infections.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter is in two folds, the methodology adopted for the research and the organisational profile of the case study under consideration. Research methodology refers to the general approach to research by the researcher (Mouton, 2001). Mouton (2001) argues that the research methodology focuses on the procedures used, the research tools, and the research process. The starting point can be a specific task (data collection), specific steps in the investigation process, and the more objective procedures used. According to Carter and Little (2017), the methodology justifies methods that provide data and analysis, and the methods, in turn, acquire knowledge, so the methodologies have epistemological content. Simply put, the research methodology of this study refers to the approach used to collect data, analyze data, and present research results. This section explains the methodology of this study. These methods include study paradigm, target population, study design, sample size, sample method, data collection tool, data sources, and ethical issues.

3.2 Study Setting

The Greater Accra Regional Hospital is a 600-bed facility located within the central business district of the nation's capital, ridge-Accra. The hospital is one of the leading referral facilities in the country with a daily delivery rate averaging 10 newborns daily. As such, the hospital is known for the treatment of newborns' umbilical cords regularly from the maternity unit. The hospital has the core mandate to provide curative, preventive, and health promotion services to clients within the region and beyond.

The hospital offers services classified from simple to complex cases and also primary, secondary, and tertiary health care. In addition, the hospital serves as an attachment bureau for several tertiary

medical schools, such as the Accra College of Medicine. In essence, the hospital is known for its commitment to creating a congenial environment in which education and research into health science, promotion, public health, and other allied sections thrive. The facility operates on 24-hour service delivery to its clients with both specialist and general consultative care services. The hospital also undertakes elective and minor surgeries as well to meet the ever-growing health needs of the population. The hospital has a dedicated maternity unit, comprising 50 beds where all mothers and newborns are taken care of. The hospital strives to discharge its mandate to meet the optimal standards required from its clients and ensure efficiency and effectiveness in its delivery, excellence, and continuous innovation to always meet client expectations.

3.3 Research Design

This study adopted an explorative case study design to determine the use of chlorhexidine gel in newborns at Greater Accra Regional Hospital, Ridge Hospital. According to Creswell and Creswell (2017), an exploratory case study is a research design that is used to develop an initial understanding of a research topic of interest. The study adopted the exploratory research design because it trims a wide area of research into manageable or simple research. The use of this design allowed in-depth data to be collected and analysed. The basis for this approach is supported by Hardwick's (2017) argument that during case studies, the researcher needs to ensure the reliability of findings and to achieve that, they have to adopt single approaches and use multiple evidential sources.

3.4 Research Approach

The qualitative research approach was used for the study. A qualitative approach was chosen for this study because the author wanted to have an in-depth understanding of the “how” and “why” issues associated with chlorhexidine application and on newborn umbilical cords. Bryman (2011)

makes the point that the qualitative research approach is the widely accepted approach to use when one wants to have a better understanding of an issue. Creswell and Creswell (2017) add by saying that the qualitative approach is the right approach to adopt when seeking to comprehend a topic of interest. Hence the qualitative analysis helped in exploring the views of mothers and healthcare providers on the acceptability and perspectives on the use of chlorhexidine gel in managing the umbilical cords of newborns as well as the measures and systems put in place by health facilities to support the use of chlorhexidine gel in managing the umbilical cords of newborns.

3.5 Sampling

Patten and Newhart (2017) explained that sampling is a process that allows a researcher to adopt predictions about a population by choosing a part of the population. Also, Bryman (2011) asserted that sampling is an approach to selecting a subgroup from a population to make deductions and conclusions from the large population. For this study, a non-probability sampling method was used. A non-probability sampling method according to Creswell and Creswell (2017) is a method of selecting from a research population using a subjective or non-random method. Based on this definition, the study adopted a purposive sampling method.

A purposive sampling method is a method where selections are made on purpose because research subjects have certain characteristics that are of interest to a researcher (Etikan, 2016). Therefore, purposive sampling was used to select the respondents and participants of the study based on their expertise on the subject matter as well as the study objectives. This sampling technique was adopted to select ten health personnel (nurses and midwives) and eight mothers, from the maternity unit of Greater Accra Regional Hospital, Ridge hospital, as respondents for the study.

3.6 Sample Size

The study targeted staff at the maternity unit of the Greater Accra Regional Hospital, Ridge, and maternal mothers from the same unit. The study population of fifteen health care workers (nurses and midwives) and twelve mothers as respondents who have experience and use in the application of the gel on newborns and cord care. However, the point of saturation was attained at the 10th for health workers and the 8th for mothers. The point of saturation as described by (Creswell & Creswell, 2017) is a point in the data collection stage where no additional data is being found. Thus the sample for the study was 10 for healthcare workers and 8 for mothers.

3.7 Data Sources

The study used primary data only. Primary data are described as firsthand information gathered by a researcher himself (Creswell & Creswell, 2017). The study used primary data only because it is more reliable, accurate and relevant to the specific research objectives. Similarly, the use of primary data gives direct and detailed insights into the study subjects, preferences, behaviours and attitudes thus presenting accurate results.

3.8 Data Collection Tools

The data collection tool for the study was an interview guide. An interview guide is described as a document that contains a list of open-ended questions aimed at soliciting responses on a topic of interest from research subjects who are associated with the topic of interest (Alamri et al., 2019). The interview guide was divided into four sections with section A presenting questions on the demographic profile of the participants. The subsequent sections which are Section B to Section D covered questions relating to the specific objectives.

3.9 Data collection procedure

Before data collection began, permission was sought from the management of Ridge hospital, to have the study conducted in the premises as well as inclusion of some staff and patients. Once permission was granted, the researcher contacted the staff and patients to seek their approval to be included in the study. Therefore only staff and patients who agreed to partake in the study were included. The staff will be contacted as and when they report for their shift. The patients will also be contacted only when they come to the hospital for medical treatment. The interview session will be recorded using a tape recorder as well as a notepad for further note-taking. The interview sessions lasted a minimum of 15 minutes for each participant. Therefore fifteen days were used for data collection.

3.10 Data analysis

The recordings were transcribed and compiled into a transcript. The transcripts were edited for correctness and completeness. Once the transcript was cleaned, the researcher started the data analysis. The data was analysed using a thematic data analysis approach. The data analysis was done based on Braun and Clarke's (2019) six-step data analysis. Therefore, the steps used for analysing the data obtained from the participants included

Step 1- Familiarising with the data collected

In familiarizing with the data, the transcript was read through twice. The first reading was to ensure that the responses were in line with the questions. The second reading was to think of and search for patterns as well as meaning within the data. This was to help with identifying codes and themes from the data set (Maguire and Delahunt, 2017).

Step 2- Generating initial codes

Once the researcher had familiarised with the dataset, the next step was to generate codes. The coding stage represents organising a dataset into meaningful groups of data. The codes were narrower than the themes and were data-driven. During this stage, the researcher revisited the research questions in response to what was perceived in the dataset. Two sessions were dedicated to coding. The first session was the identification of the codes from the dataset whereas the second session allowed us to re-read the transcript and ensure the codes were in the transcript (Nowell et al., 2017).

Step 3- Generating initial themes

In this step, the codes identified in the previous step were sorted into themes. This was done by identifying codes that had similar characteristics and grouping them as one. This was done while referring to the research objectives. It was done to identify how initial codes identified in the previous phases interact with each other or overlap. Thus, codes that contradicted the research objectives were taken out. Initial themes were organised on cardboard and diagramming was done to identify the relationships between the themes and the research objectives. This helped to authenticate the themes identified (Nowell et al., 2017).

Step 4- Reviewing themes

Reviewing the themes was done in line with reviewing the entire data set which is capturing the meaning across the whole. Therefore a brief description of the themes is to help understand the main message of the themes identified. This was also to ensure that the themes were distinct from each other. This stage ensured that the generated themes were reflective of the data set (Xu and Zammit, 2020).

Step 5- Defining and naming themes

At this stage, thoughtful names for the themes were identified. Some of the themes were defined and named using direct quotes from the dataset. The activities in this stage included going back and forth between the data and the themes identified. This was to ensure that the themes identified answered the research question, reflecting the dataset and thus making the names identified appropriate (Maguire and Delahunt, 2017).

Step 6 - Report writing

This was the final stage of the data analysis where a report was generated. The themes identified were reviewed and the meaning of each theme was presented. The reports were written under the specific objectives (Xu and Zammit, 2020).

3.11 Ethical Issues

For this study, ethical clearance was obtained from the Ghana Health Service Review Committee. This was aimed at authenticating the study and also facilitating approval from the selected health centre which is Ridge Hospital. Although clearance was obtained from the Ghana Health Service, another letter was sent to the management of the Ridge Hospital to seek approval to have the study conducted on their premises. The consent form was also presented to the staff and patients who agreed to partake in the study. The consent form was to obtain permission from the participants before the study commerce. The participants were also informed about the absence of any form of incentives before, during or after the study. To address the issue of privacy and confidentiality, the participants' names were excluded during the interview. Also, questions were presented in a manner that did not give away the identity of any participant.

3.12 Conclusion

Chapter three has highlighted the blueprint of how the research questions were answered. The study adopted a purposive sampling technique because of the specialised settings within which the gel is applied and the personnel trained to apply it, healthcare workers at the maternity unit and mothers after delivery on the safe application of the gel, to give precise responses for the study and additionally to avoid time constraints. The organisational profile of Ridge Hospital also revealed how placed the hospital is to receive all forms of maternal delivery adequately deal with all forms of infant infection and cord care and effectively manage the expectations of their clients.

CHAPTER FOUR

MONITORING AND EVALUATION ISSUES OF THE STUDY

4.1 Description of the Program/Project

According to WHO (2020), guidance about the care of the umbilical cord has evolved, which necessitates continuous training and sensitization of the workforce/healthcare staff on best and current practices. Many developing countries have encountered challenges adjusting to the use of the gel with constant reports of crude methods such as the use of antibiotics, antiseptics, and dry cord care. The WHO (2020) attributed this to inadequate training and sensitization of health staff.

4.2 Type of Evaluation

The type of evaluation was a process evaluation and it was focused mainly on: assessing the guidelines for the application of chlorhexidine for cord care among healthcare workers and mothers; examining the performance of the use of chlorhexidine gel for cord care by healthcare workers and mothers over (dry cord care) methylated spirit; examining the impact of chlorhexidine gel use on the prevention of neonatal sepsis and mortality among newborns.

CHAPTER FIVE

RESULTS

5.1 Introduction

This chapter presents the results obtained from the data analysis. The results are presented under various sections such as a section on the socio-demographic characteristics of the participants. The themes identified from the data are also presented in this chapter.

5.2 Socio-Demographic Characteristics

The participants in this study included eight midwives, two nurses, and eight maternal mothers as shown in the table below.

Table 5.5. Social-Demographic Characteristics of Participants

Characteristics	Frequency	%
Nurses Midwives		100
Sex	Female - 8	50
Rank	Midwifery Officers (MO) - 4 Staff nurses (SN) - 2	25
	Principal Midwifery Officers (PMO) - 2	25
Years of work experience		
1-3 years	2	25
4-6 years	4	50
11 years and above	2	25
Mothers		
Age of mother		
18- 30	2	25
31-40	6	75
Age of newborn		
0-2 months	2	25
3-5 month	6	75
Sex of child/newborn		
Male	3	37.5
Female	5	62.5
Level of education		
Primary	2	25
Not educated	6	75
Marital status		
Single mother	3	37.5
Married	5	62.5
Employment		
Trader/businesswoman	8	100

Table 5.6: Participant Profile: Nurses Midwives

Participant ID	Sex	Years of work experience	Rank
Mid-wife_001	Female	1-3 years	SN
Mid-wife_002	Female	4-6 years	MO
Mid-wife_003	Female	4-6 years	MO
Mid-wife_004	Female	4-6 years	MO
Mid-wife_005	Female	4-6 years	MO
Mid-wife_006	Female	4-6 years	PMO
Mid-wife_007	Female	4-6 years	SN
Mid-wife_008	Female	4-6 years	PMO

Source: Field Work, 2023.

Table 5.7: Participant Profile of Mothers

Participant ID	Age	Age of newborn	Employment Status	Marital Status	Level of Education
Mother_001	25	0-2 months	Trader/businesswoman	Single Mother	Primary
Mother_002	28	3-5 months	Trader/businesswoman	Single Mother	Not educated
Mother_003	33	3-5 months	Trader/businesswoman	Married	Primary
Mother_004	35	3-5 months	Trader/businesswoman	Single Mother	Not educated
Mother_005	38	3-5 months	Trader/businesswoman	Married	Not educated
Mother_006	31	3-5 months	Trader/businesswoman	Married	Not educated
Mother_007	33	0-2 months	Trader/businesswoman	Married	Not educated
Mother_008	34	3-5 months	Trader/businesswoman	Married	Not educated

Source: Field Work, 2023

The midwives worked in various departments related to maternal care, such as the labour ward, lying-in, and antenatal departments. Table 5.2 shows that the majority (4 out of 8) of the midwives had between 4 to 6 years of practice in their profession, with two midwives having 11 years and above and 1 to 3 years of experience respectively. Similarly, the work experience of the nurses ranged between 3 to 10 years, and they all had completed tertiary education. These demographics demonstrate that the participants in this study were experienced and can contribute to meeting the research objectives. Regarding the mothers who were interviewed on their experiences with the use of the Chlorhexidine gel, all of them were traders. Out of these 8 traders, 2 had completed their primary education, and the remaining 6 were not educated. Finally, there were two participants with 2 newborn babies between the ages of 0-2 months whilst 6 participants had newborn babies between the ages of 3-5 months.

5.3 Themes and sub-themes from the transcribed data

Table 5.8: Themes and sub-themes for transcribed data

Themes	Sub-themes
Theme 1: Measures and systems to support the use of chlorhexidine gel	▪ Development of treatment guidelines ▪ Training of health workers on the use of the gel ▪ Engagement with post-natal mothers. ▪ Public awareness and education of health facilities, in the wards and delivery rooms.
Theme 2:acceptability and use of chlorhexidine gel	▪ Delays in falling off ▪ Leaves a stamp

	▪ Skin irritation ▪ Mix reactions about the effectiveness
Theme 3: views of mothers of newborns about the use and potential benefit of chlorhexidine gel	▪ Takes time to fall off ▪ Wet and soggy ▪ Difficult to apply

Under each major theme, several subthemes emerged and these were presented under their respective themes and supported with verbatim quotes from participants. Quotes were used to represent participants for anonymity.

5.3.1 Measures and systems to support the use of chlorhexidine gel

To understand the measures and systems to support the use of chlorhexidine gel, the analysis identified four sub-themes namely: (a) Development of treatment guidelines, (b) Training of health workers on the use of the gel, (c) Engagement with post-natal mothers and (d) Public awareness and education of health facilitators, wards, and delivery rooms.

Development of treatment guidelines

All the participants confirmed that Ridge Hospital has put systems in place to support the use of chlorhexidine gel.

There is a system put in place to address the development of a portfolio or treatment guidelines by advocating for a sterile procedure and providing details on the steps to follow in applying the gel. There are treatment protocols posted everywhere at the health facility to create awareness of neonatal sepsis to assist with the use of the gel. One midwife stated that:

"It gives details on steps to follow to apply gel to prevent septic cord"(Mid-wife_001)

Training of health workers on the use of the gel

Some participants mentioned that the hospital conducts workshops to educate healthcare workers on the use of the gel. The measures include instructions on how to apply the gel in a sterile manner, such as the usage of sterile gloves, washing hands before and after application, and teaching mothers how to apply the gel. It also states that the gel should be applied to the umbilical cord immediately after delivery of the baby. The measures also address the importance of exposing the cord to dry it off before the baby wears a dress.

One midwife explained why the workshop was necessary:

> "*When the chlorhexidine gel was introduced, we had a few challenges where mothers came back with cord infections, cord sepsis and we had to go back to the use of the spirit but then a workshop was later organized and we detected where the issues were coming from. We realized the mothers were not using it appropriately. When we started using it the right way and educating the mothers on the correct method of application, we adapted the use of the chlorhexidine gel*" (Mid-wife_005)

Overall, the participants all agree that the hospital has proper measures and systems that have been put in place for the application of Chlorhexidine gel for cord care, which emphasizes the importance of preventing neonatal infections.

Engagement with post-natal mother

A midwife added that because the spirit has been used for such a long time, some post-natal mothers are hesitant to use the gel while others do not know how to properly use the gel leading to infection. However, improved education on the use of the gel has transformed the attitudes of mothers for better outcomes.

"*They come with the cord thicker than they went home with because they were applying more of the gel and they were using it more than once, they put a lot on it and do not allow it dry. Therefore, come back with the cord looking greenish with a lot of gel on it. Which makes it mostly wet. Also, because they have used the spirit for a very long period when they go home, other people convince them that it is the spirit that is known to them. They have been using and where from this, they are not seeing any show (improvement or difference) and therefore go back to the spirit. Since we started educating them, they are doing it right*". *" (Mid-wife_003)*

Public awareness and education of health facilitators, wards, and delivery rooms

Overall, the participants all agreed that the hospital has proper measures and systems that have been put in place for the application of Chlorhexidine gel for cord care, which emphasizes the importance of preventing neonatal infections.

"*Gradually adhering solely to Chlorhexidine gel use, hence no more use of the spirit*" (Mid-wife_002)

"*No more used, Ghana Health Service has instructed us to use Chlorhexidine gel only*" (Mid- wife_008)

Mothers 1, 2, and 3 also agreed that dry cord care (methylated spirit) was no longer in use and that chlorhexidine gel was the mandatory method of cord care in the Greater Accra Regional Hospital.

5.3.2 Acceptability and use of chlorhexidine gel

To explore the views of healthcare providers about their acceptability and use of chlorhexidine gel in managing the umbilical cords of newborns, the analysis identified four sub-themes namely: (a) Delays in falling off, (b) Leaves a stump,.(c) Skin irritation and (d) Mixed reactions about

effectiveness.

Delays in falling off

Since its introduction, midwives have acknowledged the reduction in neonatal cord infections. The anti-microbial effect of the gel has improved neonatal cord care.

One midwife stated that:

> **"***The gel delays in falling off using the chlorhexidine can delay cord separation, however, delayed cord separation with the use of chlorhexidine does not harm the baby*" (Mid-wife_003)

Some of the midwives reported that Chlorhexidine gel takes a longer time to fall off compared to Methylated spirit, and can leave a stump when it falls off:

> *"It takes longer to fall off" (Mid-wife_005)".*

Leaves a stump

According to the first Midwife interviewed, the gel leaves a stump when the cord falls off, which is often a cause of concern for mothers who have to return to the hospital with their babies:

> *"Cord falls off but leaves a stump. Clients return to the Hospital with stumps most of the time" Mid- wife_001),*

Skin irritation

Participants acknowledge that some mothers do not apply the gel properly. They found out that, when mothers apply the gel, it touches the skin of the baby and this causes skin irritation. Some visible signs include reddish skin and when care is not taken can expose the baby to infection. One nurse stated that some babies react to the gel if it touches their skin. "*The reaction is when the mother applies more of the gel on the cord and when it touches the skin of the baby some of the babies react and some little rashes appear around the skin close to the cord area*" (Mid-

wife_005).

An infected umbilical cord can cause a range of symptoms that parents and caregivers should be aware of. Some common symptoms of an infected umbilical cord according to Participants 1, 2, 3, and 4 are; Redness and swelling: An infected umbilical cord may appear red and swollen. The skin around the base of the cord may also be warm to the touch; Foul odor: A strong, unpleasant odor coming from the umbilical cord can indicate an infection; this odor may be accompanied by discharge or pus; and discharge: Discharge may be present from the umbilical cord in the case of an infection. The discharge may be thick and yellow or green. Below are some illustrations from the study participants.

"*Cord is offensive, the skin around the cord is reddish, a baby has temperature, cord looks moist, one was very cold and the baby was not active*" (Mother_001).

"*Normally you have the area looking red and also has some discharge, some of the children will be having spiking temperature, some will have poor feeding as well, some inflammation around the place*" (Mother_003).

A nurse added that "*some of them report with cord wet and a little bit greenish, some too reddish at the base, and sometimes it smells*" (Mid-wife_005).

Mixed reactions about the effectiveness

The study revealed that there was a mixed reaction about the effectiveness of the gel. In other words, there were different attitudes and perceptions about the effectiveness of the gel. Mixed reactions about effectiveness because some mothers' complained about their cord not falling off which makes them think there is an issue compared to the Methylated spirit which dries and evaporates the cord and comes off earlier sometimes even before a week. In other words, some of the participants are of the perception that the gel is working for them whereas others think it

does not. Some people feel the gel is working for them perfectly others too, feel it is not helping the baby. So the acceptance of the gel has not been fully accepted due to the mixed experiences of other mothers.

One of the key benefits of using Chlorhexidine gel is the presence of antibiotics in the gel, which helps to prevent infection in the umbilical cord. As indicated by some participants " the gel contains antibiotics and prevents infection" and "Reduces the risk of infection". Participants 3 and 4 also agreed on this point, with Participant 4 saying "*Antibiotics in the gel compared to the use of spirit, reduced rate of cord infection in the newborn*."

A detailed quote from a midwife indicates that "*the gel is an antiseptic and the antiseptic agent can be measured. If it is 0.5 then it is 0.5 in all from the manufacture while that of the spirit cannot be measured, you cannot be sure of the content and source with the spirit. The gel is easy to use while with the spirit you will need cotton and a technique in applying it, with the gel the same finger is used to drop it and smear it everywhere while with the spirit you need to hold the cotton from the base upwards. When the gel is applied well it prevents cord sepsis*" (Mid-wife_002).

One nurse also iterated that "*I think chlorhexidine gel has some antibacterial agent inside which prevent cord infection that is when you use it properly and also with methylated spirit, it's quite painful when used to dress the umbilical cord, unlike chlorhexidine gel it not as painful as the spirit. this is the only advantage that I know*" (Mid-wife_007).

The responses given are in line with the main use of chlorhexidine gel that is, as a topical antiseptic for umbilical cord care and other various use of chlorhexidine for wound care, skin disinfection, and oral hygiene. When applied to the skin, it helps to reduce the risk of infection and promote

healing.

However, one nurse added that she has not seen any improvement in cord infections since the introduction of the gel as some mothers do not properly use it. She had this to say:

> "*For me, I have not seen any improvement in cord infection. Almost every week, we have cord sepsis cases coming, the mothers who come with the infection are a result of how they care for the cord aside from applying the gel. Most of them make the place very wet and some apply other agents together with the gel. Sometimes they apply toothpaste, cow dung, some herbally prepared solution, etc. just to speed up healing and prevent a stump when the cord falls off, so they claim. Even with the introduction of the gel, we still have cord sepsis cases. Some of the infection is not from the medicine itself, it is from how mothers treat the cord*" (*Mid-wife_005).*

Another nurse chipped in:

> *"You can see that the gel rule out infection. It is just that the mothers do not apply it well. Some more of the gel on the cord makes it thick and therefore takes longer time for the cord to fall off. That is the reason why most of the mothers do not like the gel. But when they come and you take them through the right method of application it helps" (Mid-wife_004).*

5.3.3 Views of mothers of newborns about the use and potential benefit of chlorhexidine gel

To understand the perspectives of mothers of newborns about the use and potential benefit of chlorhexidine gel in the prevention of neonatal sepsis and mortality among newborns, the analysis

identified three sub-themes namely;

Takes time to fall off

It can be seen that most mothers had some challenges with the use of the gel. One mother had this to say:

> "*I don't have enough knowledge whether to use or apply the gel on the cord, whether to use it more than expected or to use it less. I am confused about whether to use it once a day or twice a day. Since I used the gel, for over a week, my baby's cord was not coming off. It took close to three weeks before it came off. At a point in time, I thought there was something wrong with the cord so I was very worried*". (Mother_004)

Wet and soggy

The study revealed that the mothers found the use of the gel to be wet and soggy. This discourages them from using the gel. The outcome of using the gel also makes the mothers feel it is not effective. One of the mothers had this to say:

> "*It never drives up when I apply the gel. It is always wet and soggy so I did not know if the gel was working or not*" (Mother_008).

CHAPTER SIX

DISCUSSION

The study aimed to evaluate the use of Chlorhexidine gel in the Greater Accra Regional Hospital in Ghana. The participants were experienced and well-educated midwives who worked in maternal care departments such as the labour ward, lying-in, antenatal departments, and pediatric unit. The study found that all of the midwives had been using Chlorhexidine gel for at least three years The study found that the hospital has proper guidelines for the application of Chlorhexidine gel for cord care, which emphasizes the importance of preventing neonatal infections. The majority of the care providers indicated that the use of methylated spirit has been phased out and replaced with Chlorhexidine gel as the primary method of cord care, and both mothers and care providers reported that Chlorhexidine gel was more effective in preventing infections compared to dry cord care methods.

This present study shows that most of the mothers had heard of chlorhexidine gel, and those who had heard knew what it was used for. This is in line with the finding by Berhe et al (2017) where 87.3% of the study participants had good knowledge about cord care after birth. Similarly, a study done in Abeokuta (2022) also showed that 69% of the study subjects had good knowledge of the use of Chlorhexidine gel. The findings from the study showed that mothers who used Chlorhexidine gel applied it once daily as recommended by WHO. Other mothers applied Chlorhexidine gel as many as 2-10 times a day. This finding is similar to the studies done in Ethiopia by Berhe et al. (2017) and Jos by Abeokuta (2022 which showed that most mothers applied Chlorhexidine gel every 2 hours-similar to the way the methylated spirit is applied. In the study done in Jos by Schwe et al. (2018), Chlorhexidine gel was applied at least twice daily, to the cord and stump base as directed by the researchers. This was an experimental study where the

participants were trained at the beginning of the study on how to apply the Chlorhexidine gel, and the instruction according to their study design/protocol was to apply the Chlorhexidine gel twice a day and any other time the cord appears wet. In contrast, the mothers in a study done in Kenya (Ambale, Ngathia, Nthusi, & Mukonzo, 2021), applied the Chlorhexidine gel correctly once daily. The Kenyan study involved both non-health workers and health workers as participants. The majority of the non-health worker group were mothers instructed by the researchers to apply Chlorhexidine gel correctly once daily. The other participants in that study were healthcare workers and were thus more informed. The sample size was small and thus it was easier for the researchers to pass information about proper cord care using Chlorhexidine gel more effectively to a small group.

Most mothers felt that delayed cord detachment was a side effect of Chlorhexidine gel and were unwilling to use it again. In addition, some would not recommend its use. This perception of its inefficiency because of delay in cord detachment may explain why the majority of the mothers in a study by Josephine et al., (2021) kept on applying other agents even after the cord stump fell off. Cultural beliefs of communities influence a mother's perception of how long it should take for the cord to fall off. This explains why some of the mothers in this study applied other agents after some days of using Chlorhexidine gel, to hasten drying of the cord. This is similar to the practice of some mothers reported in the study by Asiedu (2019) in Ghana. The study by Ambale et al. (2021) in Kenya also reported that some mothers used other agents like spirit, warm water, normal saline, and antiseptics to clean off the dry flakes left by the gel on the cord.

However, there are also some drawbacks to the use of the gel, such as delayed cord drying time, a stump that is left when the cord falls off, and a longer time for the cord to fall off. Despite these drawbacks, all participants agreed that the main advantage of Chlorhexidine gel over methylated

spirit is that it contains antibiotics, which reduces the risk of infection in newborns.

The findings of this study are consistent with other studies conducted globally on the use of Chlorhexidine gel in newborn care. Chlorhexidine gel is effective in reducing the risk of neonatal infections, particularly sepsis. Additionally, other studies have also reported the presence of a stump after the cord falls off, which is a common concern for mothers. However, the benefits of Chlorhexidine gel in reducing the risk of infections outweigh the drawbacks, and it has been widely recommended as a safe and effective alternative to traditional dry cord care methods.

A study by Gebru et al. (2015) found that Chlorhexidine gel was more effective in reducing umbilical cord infections compared to dry cord care with 70% of newborns in the Chlorhexidine gel group having no infections compared to 44% in the dry cord care group. Another study by Darmstadt et al. (2000) also found that Chlorhexidine gel reduced the incidence of neonatal sepsis compared to other cord care practices.

Again, the results of this study are consistent with the findings of other studies on the use of Chlorhexidine gel in cord care. A study by Brouwers et al. (2017) found that the use of Chlorhexidine gel reduced the risk of neonatal infections compared to dry cord care methods. Another study by McDonald et al. (2017) found that Chlorhexidine gel was more effective than other methods in reducing the risk of neonatal infections and improving cord healing. A systematic review by Aldeen et al. (2015) also found that the use of Chlorhexidine gel was effective in reducing the risk of neonatal infections. These findings support the results of the study conducted in the Greater Accra Regional Hospital, indicating that the use of Chlorhexidine gel is a viable method of cord care for newborns.

Additionally, the findings of this study are also in line with previous qualitative studies conducted on the use of Chlorhexidine Gel for cord care. A study by Wirz et al. (2015) found that

Chlorhexidine Gel was more effective in reducing neonatal mortality and morbidity compared to dry cord care methods. Another study by Lawn et al. (2010) found that the use of Chlorhexidine Gel was associated with a lower incidence of umbilical cord infections compared to traditional cord care practices. These studies support the conclusion of the current study that Chlorhexidine Gel is an effective method of cord care in reducing the risk of neonatal infections.

In conclusion, although the level of knowledge on the use of Chlorhexidine gel was good, its acceptability and use were not good. This was because of the delays in falling off, leaving stumps, and skin irritation. This was coupled with mixed reactions about its effectiveness among mothers. The hospital has proper guidelines in place for its use, but there are some drawbacks, such as delayed cord drying and higher rates of stumps. Further research is needed to assess the long-term effects of Chlorhexidine gel on the health of newborns.

6.2 Study Limitation

One of the major limitations of the study was relying solely on the views and perceptions of mothers and healthcare givers views instead of conducting a comparative study on the effect of chlorhexidine gel and dry cord care on infection outcome. Also, Qualitative research occurs in a natural setting and requires interviewers to record participants' facial expressions and other non-verbal forms of communication during the period of data gathering, as such, it may be difficult for the study to be replicated. Moreover, the generalization of findings from this study may be uncertain since additional research may be needed to verify whether findings from this study apply to those in similar organizations Additionally, even though the COVID-19 pandemic situation has improved in the country, interviewers and interviewees were still asked to observe social distancing and have the discussion having their nose masks on The findings of this study are consistent with other studies conducted globally on the use of Chlorhexidine gel in newborn care.

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In conclusion, although the level of knowledge on the use of Chlorhexidine gel was good, its acceptability and use were not good. This was because of the delays in falling off, leaving stumps, and skin irritation. This was coupled with mixed reactions about its effectiveness among mothers. The hospital has proper guidelines in place for its use, but there are some drawbacks, such as delayed cord drying and higher rates of stumps. Further research is needed to assess the long-term effects of Chlorhexidine gel on the health of newborns.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This chapter is comprised of two sections. The first section provides a conclusion to the study concerning the findings of the study. The second section suggests recommendations for Greater Accra Regional Hospital, the Ministry of Health, and future research.

7.2 Conclusion

In conclusion, the use of Chlorhexidine gel for cord care in the Greater Accra Regional Hospital in Ghana is an effective method of reducing the risk of neonatal infections. The study showed that the hospital has proper guidelines for its application, and experienced midwives have been using it for at least three years.

While there are some drawbacks associated with the use of Chlorhexidine gel, such as delayed cord drying time and a higher rate of stumps, these drawbacks are outweighed by its benefits in reducing the risk of infection.

The findings of this study are consistent with other studies conducted globally on the use of Chlorhexidine gel in newborn care.

7.3 Recommendations

Based on the findings, the following recommendations were addressed to the following organizations: The Greater Accra Regional Hospital (RIDGE), the Ministry of Health (MOH), and future researchers.

The Greater Accra Regional Hospital (RIDGE)

Based on the results, the study recommends that the hospital should consider educating mothers on the benefits of Chlorhexidine gel and the potential drawbacks to alleviate any concerns they

may have. Additionally, the hospital should continue to monitor the use of Chlorhexidine gel and evaluate its long-term effects on the health of newborns. The study also recommends that the Greater Accra Regional Hospital should continue to promote the use of Chlorhexidine gel as part of its commitment to providing high-quality maternal and newborn care.

Ministry of Health

Again, based on the findings of the study and previous research, it is recommended that the Ghanaian Ministry of Health promotes the use of Chlorhexidine gel as the primary method of cord care for newborns in all health facilities in Ghana. The guidelines for the application of Chlorhexidine gel for cord care should be disseminated to all health care providers, particularly those working in maternal care departments such as the labour ward, lying-in, and antenatal departments.

The Ministry of Health should also consider developing awareness-raising programs to educate mothers and other caregivers about the benefits of Chlorhexidine gel and its proper use. This can be achieved through community health education programs, health promotion activities, and public service announcements. It is important to emphasize the importance of preventing neonatal infections and to provide information about the proper application of Chlorhexidine gel to avoid the development of stumps.

In addition, the Ministry of Health should encourage further research to explore the long-term effects of Chlorhexidine gel on the health of newborns, as this can provide valuable insights into the safety and effectiveness of this method of cord care.

Future Studies

For future studies, the study recommends that future studies should consider conducting a study to measure the comparative effects of Chlorhexidine gel and dry cord care and not only on the

perception and views of participants

Also, future studies should consider conducting a study on how the demographic characteristics of respondents such as level of education play a role in the acceptance and use of Chlorhexidine gel among mothers.

Finally, future studies should consider conducting studies between two or more hospitals. This will reveal the state of using Chlorhexidine gel for cord care among healthcare workers and mothers.

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APPENDIX A: INTERVIEW GUIDE

DEPARTMENT OF PUBLIC HEALTH UNIVERSITY OF GHANA

TOPIC: EVALUATING THE USE OF CHLORHEXIDINE GEL IN THE MANAGEMENT OF NEWBORNS' UMBILICAL CORDS IN GREATER ACCRA REGIONAL HOSPITAL

Note: This research is strictly for academic purposes only, confidentiality is therefore assured

DATE OF INTERVIEW……

PART ONE: HEALTHCARE WORKERS INTERVIEW GUIDE

SECTION A: PERSONAL DATA

1. Which department do you work in?

……

What is your profession?

……

What is your level of education?

……

How long have you worked as a healthcare staff with Ridge Hospital?

……

2. Does Ridge Hospital institute guidelines for the application of chlorhexidine gel?

……

How long have you been applying chlorhexidine gel to newborns?

……

Do the guidelines address the prevention of sepsis and other neonatal infections?

7.1 Yes (b) No

If Yes, provide a reason

……

If No, provide a reason

……

Are there any side effects of the use of dry cord care methods on the umbilical cords of neonates?

(a) Yes (b) No

If Yes, provide a reason

……

If No, provide a reason

……

8. Do you apply methylated spirit to the cord care of neonates?

a. Yes (b) No

If Yes, provide a reason

……

If No, provide a reason

……

9. Are there any side effects on the use of chlorhexidine gel on the umbilical cord of neonates?

a. Yes (b) No

If Yes, provide a reason

……

If No, provide a reason

……

10. What are some of the symptoms of an infected umbilical cord?

……

What is the importance of chlorhexidine gel over the use of methylated spirit on the umbilical cord of newborns?

……

13. What is the rate of umbilical cord sepsis and mortality among newborns upon the adoption and application of chlorhexidine gel on newborns?

……

MOTHERS INTERVIEW GUIDE

SECTION A: PERSONAL DATA

1. Have many children do you have?

……

Have you given birth in a traditional home before?

……

What is your profession?

……

What is your level of education?

……

Do you have knowledge on the use or application of chlorhexidine gel

- Yes (b) No
- If Yes, provide a reason

2. What are your views

……..

3. Do the healthcare workers sensitize you on the use of chlorhexidine gel on the umbilical cord of your child?

- Yes (b) No
- If Yes, provide a reason

……

If No, provide a reason

……

Are you given a copy of the guidelines on how to apply the chlorhexidine gel in your home?

- Yes (b) No

If Yes, provide a reason

……

If No, provide a reason

……

Have you used methylated spirit on an umbilical cord before?

(a) Yes (b) No

If Yes, provide a reason

……

If No, provide a reason

……

What are some of the symptoms of an infected umbilical cord?

……

What are the benefits of chlorhexidine gel over the use of methylated spirit on the umbilical cord of newborns?

……

4. Do you have easy access to healthcare staff in the event of complications from the use of chlorhexidine gel?

(a) Yes (b) No

(b) If Yes, provide a reason

……

If No, provide a reason

APPENDIX B: ETHICAL CLEARANCE CERTIFICATE

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

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

My Ref. GHS/RDD/ERC/Admin/App/23/079
Your Ref. No.

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Digital Address: GA-050-3303
Mob: +233-50-3539896
Tel: +233-302-681109
Email: ethics.research@ghs.gov.gh
1st February, 2023

Maame Akosua Owusu Asante
P. O. Box 17627
Accra - Ghana

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

GHS-ERC Number	**GHS-ERC: 020/12/22**
Study Title	Evaluating the use of chlorhexidine gel in the management of newborns umbilical cord in Greater Accra Regional Hospital
Approval Date	1st February, 2023
Expiry Date	31st January, 2024
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

- Submission of a 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.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

Please note that any modification of the study without ERC approval of the amendment is invalid.

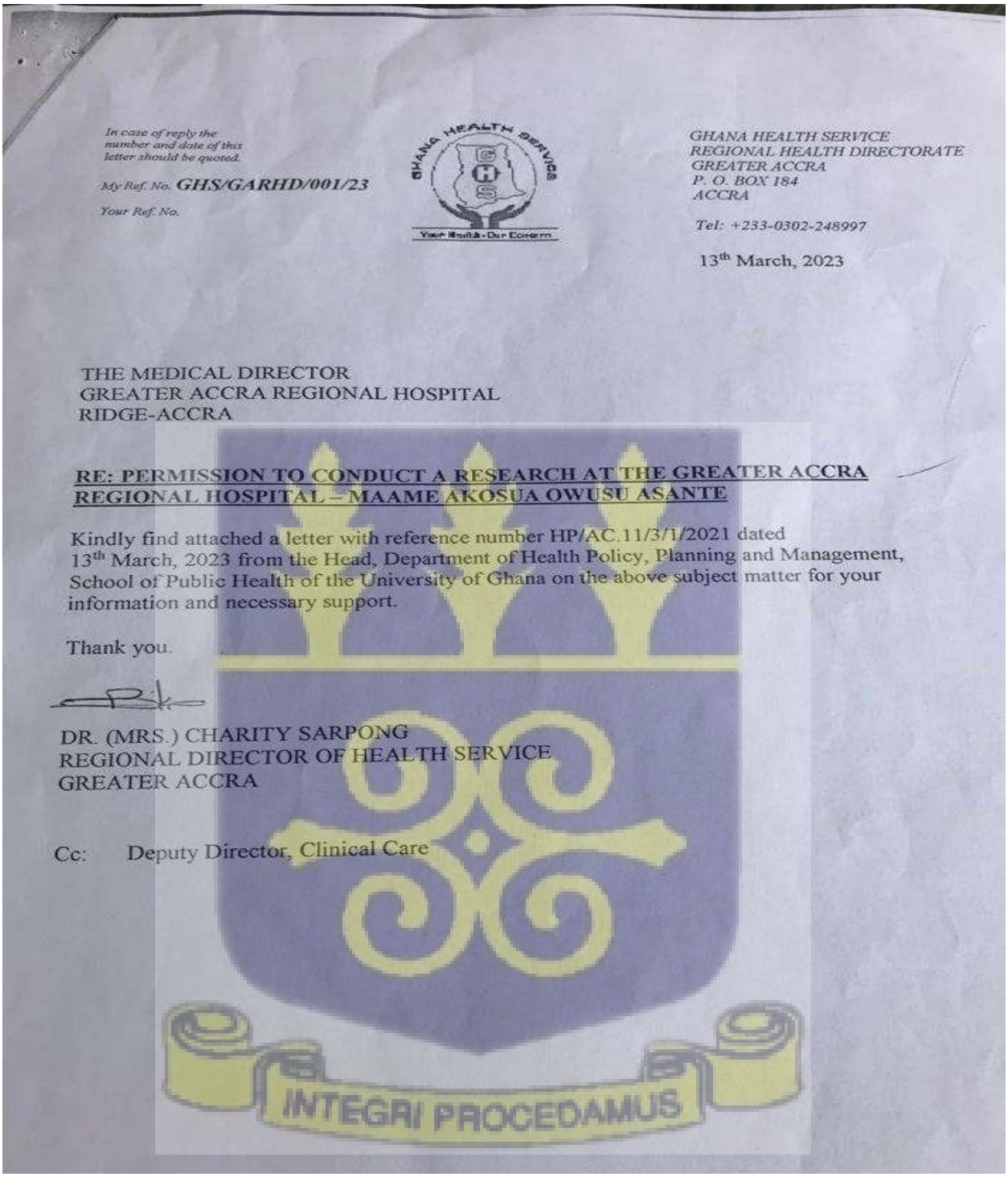
The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

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

SIGNED.....
Dr. Naa-Korkor Allotey
(Ag. Head, Ethics & Research Management Department)

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

APPENDIX C: INTRODUCTORY LETTER



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

My Ref. No. GHS/GARHD/001/23

Your Ref. No.

GHANA HEALTH SERVICE
REGIONAL HEALTH DIRECTORATE
GREATER ACCRA
P. O. BOX 184
ACCRA

Tel: +233-0302-248997

13th March, 2023

THE MEDICAL DIRECTOR
GREATER ACCRA REGIONAL HOSPITAL
RIDGE-ACCRA

RE: PERMISSION TO CONDUCT A RESEARCH AT THE GREATER ACCRA REGIONAL HOSPITAL – MAAME AKOSUA OWUSU ASANTE

Kindly find attached a letter with reference number HP/AC.11/3/1/2021 dated 13th March, 2023 from the Head, Department of Health Policy, Planning and Management, School of Public Health of the University of Ghana on the above subject matter for your information and necessary support.

Thank you.

DR. (MRS.) CHARITY SARPONG
REGIONAL DIRECTOR OF HEALTH SERVICE
GREATER ACCRA

Cc: Deputy Director, Clinical Care