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Assessing Changes in Knowledge about and Self-efficacy for Neonatal Resuscitation Among Rwandan Nurses and Midwives after a Mentorship Process

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Graduate Program in Nursing

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Abstract

In the first minute of life after birth, it is critical to effectively manage an infant's respiratory status. Given the critical nature of newborn airway management, it is vital that health professionals have the knowledge and confidence to engage in airway management procedures. Consequently, there has been a call for nurses and midwives to be prepared to skillfully enact neonatal resuscitation interventions when required, especially in low-resource environments, to help reduce neonatal death. The purpose of this study was to assess the impact of a mentorship program that involves an education component for neonatal resuscitation in the first minute after birth. The study examined changes to knowledge and self-efficacy of Rwandan nurses and midwives towards newborn airway care outcomes. A pre-/post-test, quasi-experimental study design was used to assess the changes in knowledge about and self-efficacy for neonatal resuscitation. Using a paired t-test, the results suggested that nurses' and midwives' knowledge and self-efficacy increased significantly, and participants' knowledge correlated positively to self-efficacy. Therefore, a mentorship program that supports professional development through education appears to be an effective strategy to enhance nurses' and midwives' knowledge about and self-efficacy for neonatal resuscitation and could eventually lead to neonatal practice improvements.

Keywords: Helping Babies Breathe, knowledge, self-efficacy, mentorship, nurses, midwives, neonatal resuscitation

Summary of Lay Audience

Background: In the first minute of life after birth, it is critical to effectively manage an infant's ability to breathe. Given the critical nature of breathing to the survival of newborns, it is vital that health professionals have the knowledge and confidence to engage in procedures that can help restore the breathing of babies having difficulty at birth. Consequently, there has been a call for nurses and midwives to be prepared to skillfully intervene when babies have difficulty breathing at birth, especially in low-resource environments where newborn deaths are still relatively common. **Purpose of the study:** The study tested changes to the knowledge and confidence in their ability to improve newborn breathing before and after a six-month mentorship program. **Method:** A before and after study design was used to assess the knowledge and confidence related to improving babies breathing for nurses and midwives from three districts in Northern Rwanda. Among 169 nurses and midwives who registered to attend the mentorship, 141 were accessible for a pre-mentorship assessment. However, only 123 completed both the before and after assessments. **Results:** By comparing the average scores before and after the mentorship, the findings revealed that nurses and midwives' knowledge and confidence in their ability increased significantly from 78.2% to 93.4% and from 7.17/10 to 9.34/10 respectively. Similarly, the strength of the relationship between participants knowledge and confidence in their ability increased significantly after the mentorship. **Conclusion:** A mentorship program that supports' professional development through education appears to be an effective strategy to enhance Rwandan nurses' and midwives' knowledge about and the confidence in their ability to help newborns breathe better at birth. Implementing a national program based on the study could help lead to practice improvements and reduce infant deaths in Rwanda.

Co-Authorship Statement

Gerard Nyiringango conducted the research for his masters' thesis under the supervision of Dr. Mickey Kerr, Dr. Yolanda Babenko-Mould, and Dr. Clementine Kanazayire who will be co-authors on presentations and publications resulting from this thesis.

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List of Abbreviations

- AAP: American Academy of Pediatrics
- AHI: African Health Initiative
- CHW: Community Health Workers
- CI: Confidence Interval
- CPD: Continuous Professional Development
- ED: Emergency Department
- ETAT: Emergency Triage Assessment and Treatment
- GAC: Global Affairs Canada
- HBB: Helping Babies Breathe
- HBB-QIC: Helping Baby Breathe-Quality Improvement Cycle
- HIV: Human Immunodeficiency Virus
- IMAI: Integrated Management of Adult and Adolescent Illness
- IMCI: Integrated Management of Child Illness
- KNR: Knowledge about Neonatal Resuscitation
- M: Mean
- MDG: Millennium Development Goals
- MNCH: Maternal and Newborn Child Health
- MoH: Ministry of Health
- NATO: North Atlantic Treaty Organisation
- NCD: Non-Communicable Diseases
- NISR: National Institute of Statistics of Rwanda
- OSCE: Objective Clinical Structured Examination
- PARS: Perinatal Audit Registry of the Netherlands

PHIT: Population Health Implementation and Training

SD: Standard Deviation

SDG: Sustainable Development Goals

SENR: Self-Efficacy for Neonatal Resuscitation

SES: Self-Efficacy Scale

SHIE: Suspected Hypoxic-Ischemic Encephalopathy

SPSS: Statistical Software Package for Social Sciences

TSAM: Training Support and Access Model

UN: United Nations

WHO: World Health Organization

CHAPTER ONE

INTRODUCTION

In this chapter, the general background information pertaining to neonatal resuscitation, mentorship, and nurses' and midwives' knowledge and self-efficacy of neonatal resuscitation are discussed. Moreover, the significance and purpose of the study are described.

Background and Significance of Study

Among the major challenges that the world faces today is the issue of child mortality, particularly neonatal mortality. Strategies to address it were highlighted in both the United Nations (UN) Millennium Development Goals (MDG) and the Sustainable Development Goals (SDG), as world leaders committed themselves to fight all causes of child mortality (Lawn et al., 2015). Through these MDG efforts, the UN has reported a tremendous overall reduction in child mortality worldwide from 90 to 43 deaths per 1,000 live births between 1990 and 2015 (UN, 2015). However, while overall child mortality rates have dropped, this is not the case for neonatal mortality in particular. The UN (2015) has estimated that in 2015, approximately 6 million children died before their fifth birthday, among them, about 1 million died on their day of birth. The same report also states that 1 million died in the first week, and around 2.8 million died during their neonatal period, defined as the first 28 days of childhood (UN, 2015). Globally, the neonatal period is a vulnerable time for a child to survive, particularly in developing countries. Death during this time period is termed as either still birth or neonatal death. Kujala et al. (2017) define neonatal death as an infant's death in the first 28 days of life, while still birth occurs when the newborn does not cry, breathe or move at birth.

Knowledgeable and skilled health care management in the first minute of life can contribute significantly to avert both neonatal death and still birth.

A report by You et al (2014) shows that worldwide, neonatal mortality dropped from 33 deaths per 1,000 live births in 1990 to 20 deaths per 1,000 live births in 2013. While, the decrease since 1990 to 2013 is apparent from region to the region, there were huge differences in rates across them. In developed regions, the decrease was from 8 to 3 deaths per 1,000 live births, while in the developing regions the decrease was from 36 to 22 deaths per 1,000 live births. In Eastern Asia, excluding China, the decrease was from 25 to 8 deaths per 1,000 live births; in Southern Asia the decrease was from 51 to 30 deaths per 1,000 live births; in South Eastern Asia the decrease was from 28 to 4 deaths per 1,000 live births. However, in Sub-Saharan Africa the decrease was from 46 to 32 deaths per 1,000 live births. Neonatal mortality is not only reducing very slowly in Sub-Saharan African countries but also its proportion in all under-five deaths remains very high (You et al., 2014).

A recent report from the World Health Organization (WHO, 2017), revealed that, in 2016, neonates accounted for 46% of deaths among children under five. Although, the same report acknowledged a decline in child mortality in under five years of age, the proportion of neonatal mortality increased from 41% to 46%. This increase instead of decrease brings in to question the likelihood of achieving the UN's stated SDGs related to neonatal mortality. The SDGs, in its goal 3, has committed to have reduced neonatal mortality to 12 per 1,000 live births by the year 2030, however, most developing countries are very far from reaching this goal, since the rate of decreasing neonatal mortality is low (UN, 2015). Reports indicate that the proportion of deaths during the neonatal period differ widely from country to country. Nevertheless, 98% of neonatal

deaths occur in middle and low-income countries (Lawn et al., 2015). Clearly, this large gap in neonatal mortality between developing and developed countries reveals a probable association between the quality of health care available and the risk of neonatal mortality.

Causes of Neonatal Mortality

The published literature attributes neonatal deaths as being due to unattended births, less skilled health workers, natural and human made disasters (including war), limited investment in health care professionals' ongoing education needs, low quality of care, maternal age above 35 years, syphilis, HIV, malaria, overweight and obesity of mothers, maternal pre-existing hypertension, pre-eclampsia, tobacco use, post-term pregnancy, rhesus incompatibility and birth asphyxia. Most of these causes are preventable and can be eliminated through the improvement of quality health care. Although some of these factors can stand alone in contributing to the morbidity or mortality of neonates, studies have shown that many of these factors are related to poor management of birth asphyxia, which kills many neonates in developing countries (Best et al., 2019; Chuwa, Mwanamsangu, Brown, & Mahande, 2017; Kattwinkel et al., 2010; Lindskog, 2016; Weightman et al., 2012). "Neonate asphyxia is defined as the inability of the neonate to initiate and sustain adequate respiration after delivery" (Ilah et al., 2015 p.64). "Birth asphyxia is the fifth largest cause of under-five child mortality, after pneumonia, diarrhea, neonatal infection, and complications of preterm birth" (Ilah, Aminu, Musa, & Adhlakun, 2015 p.64). An analysis conducted by Afolabi, (2017) showed that birth asphyxia accounts for 24% of all causes of neonatal deaths in Africa.

A study conducted in one Ethiopian hospital from July 2014 to June 30, 2017, showed that of the 9,738 babies who were born during that study period, 302 (3.1%) had birth asphyxia (Ibrahim, Muhye, & Abdulie, 2017). Another study that was conducted at

the University of the Gondar, a referral hospital in Ethiopia, showed that birth asphyxia accounted for 31.6 % of all neonatal causes of deaths (Wosenu, Worku, & Teshome, 2018). Similarly, a study that was conducted in Nigeria revealed the gravity of birth asphyxia for taking the lives of neonates. The study showed that 21.1% and 5.4% of all deliveries during the study were cases of asphyxia and death due to asphyxia respectively (Ilah et al., 2015). In Rwanda, a study related to an audit report of neonatal deaths showed that 36.7% of 1324 neonatal deaths cases were attributed to birth asphyxia and related complications (Wilmot, Yotebieng, Norris, & Ngabo, 2017).

Management of Neonatal Birth Asphyxia

To address the challenge of neonatal birth asphyxia, the American Academy of Pediatrics (AAP), developed an evidence-based intervention for resource-limited environments called Helping Babies Breathe (HBB) to help reduce neonatal mortality, by focusing on the first golden minute of life (Kattwinkel et al., 2010). The AAP states that in the first minute of life, simple steps can effectively resuscitate the majority of neonates who are not breathing at birth, through an evidence-based medical intervention called HBB. Some of the steps for this intervention are to prepare a clean, warm, and well-lit environment for delivery. Moreover, in the golden minute (the first minute immediately after delivery) it is crucial to establish skin-to-skin contact with the mother and baby to keep the neonate warm, to dry the baby immediately after delivery, and to start ventilation as soon as the neonate is not breathing (Kattwinkel et al., 2010). Although these simple steps are effective in management of neonatal asphyxia, studies show that resuscitation practices are poorly followed in Sub-Saharan countries.

In some health facilities of countries in sub-Saharan Africa, it was found that skin to skin care was extremely rare, while drying and wrapping the neonate are also poorly

done (Bee, Shiroom, & Hill, 2018). The findings show that instead of focusing on ensuring that a newborn is breathing effectively, some health professionals instead engage in more traditional practices such as bathing the baby immediately after birth, which can lead to hypothermia, hypoxia, and death (Khan, Kim, Singh, Amouzou, & Carvajal-Aguirre, 2018; WHO, 2013). The WHO (2013), recommends bathing of the baby 24 hours after birth. However, this is not followed in various Sub-Saharan countries: In Ethiopia, some believe that cleaning the baby, removes odour and can make a baby stronger. In Ghana, bathing of the bay is practiced to stop bad odour later in life, to shape the head, and to make the body feel clean, which it is believed helps the baby to sleep. In Senegal, bathing is thought to remove blood, sperm and impurities, to make the baby comfortable, stop body odour in life and to stop the baby from getting sick. In Tanzania, bathing the baby is thought to remove the dirt and vernix and help the baby to cry. In Uganda, they bath a baby to remove dirt and odour and to improve the health and hygiene of the baby, make the baby comfortable, remove vernix, and make the baby clean for visitors (Bee et al., 2018).

Mentorship and Neonatal Mortality

Published evidence shows that most neonate deaths are attributed to birth asphyxia and various strategies are needed to reverse the situation. It is estimated that between 80 and 90% of deaths occurring from asphyxia and infection can be averted by improving health care and proper use of ventilation (Griffin et al., 2017). In addition, studies show a gap of knowledge, skills, and clinical judgement among birth attendants: A study conducted in Kenya by Murila, Obimbo, and Musoke (2012) showed that only 30% of frontline neonatal health care providers, which includes nurses and midwives, could pass a neonatal resuscitation assessment test. The same study reported that 70% of

neonatal care providers identified the lack of refresher training in neonatal resuscitation as a key factor leading to low confidence in their resuscitation skills.

One of the strategies praised for its potential contribution to quality health care improvement is mentorship. “Mentorship is a professional activity in which mutual respect and trust between mentors and mentees are critical for maintaining a supportive environment that facilitates learning and development” (Shaikh, Alturabi, & Jr, 2016, p.56). Mentorship involves the mentor and mentee working together into a collegial environment that helps the mentee acquire new knowledge, confidence, and skills. Mckimm, Jollie, and Hatter, (2007), explain mentoring as one person helping another in making significant transitions in knowledge, work or thinking. The person helping is referred to as a mentor and the person being helped (learner) is known as the mentee. During the duration of mentorship, the mentor assumes the following roles: teacher, confidante, motivator, facilitator, counsellor, coach, friend, adviser, guide, expert and role model. On the other side, the mentee is characterised by willingness to learn and to develop, willingness to participate, ambitious, keen to succeed, loyal, committed, flexible, adaptable, self-aware, well-organised, able to accept change, and receive constructive feedback (American Psychological Association, 2006; Mckimm, Jollie, & Hatter, 2007; Plamondon & Canadian Coalition for Global Health Research (CCGHR), 2007; Supe, Edward, & Hospital, 2011). As discussed later, the mentorship in this study followed these same principles.

Schwerdtle, Morphet, and Hall (2017), in a scoping review on mentorship of health personnel for improving the quality of health care in middle and low-income countries, revealed that effective mentorship contributes to improving the quality of health care (p.6). Similarly, the study conducted by Anatole et al (2013) in Rwanda about

mentorship and improvement of health care, supported the use of mentorship for improvement in a number of health care quality indicators.

Rwanda - Background, Healthcare and Economic Status and Neonatal Mortality

Rwanda is considered to be an East African country, although its geographical location lies more in central Africa. It is immediately south of the equator between latitude 1°4' and 2°51'S and longitude 28°63' and 30°54' E (National Institute of Statistics of Rwanda (NISR) [Rwanda], Ministry of Health (MoH), 2015). It is a land-locked country of 26,338km². Rwanda forms part of the highlands of eastern and central Africa with mountainous terrain and an average elevation of 1,700 meters. Rwanda experiences a sub-equatorial climate with an annual average temperature of 18.5°C. It is a fairly dry region, with total rainfall of 1,250 millimeters that occurs over two rainy seasons that alternate with dry seasons. Rwanda is segmented into five provinces, which are in turn divided into 30 districts and 416 sectors, 2148 cells, and 14,837 villages. In 2015, the population of Rwanda was estimated to be 11,274,221. It is among one of the most densely populated countries in the world with 415 people per km² (NISR, Ministry of Health (MoH), 2015). According to the NISR, in 2014, the annual Gross Domestic Product of Rwanda was 791 USD; 84% live in rural areas, while 39% of the total population live in poverty and 23% are illiterate (NISR, Ministry of Health (MoH), 2015).

Neonatal mortality due to birth asphyxia is still high in Rwanda (MoH, 2016): the neonatal mortality rate is 20 newborns/1000 births of which birth asphyxia is among the leading causes (NISR, 2014/2015). The burden to the country of neonate deaths is addressed through the health care system that starts from community health workers (CHWs) to the referral hospitals. According to a 2015 Rwandan health sector policy,

each Rwandan village is inhabited by a minimum of 50 to 100 households and is assigned with three CHWs specific to that population (Rwanda. Health Sector Policy, 2015). The same policy states that CHWs coordinate health activities at the village level mainly through health education and advising the population when to consult further health services. This level of health system plays a significant role, not in the least because they can help reduce the potentially negative effects of some practices used by traditional healers. Traditional healers base their treatment on herbs and spirituality which may not be effective for management of every health condition. Thus, CHWs play a big role of sensitizing the population to seek modern health services. Nearly each district has a district hospital and each sector has a health center (Rwanda. Health Sector Policy, 2015) with transfers going from CHWs to health centers, then to hospitals.

In Rwanda, all health centers in the country are managed by nurses and midwives: they are in charge of delivering and taking care of neonates (MoH, 2016a). Currently, the level of education of nurses and midwives at health centers in Rwanda ranges from three to four years of health training: Three years of high school referred as associate nurses and three or four years at college level referred as registered nurses on midwives.

Although, the studies from other Sub-Sahara African countries have shown inadequate knowledge and skills in neonatal resuscitation (Bee et al., 2018; Kattwinkel et al., 2010), there is no known routinely available evidence in Rwanda about nurses' and midwives' knowledge about neonatal resuscitation. Consequently, a practice-based mentorship model was developed by the Training Support and Access Model (TSAM) project in Rwanda, a Canadian government-sponsored project serving not only to address the gap of neonatal resuscitation knowledge and skills but also to address broader challenges related to maternal, newborn, and child health (MNCH) in Rwanda in general. The TSAM

project selected health professionals who volunteered to be mentors and provided them with education about the role of a mentor, education about how to facilitate the learning of mentees, as well as education about how to provide neonatal resuscitation. Specifically, the education program was called Helping Babies Breathe and was developed by the AAP (2010) for use in developing countries. Mentors were paired with mentees (nurses and midwives who work in maternity of health centers) who had volunteered to be involved in the TSAM project and who were employed as nurses or midwives at TSAM project participating health centers. When the mentor was with the mentee in the health centre and engaging in practice together at the bedside, the mentor would take the opportunity to facilitate the learning of the mentee about neonatal resuscitation through discussion and real-world hands-on learning. Thus, assessing the effectiveness of the neonatal resuscitation aspects of the TSAM mentorship model was the main purpose of this study. In particular, the researcher anticipated that the mentorship model would enhance mentees' knowledge and self-efficacy pertaining to neonatal resuscitation. Ultimately, it was proposed that if TSAM project mentors facilitated the learning of mentees' (nurses and midwives) about neonatal resuscitation throughout their mentoring relationship, then mentees' knowledge about and self-efficacy for neonatal resuscitation would increase. Ultimately, more knowledgeable and self-efficacious health professionals may be more likely to effectively engage in neonatal resuscitation behaviours when the situation was to arise in the future, which has the potential to decrease neonatal mortality in Rwanda. Reduced incidences of neonatal mortality is a critical goal to strive for, and is a key aim of the country of Rwanda as well as a Sustainable Development Goal (UN). Policy makers in the Rwandan health sector could consider the TSAM mentorship model and associated study results in relation to

their newborn resuscitation protocols for future health care strategic planning purposes. Further, the study would contribute more broadly to the literature about mentorship, knowledge and self-efficacy development, and to neonatal resuscitation.

Research Purpose

The aim of this study was to assess the impact of the TSAM practice-based mentorship model that involved mentors' facilitation of mentees' learning about HBB principles of neonatal resuscitation. In particular, the purpose was to assess nurses' and midwives' (mentees') knowledge about and self-efficacy for neonatal resuscitation before and after participating in the TSAM practice-based mentorship model in Rwanda.

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CHAPTER TWO

**ASSESSING CHANGES IN KNOWLEDGE ABOUT AND SELF-EFFICACY FOR
NEONATAL RESUSCITATION AMONG RWANDAN NURSES AND MIDWIVES
AFTER A MENTORSHIP PROCESS.**

Background

The first 28 days of life, termed the neonatal period, represents the most difficult period for a child's survival. The risk of a child dying during the neonatal period is very high compared to any other period in the first five years of life. A World Health Organization [WHO] (2016) report states that the proportion of overall child mortality attributable to neonatal mortality is increasing, where 46% of under-five mortality is now due to neonatal deaths. Worldwide 2.6 million neonates died in 2016 of which 1 million died within the first 24 hours of birth (WHO, 2016). The WHO estimates that 7000 neonates die every day worldwide. Moreover, the report highlights that 80% of the mortality burden is borne by 60 countries and these countries are likely not to achieve the SDG target of reducing neonatal deaths to 12 deaths per 1000 live births by the year 2030. Although, in the last decade, child mortality reduced by 2.5%, neonatal mortality only reduced by 2.1% (Griffin et al., 2017). Neonatal mortality rates vary greatly by region: in developed regions (mostly Europe and North America), the neonatal mortality rate is 3.7 deaths per 1000 live births, whereas in sub-Saharan Africa, the rate is about 10 times higher (Blencowe & Cousens, 2013).

Although neonatal mortality accounts for the largest proportion of under-five mortality, most of the causes can be prevented by improving antenatal care, the use of skilled birth attendants, and improving the quality of emergency obstetric care (Griffin et al., 2017). Rwanda, a land locked country and one of the developing countries in sub-

Saharan Africa, experiences a high rate of neonatal mortality. Although, neonatal mortality in Rwanda has been reduced in the past 15 years, the National Institute of Statistics of Rwanda [NISR] (2014/2015), reported a neonatal mortality rate of 20 newborns per 1000 live births. The annual report of the Rwandan Ministry of Health (MoH) acknowledges that the number of neonatal deaths need to be decreased (Rwanda. MoH, 2016b). To counter this heavy burden the country has launched a number of different strategies including, but not limited to: the training of healthcare providers on the Integrated Management of Child Illness (IMCI); Emergency, Triage, Assessment and Treatment (ETAT) and essentials of newborn care (Rwanda. MoH, 2016b); However, more activities and specific strategies that focus on neonatal mortality are still needed to address all preventable causes.

Birth asphyxia is highlighted as a major cause of neonatal mortality in developing countries including sub-Saharan Africa (Wosenu et al., 2018). Blencowe and Cousens (2013) highlighted the three primary causes of neonatal mortality as preterm birth, birth asphyxia, and infections. Birth asphyxia is associated with three quarters of neonatal deaths in developing countries (Liu et al., 2016). A study conducted in one Ethiopian hospital from July 2014 to June 30, 2017, showed that of the 9,738 babies who were born during that study period, 302 (3.1%) had birth asphyxia (Ibrahim, Muhye, & Abdulie, 2017). Another study that was conducted at the University of Gondar referral hospital in Ethiopia showed that birth asphyxia accounts for 31.6 % of all neonatal causes of deaths at that particular hospital during the study period (Wosenu et al., 2018). Similarly, a study conducted in Nigeria revealed the gravity of birth asphyxia for taking neonates lives (Ilah, et al., 2015). The study showed that 21.1% and 5.4% of all deliveries during the study involved cases of birth asphyxia and death due to birth asphyxia respectively (Ilah

et al., 2015). Thus, improving neonatal resuscitation to decrease the incidence of birth asphyxia is a crucial step.

“Approximately 5% to 10% of all infants born in health facilities require some degree of resuscitation, such as tactile stimulation or airway clearing” (Wall et al., 2010 p.399). The study by Wall et al (2010) reports that among all babies born worldwide, less than 1% will require advanced care (e.g. chest compression and drug use), approximately 6 million (3-6% of all babies born) will require an ‘ambu (an equipment for giving air bag’ and mask for ventilation (i.e. resuscitation procedure), approximately 10 million (5-10% of all newborn babies) will require drying and rubbing to initiate immediate breathing, and all babies will require an immediate assessment of breathing followed by drying the baby, and placing the baby skin to skin with its mother (Wall et al., 2010). Based on these simple resuscitation procedures, the American Academy of Pediatrics (AAP), developed an evidence-based educational program called Helping Babies Breathe (HBB) to help reduce neonatal mortality, focusing on the first golden minute of life in resource-limited environments (Kattwinkel et al., 2010). The AAP argues that in the first minute of life, steps can be taken to effectively resuscitate the majority of neonates who are assessed as not breathing at birth. Health care providers can learn about how to carry out neonatal resuscitation techniques through the HBB educational program that is an evidence-informed professional development program. In the ‘golden minute’ (the first minute immediately after delivery) it is crucial that skin-to-skin contact is established between the mother and neonate to keep the neonate warm, to dry the baby immediately after delivery, and to start ventilation with bag and mask (Ambu bag) as soon as the neonate is assessed as not breathing (Kattwinkel et al., 2010). Although these steps are

effective in management of neonatal asphyxia, studies show that resuscitation practices are poorly followed in sub-Saharan countries.

Bee, Shiroor, and Hill, (2018) reported that skin to skin care was rarely practiced, while drying and wrapping the neonate were also poorly done. Stressing the influence of cultural beliefs, studies also revealed potentially dangerous practices by health practitioners like bathing a neonate immediately after birth. Bathing the baby immediately after birth leads to hypothermia which can result in hypoxia and consequently, death (Khan, Kim, Singh, Amouzou, & Carvajal-Aguirre, 2018; WHO, 2013). The baby should be bathed at least 24 hours at the earliest after birth (WHO, 2013). Nonetheless, these practices are less followed or not at all in various sub-Saharan countries: In some countries like Ethiopia, Ghana, Senegal, Tanzania, and Uganda, neonates are often bathed immediately after birth for various reasons: like removing of bad odour, making it stronger, stopping bad odor late in life, shaping the head, making the body feel clean, helping the baby to sleep, removing blood, sperm and impurities, stopping the baby from getting sick and making the baby clean for visitors (Bee et al., 2018). To stop such unsound practices and to establish a cadre of health professionals that can engage in evidence-informed neonatal care, urgent strategies are needed to support health professionals' knowledge development for neonatal resuscitation techniques.

The literature highlights mentorship as a strategy that can improve the quality of health care delivery. Shaikh et al., (2016) define “mentorship as a professional activity in which mutual respect and trust between mentors and mentees are critical for maintaining a supportive environment that facilitates learning and development” (p.56). Public Health Research Education and Development [PHRED], (2005) explicates mentorship as a long relationship that enables the growth of a mentee (a novice) with the help a mentor

(expert) thru a purposeful empowering, mutual sharing, learning and respect. Mentorship brings the mentor and the mentee together to work in a collegial environment to help the mentee to acquire new knowledge and skills. Schwerdtle, Morphet, and Hall (2017), in their scoping review on mentorship of health personnel for improving the quality of health care in middle and low-income countries, reported that effective mentorship contributes to the improvement of the quality of health care and neonatal outcomes (p.6). Nonetheless, to the researchers' knowledge, there are no documented findings related to the impact of mentorship on knowledge and self-efficacy of health care personnel related to neonatal resuscitation in Rwanda. Thus, this study was designed to assess the impact of mentorship on Rwandan nurses and midwives' knowledge and self-efficacy about neonatal resuscitation.

Literature Review

To understand the concepts related to this study and to be informed about the research questions, the researcher conducted a literature review using the following key words: knowledge, self-efficacy, neonate mortality and birth asphyxia, mentorship, and Helping Babies Breathe. The review considered the findings documented in the English language that were not published more than 10 years ago.

Theoretical Framework

Self-Efficacy

Self-efficacy, the theory underpinning this study, is explained as a person's belief in their capabilities to attain a given outcome through behavior change (Bandura, 1977). Although, the theory acknowledges that cognitive processes play a prominent role in the acquisition and retention of new behavior patterns, efficacy and outcome expectation are of paramount importance in behavior change; they lead to persistence in practice of a

behavior (Bandura, 1995). Therefore, to re-enforce someone's self-efficacy that leads to behavior change, efficacy and outcome expectations should be explicitly considered. Emphasizing on the five sources of self-efficacy; mastery experience, vicarious experience, social persuasion, and physiological and emotional states determines the efficacy and outcome expectations that affect behavioral change. Once an individual has established self-efficacy expectations, the behavioral change may also be affected by outcome expectations where the person believes that engaging in certain actions will lead to a desired outcome (Bandura, 1977).

As a result of engaging in TSAM mentorship preparation, it was anticipated that individuals who had been mentors to mentees in this study would have integrated sources of self-efficacy information into their mentoring role in order to support mentees' belief in themselves for engaging in neonatal resuscitation efforts in the practice setting. For instance, performance accomplishment (mastery experience) could have been reinforced during the mentorship experience as nurse and midwife mentees performed neonatal resuscitation procedures under the guidance of mentors. Vicarious experience may have been established if mentees observed mentors performing neonatal resuscitation techniques. Mentors may have created welcoming practice environment working conditions for mentees to help decrease mentees' fear of carrying out neonatal resuscitation. With decreased fear, it is anticipated that mentees would have experienced more enhanced emotional and physiological states in practice. Mentors may have used verbal persuasion with mentees through encouraging comments and sharing their clinical and theoretical knowledge to enhance mentees' knowledge and confidence.

Moreover, literature supports the use of mentorship and education to increase knowledge and self-efficacy (McDonough et al., 2016; Raymond & Sheppard, 2017).

Researchers have highlighted the significant role self-efficacy has in predicting behavior changes (Davis-Smith & Edwards, 2016; Tang, Smith, Mc Sharry, Hann, & French, 2018). Thus, in this study self-efficacy is regarded as a determinant that predicts the behavior change to perform neonatal resuscitation based on the mentorship intervention.

Knowledge

Different theorists categorize knowledge into three types: personal, procedural and propositional knowledge (Booth, 2014a, 2014b; Hetherington, 2008; Joyce, 2014; Klubertanz, 2012; Larson, Ibes, & White, 2011; Turri, 2012). Personal knowledge is defined as having had an experience of something and remembering it. For example, knowing the person you have previously met. Procedural knowledge is the ability to perform a certain skill, for example driving. Propositional knowledge is explained as the knowledge that is not sufficient to belong either in personal or procedural knowledge. Both personal and procedural knowledge are related since someone who believes to have learnt something and still remembers it can therefore justify it through demonstrating their acquired skills. For the purpose of knowledge measurement in this study, knowledge is defined as “a belief that is true and justified” (Hunt, 2003 p.100). Hunt (2003) argues that “a person can possess considerable knowledge as a result of learning, but such knowledge remains a hidden power until the person uses the knowledge to do something such as perform a task, understand something, make a decision or solve a problem” (p.102). On other hand, propositional knowledge is neither remembered nor could be demonstrated, thus, it can be viewed as incorrect knowledge. Hunt (2003), categorize knowledge as correct, uninformed or misinformed. Correct knowledge is a justified knowledge while uninformed knowledge is the knowledge where a person is not correct, and there are doubts about the certainty of correctness. However, with misinformed

knowledge, the person believes the unjustified knowledge is the correct knowledge (Hunt, 2003). Contrary to uninformed knowledge, misinformed knowledge is dangerous because it can lead to error performances since the person believes it is true. In this study, only the correct knowledge was assessed based on correct practices about neonatal resuscitation that are justified by research-based knowledge according to the AAP (2010) HBB knowledge questionnaire. Participants were assessed according to whether or not they responded correctly to the neonatal resuscitation knowledge-based questions.

Neonatal Mortality and Birth Asphyxia

Several studies have linked neonatal mortality with birth asphyxia. The literature review that was carried out by Lawn et al., (2009) which aimed to find out why, where, and what can be done to reduce neonates deaths, found that neonatal mortality rates are up to 25-fold higher in low income countries. Their study revealed that rural and poor populations are at highest risk of neonatal birth asphyxia. Furthermore, the study explains that these populations face the challenge of the lowest coverage of skilled health care at birth (Lawn et al., 2009). Another multi-country prospective cohort study about neonatal deaths was conducted by Bahl and Yochida, (2018) with the aim of generating high quality data about the burden, timing, and causes of maternal deaths, stillbirths, and neonatal deaths in south Asia and sub-Saharan Africa. The study used a data collection tool and standardized procedures to conduct a verbal autopsy of deaths of women in reproductive age (15 to 49 years old) as well as neonatal deaths. The study found that 40% - 45% of neonates' deaths occurred during labor, delivery, or within 24 hours after birth. Forty percent of neonatal deaths were due to perinatal birth asphyxia. Thus, the study recommended to put more effort into addressing perinatal asphyxia as it is critical for achieving sustainable development goals (Bahl & Yochida, 2018).

Iwamoto et al., (2013) conducted a retrospective verbal autopsy study about risks of neonatal death. The study collected data from 54 community clusters in Bangladesh and India. The study showed a significant increased risk of neonatal death in relation to birth asphyxia. Kortekaas et al., (2018) carried out a study in the Netherlands. The study used the 2010-2012 data from the Perinatal Audit Registry of the Netherlands (PARS) to find out the causes of neonates' deaths. The study attributed 10% of the deaths to neonatal asphyxia (Kortekaas et al., 2018). Similarly, Wilmot, Yotebieng, Norris, and Ngabo (2017) conducted a study in Rwanda on missed opportunity in neonatal deaths. The study used a standardized electronic questionnaire that captured information from 40 health facilities across Rwanda from January to December of 2012. The study used proportions to describe the main causes of deaths: Among 1324 neonates' deaths, 36.7% were due to birth asphyxia and its complication, 22.5% were due to lower respiratory tract infections, and 22.4% were due to prematurity complications. The study also showed that 29.1% of neonates' deaths were associated with neonatal delay in adequate care, while 14.2% are associated with maternal delay in adequate care. The study concluded that quality obstetric care could reduce neonatal deaths related to asphyxia (Wilmot et al., 2017).

Mentorship for Health Care Quality Improvement

Most low and middle-income countries are confronting a crisis in human resources, with limited to low availability of health personnel, poor quality of care and limited training and development of the workforce. To achieve the UN SDG health-related targets, these challenges need effective measures to address them. Many have proposed mentorship as an effective mechanism for improving health care performance. A scoping review conducted by Schwerdtle et al. (2017) emphasized the importance of

mentorship for improving healthcare. Based on the results of their review of published articles for mentorship of health personnel to improve quality of health care in low- and middle-income countries, mentorship was praised as a significant strategy to improve the quality of health care. The study revealed two types of mentorship: side by side and team to team. The side by side mentorship model uses building of relationships, communication, and feedback as the main strategy to consider while mentoring. This type of model also requires that the mentor and mentee belong to the same culture (customs and social behavior) and professional background. In the side by side mentorship model, the mentors are chosen on the basis of expertise, knowledge and skills. Their study shows that before the start of a mentorship program; the mentors receive clinical training that emphasize relationship building, communication skills, giving of feedback, theories of adult learning, clinical teaching, applying clinical mentorship techniques, using observation checklists and cultural sensitivity. Contrary to this, the team to team mentorship model involves connecting the modelling mentors' team to the mentees' team. The mentoring team can use visits or video-conferencing to inspire the mentees' team. The frequency for visits in both models differs, ranging from 1 day visit to the whole week. Moreover, the duration for mentorship ranged from weeks to a year. The review of the published articles about mentorship, largely suggests an effective mentorship for improvement of certain quality of health care outcomes (Schwerdtle et al., 2017).

In another study, the African Health Initiative (AHI) financially supported mentorship program that was conducted by the Population Health Implementation and Training (PHIT). The mentorship intervention program aimed for quality improvement in five countries: Ghana, Mozambique, Rwanda, Tanzania, and Zambia. The project used mentorship to address gaps in health worker knowledge and skills. For the assessment of

the project implementation, both qualitative and quantitative methods were used to capture and analyse the data. They captured data on: mentorship, selection and orientation of mentors, integration of skills into the system, evaluation and monitoring, success and challenges, improvement of outcome and contextual factors. The number of visits for mentorship at health facilities varied: Ghana 156, Mozambique 24, Rwanda 24, Tanzania 30, and Zambia 42. The emphasis of mentorship varied from country to country. For example, in Rwanda, the mentorship emphasized quality care through decentralization of clinical training and supervision of clinical services delivery. Improved health services delivery purposely focused on maternal and newborn child health (MNCH), principles of integrated management of adult and adolescent illness (IMAI) and non-communicable diseases (NCD) management. In Tanzania, among other things, mentors emphasized child health care including community based integrated management of childhood illness when partnering with mentees. The chosen mentors were experts in their field of mentorship. They visited the health facility every 4-6 weeks to provide mentorship to their assigned mentees. The findings revealed that mentorship was related to quality improvement in health care outcomes. In Rwanda, the quality of under-five health care improved. Danger signs assessment, diagnosis and management were among the assessed variables. Quality improvement correlated with number of visits and was measured in both diagnosis and recognition of danger signs. Overall, in all participating countries, mentorship in practice settings was shown to be effective in strengthening the quality of MNCH health care (Manzi, Hirschhorn, Sherr, Chirwa, & Baynes, 2017). However, the study highlighted that adaptation of approaches to reflect local context should be considered while planning for mentorship. The study reported

that the contextual approaches, encouraged the adaptation and improved their effectiveness and sustainability.

Another mentorship study was conducted in Afghanistan to evaluate mentorship intervention by exploring Afghan health care providers' (mentees) experience from their Canadian mentors' team. The Canadian mentoring team from the North Atlantic Treaty Organisation (NATO) was composed of physicians, nurses, a pharmacist, and a laboratory and diagnostic imaging technician. The Afghan health care providers (mentees) team were composed with 13 physicians, 21 nurses, and 2 other health care personnel from two hospitals. The Canadian team were educated about cultural sensitivity before the mentoring experience began. The study used CanMEDS 5-point Likert scale (ranged from 1-strongly disagree to 5-strongly agree) for 19-questions self-administered. CanMEDS is a framework for improving patient care by enhancing physician training. It was developed in 1990 by the Royal College to improve integrated competencies of playing the roles of expertise, communicator, collaborator, leader, health advocate, scholar, and professional (Frank, Snell, & Sherbino, 2015). The study used team to team approach for mentors to train and advice mentees on CanMEDS framework. The results showed that Afghan health care providers considered the mentorship experience positively: The training and advice offered by mentors on medical expertise were appropriate. However, they criticized the mentors' team reliance on technology alone that failed to consider the limited resources in Afghanistan (Beckett et al., 2015).

Helping Babies Breathe (HBB)

The medical intervention for helping babies breathe (HBB) in the first minute of life has been adopted by many limited resource environments to address the challenge of birth asphyxia. HBB was developed by the American Association of Pediatrics (AAP) in

2010, and since then it has been used in many settings to save lives. HBB principles involves simple steps of neonatal resuscitation: place the baby skin to skin with its mother, stimulate the baby by drying it thoroughly, ventilate the baby if is not breathing (AAP, 2010). All these steps are done in the golden minute (first minute after delivery).

In a study that was conducted by Rule et al., (2017) that took place at a rural referral (Tenwek) hospital in Kenya with a high rate of birth asphyxia. The study used HBB based principles. The study had a goal of decreasing the suspected hypoxic-ischemic encephalopathy (SHIE) rate by 50% within six months after the HBB intervention. The researcher invited the master trainers from the Tenwek hospital and North America. The training team joined health care providers at the Tenwek hospital for the period of one year (July 2014 – June 2015) to work with them with the purpose to identify the gaps according to HBB standards. Thereafter, the training of 96 participants started and lasted for the period of two months. The training based on HBB principles to engage staff/trainees neonatal resuscitation skills. The study results reported the decrease of hypoxic ischemic encephalopathy: Baseline data showed a median of suspected hypoxic ischemic encephalopathy rate of 14.7/1000 live births with wide variability and ten months post-HBB education, the suspected hypoxic ischemic encephalopathy rate decreased by 53% to 7.1/1000 live births ($p = 0.01$).

Another study was conducted on rural Ghanaian midwives ($n=48$) by Eblovi et al. (2017) with the aim to determine the impact of HBB educational interventions on resuscitation skills and retention. Trained midwives on HBB principles were used to educate their colleagues. One year later, 48 midwives from Ghana in rural health clinics were educated in HBB principles through their colleagues (master trainers). Trainee skills were evaluated using objective clinical structured examination (OSCE) at three-time

points: first evaluation immediately after training, second evaluation four months after initial training, and the last evaluation four months after refresher training. OSCE mean scores for immediate evaluation (M=94.9%) decreased to (M=81.2%, $p<0.001$) during the second evaluation four months post training. However, the OSCE mean score improved to (M=92.7%, $p=0.0013$) during the third evaluation that assessed knowledge retention, four months following refresher training. In addition, the data reported by clinic sites that employed health care providers educated in HBB indicated that among 5.0% of neonates who required bag-mask ventilation, less than 1% (0.71%) did not survive compared with a national estimate of 1.7%. The study concludes that this difference in local infant mortality rates compared to mortality at the national level could be attributed to health providers' use of the knowledge and skills learned through involvement in HBB education, and subsequently applying that to their practice (Eblovi et al., 2017).

A study conducted in Nepal used different strategies to enhance resuscitation knowledge, resuscitation knowledge retention and resuscitation skills of 137 nurses who worked in admission units, antenatal units, labor units, operation theatre, and postnatal ward. The study used time series design to assess HBB knowledge, bag and mask use skills, preparation for resuscitation at birth, peer evaluation on HBB process and OSCE about HBB practices. The assessment was done before the start of HBB training, immediately after the training, and 6 months after the training. Study results indicated higher levels of knowledge about resuscitation immediately after training $M=16.4$ ($SD=1.4$) [the score was out of 17] compared to $M=12.8$ ($SD=1.6$, $p<0.001$) before the training. Knowledge was retained after 6 months $M=16.5$ ($SD=1.1$, $p<0.001$). Further, the study found an association between knowledge retention and the strategies used to

enhance HBB based resuscitation skills: health worker's completion of training, daily check for use of bag and mask for resuscitation, use of self-evaluation, and peer review on adherence to HBB resuscitation practice. The study recommended the importance of establishing the appropriate mechanism for implementing the resuscitation standards from preparation of delivery and immediately after delivery as well as self and peer-review following resuscitation (Ashish et al., 2017).

Mentorship and Self-Efficacy Acquisition

Actual implementation of knowledge and skills go hand in hand with self-efficacy (Bandura, 1995). Raymond and Sheppard (2017) conducted a study to “describe the effects of a mentorship experience on the level of perceived stress, sense of belonging, self-efficacy, and loneliness by first year baccalaureate nursing students” (p. 16). A quasi-experimental design (n=36 in control group, and n=34 in the experimental group) was conducted with baccalaureate nursing students all selected from a single baccalaureate nursing program. Third year nursing student peer mentors were purposefully nominated by nursing professors within the program. Mentorship role was to develop an ongoing relationship with each mentee in their assigned group as well as encouraging the development of study groups. The score in post mentorship experience in experimental group had a statistically significant impact in reducing first year nursing students' perceived stress and loneliness and increased their sense of self-efficacy about performing academic requirement and psychological sense of belonging.

Megan (2017) conducted a study to assess the impact of peer mentorship on self-efficacy about clinical skills performance of anesthetist students. According to the study anesthetist students are registered nursing with at least one year of clinical experience.

Megan assessed the self-efficacy of clinical skills performance of nurse anesthetist

students immediately prior to and after participation in the peer mentorship program. Seventeen students of the class cohort of 2017 mentored 17 students of the cohort enrolled in 2018 in a paired format for 2 weeks. The main analysis used paired t-test to compare the pre and post mentorship results. The findings showed that self-efficacy about clinical skills performance mean increased significantly from 34.00 (SD=3.32) to 37.88 (SD=2.93), $p < 0.0001$ (Megan, 2017).

Relationship between Knowledge and Self-Efficacy

The literature reviewed about knowledge and self-efficacy showed inconsistent results related to associations between knowledge and self-efficacy. Scherer and Bruce (2001) conducted a study that examined relationships between knowledge, attitudes, self-efficacy and compliance with prescribed medical regimen, number of emergency department (ED) visits, and hospitalizations in adults with asthma. Participants (n=29) consisting of adults with a diagnosis of asthma, were involved in the survey. The results showed a significant correlation between knowledge about asthma and attitudes about compliance with prescribed medical regimen. Similarly, the study revealed the significant correlation between knowledge about asthma and self-efficacy about compliance with prescribed medical regimen. The study showed that the higher their knowledge scores, the better their scores on the self-efficacy scale.

However, a study about “racial and ethnic differences in breastfeeding, maternal knowledge, and self-efficacy among low-income mothers” that was conducted by Alghamdi, Horodyski, and Stommel, (2017) did not support a relationship between knowledge about and self-efficacy on in infant feeding and propensity to breastfeed. The study examined racial and ethnic differences in the propensity to engage in breastfeeding, maternal knowledge, and self-efficacy in infant feeding among three groups of low-

income mothers: non-Hispanic (NH) White, NH African American, and Hispanic. The study used secondary analysis data from a randomized clinical trial with a sample of 540 low-income mother-infant pairs from Colorado and Michigan. Using a self-reported questionnaire data were collected when infants were approximately one month old. The results show that Hispanic mothers scored significantly higher in propensity to engage in breastfeeding than NH African-American mothers (OR=2.5, 95% CI:1.59–3.96) and NH White mothers (OR= 1.7, 95% CI:1.08–2.81). Nonetheless, Hispanic mothers' knowledge about and self-efficacy for infant feeding were significantly lower than the other two groups. In addition, the study revealed a non-significant correlation between maternal knowledge and self-efficacy in terms of infant feeding, and the propensity to breastfeed (Alghamdi et al., 2017).

Problem Statement

The reviewed studies suggest the relationship between mentorship or educational interventions and the improvement of health care delivery. Moreover, the studies show that the mentorship or education intervention increases participants' knowledge/self-efficacy. However, the literature does not indicate the impact of mentorship on nurses or midwives' knowledge about and self-efficacy for neonatal resuscitation. Also, there are no known studies that focus on this topic in Rwanda. Thus, this study intends to address these gaps.

Hypotheses

1. Nurses and midwives who were mentored as part of the TSAM practice-based mentorship program would have an increase in knowledge about neonatal resuscitation at the conclusion of the mentoring program, as compared to the beginning of the mentorship program.

2. Nurses and midwives who were mentored as part of the TSAM practice-based mentorship program would have an increase in self-efficacy for neonatal resuscitation at the conclusion of the mentoring program, as compared to the beginning of the mentorship program.
3. Nurses' and midwives' knowledge about neonatal resuscitation would positively correlate with self-efficacy for engaging in neonatal resuscitation

Rationale for Hypotheses

Based on a review of the literature about: the importance of continuous professional knowledge development for nurses and midwives, the effectiveness of the HBB program for supporting enhanced understanding about neonatal resuscitation, and mentorship initiatives for improving health care delivery, the researcher hypothesized that involvement in a mentorship program could increase nurses' and midwives' knowledge about and self-efficacy for neonatal resuscitation, as well as support a relationship between knowledge about and self-efficacy for neonatal resuscitation. The study considers that when mentees are involved in a formalized mentorship program where mentors and mentees engage in practice, where mentors can facilitate mentees' professional development about neonatal resuscitation, and where mentors can act as positive role models for mentees, then nurse and midwife mentees may enhance their knowledge and self-efficacy for improved neonatal resuscitation knowledge and self-efficacy. Using the HBB guidelines, the mentors would work with mentees on cases that need neonatal resuscitation steps (here considered as the exposure) which would lead to increased knowledge and self-efficacy. Considering that knowledge is a justified belief that is achieved through learning (Hunt, 2003) and self-efficacy is achieved through performing, vicarious experience and verbal persuasion (Bandura 1977), the study also

hypothesizes that the possessed knowledge before the mentorship and after the mentorship would significantly correlate to self-efficacy about neonatal resuscitation although the reviewed studies suggest that knowledge and self-efficacy are not always linked.

Methodology

Summary of the Study Design and Intervention

A quasi-experimental study design was used to assess the participants' changes in knowledge about and self-efficacy for neonatal resuscitation based on mentorship process (study intervention). The researcher did not control the mentorship program process; thus, no control group was included, only an intervention group was involved; hence the quasi-experimental approach. Pre-and-post assessments were conducted to collect primary data on nurses' and midwives' knowledge about and self-efficacy for neonatal resuscitation using self-administered questionnaires. Immediately prior to the start of the mentorship program each individual who consented to participate in the study completed questionnaires related to knowledge about and self-efficacy for neonatal resuscitation. These assessments were repeated at the conclusion of the mentorship program. The practice-based mentorship program involved mentors facilitating mentees' professional development at practice locations for a total of 6 visits over a six-month period.

Mentorship Program as Intervention and Data Collection Procedures

The researcher did not develop or deliver the practice-based mentorship program. However, with permission, the researcher assessed the mentorship program that was delivered by the Training, Support, and Access Model (TSAM) for Maternal, Newborn and Child Health (MNCH) in Rwanda under their permission. This TSAM project is a 5-year international development partnership project with funding provided to the

University of Western Ontario (Western) by Global Affairs Canada (GAC) from the Government of Canada. TSAM was responsible for all mentorship activities including the development and delivery of the practice-based mentorship program. The main mission of the TSAM project is to improve MNCH in Rwanda by working with local partners to improve health service access and delivery. It is therefore in this regard that they created a mentorship model that was situated in mentees' practice settings where mentors could facilitate mentees' professional development in MNCH areas such as obstetric emergencies of which neonatal resuscitation was included. Mentees (nurses and midwives selected by TSAM to be involved in the mentorship experience) practiced as health professionals at health centers in one of three districts of the Northern Province of Rwanda (Rulindo, Gakenke, Gicumbi). With the permission of TSAM project Directors in Canada and Rwanda, the researcher assessed the pre-mentorship stage knowledge about and self-efficacy for neonatal resuscitation and then also conducted a post-mentorship assessment after 6 months, which was immediately after the mentorship was completed. Although TSAM used both a team and a one-to-one mentor-mentee approach, the researcher assessed the one-to-one mentor-mentee approach that took place at the health center level. Data for the pre- and post-mentorship program assessments were collected in the form of self-administered questionnaires about nurses' and midwives' knowledge about and self-efficacy for neonatal resuscitation.

In partnership with the Rwandan MoH and district hospitals, TSAM selected midwives (known as mentors in this study) with expertise in MNCH and who were practicing in maternity units in the participating district hospitals. Prior to the start of the practice-based mentorship program, the selected mentors attended a two-week educational session about emergency obstetrics of which neonatal resuscitation was a key

part. In addition, the educational session emphasized what mentorship was, how to be an effective mentor, and how to facilitate the learning of their future assigned mentee. After the educational session, the TSAM mentors met with the nursing and medical directors of partnered district hospitals to discuss the availability of mentees for the mentorship program. Since health centers are under the supervision of district hospitals, they agreed to facilitate the scheduling of mentorship meetings. Thereafter, another meeting gathered heads of health centers, directors of district hospitals, mentors and TSAM project administrators to agree on the selected mentees and the timeline for the mentorship program. The meeting elaborated the mentorship program schedule and the list of mentees. Moreover, the meeting paired mentors and mentees at the average ratio of 1:2 and each mentor was assigned to work with the mentee at a specific health center. The heads of health centers ensured the availability of mentees during the mentorship sessions.

Although, the mentor visited the health center only once a month, the mentorship was built on an ongoing relationship whereby a mentee could call the mentor for information regarding situations that arose between visits needing their input. During the mentorship site visit, the mentor worked with mentees in all cases related to delivery including neonatal resuscitation. Upon the availability of the case, the mentor resuscitated the neonate using HBB program steps. The mentees observed and thereafter asked related questions. For subsequent cases requiring intervention, the mentee performed neonatal resuscitation and the mentor helped and provided constructive feedback.

According to the TSAM project plan, 2 or 3 nurses or midwives (mentees) were to be involved in this TSAM mentorship program at each health center from all 68 health centers of the three districts. Before the start of the mentorship program, the researcher

went to each health center to recruit mentees as study participants. Among 169 nurses and midwives who worked in maternity units and who were enrolled in the TSAM mentorship program, 141 (83%) consented to participate in the study and were given the study questionnaires to complete about their knowledge about and self-efficacy for neonatal resuscitation. After completing the study questionnaires, the mentees began the 6-month long mentorship program. After the practice-based mentorship program was complete, the researcher returned to all health centers again and administered the same questionnaires to assess mentees' post-mentorship program knowledge about and self-efficacy for neonatal resuscitation.

Sample and Setting

To determine the appropriate sample size G*power 3.1 was used (Faul, Erdfelder, Lang, & Buchner, 2007). Since the study tested the differences in means of two dependent variables, the paired t-test was the main test used to evaluate the mentorship intervention in regard to neonatal resuscitation. Therefore, an alpha of .05, a power level of .95 and a moderate effect of .3, were used to determine a sample size. Based on the G*Power calculation, the sample size required for this study was 122. Thus, 122 nurses and midwives were the required sample for participation in this study. However, 169 nurses/midwives attended the mentorship program, thus all participants were invited to participate due to anticipated attrition since the sample calculated was so close to the maximum total participants available. Among them, 141 (83%) mentees consented to participate and they were assessed on knowledge about and self-efficacy for neonatal resuscitation before the beginning of the mentorship program. The remaining 28 mentees did not refuse to participate in the study. They did not participate only because they were not accessible during the pre-mentorship program data-collection time period. At post-

mentorship program, 123 mentees completed the study questionnaires. Some participants who completed the questionnaires at the pre-mentorship program time did not participate in the second assessment due to their absence during the post-mentorship data collection time period.

The criteria for inclusion was based on the mentee's consent to participate in the study process of pre- and post-questionnaire completion, being a nurse/midwife working in a maternity and having enrolled in the TSAM mentorship program. The exclusion criteria included being on leave or not being available for the full mentorship period.

In Rwanda, the health center is a formal health service unit. It serves approximately 23,000 people at its sector level by providing a government defined package of services and activities. This includes curative, preventive, and rehabilitation services, and supervision of health posts as well as community health workers in their catchment area (WHO, 2017). Nurses and midwives almost exclusively deliver all health services at the health center level.

Instruments

The following instruments were used in this study: Demographic Instrument (see Appendix E), Knowledge about Neonatal Resuscitation (see Appendix F), and the Self-efficacy for Neonatal Resuscitation (see Appendix G). The Knowledge about Neonatal Resuscitation questionnaire that was based on principles from the HBB program and was adapted with permission from AAP (2010). The structure of the Self-efficacy for Neonatal Resuscitation (SENR) questionnaire was based on Bandura's (1977) Self-Efficacy Scale (SES). The SENR instrument is a 24-item scale that measured nurses' and midwife's belief in their capabilities to perform various behaviors associated with neonatal resuscitation (Bandura, 1977). The scale was divided into four subscales:

preparation (6- items), routine care during and after delivery (8-items), ventilation (7-items) and material decontamination (1-item). All SENR items were rated on a 10-point Likert scale ranging from 0 (not confident at all) to 10 (very confident) and a final score was calculated by averaging the items from the subscales and thereafter averaging all 24 items for the total SENR score. The SENR demonstrated good overall internal consistency with a Cronbach alpha value of 0.93.

The Knowledge about Neonatal Resuscitation (KNR) questionnaire was adapted, with permission, from the HBB knowledge assessment tool that had originally been developed by the American Academy for Pediatrics (AAP). In particular, the AAP was contacted for the use of the tool and permission was granted (see Appendix K).

The KNR questionnaire was completed by nurse and midwife participants immediately prior to and after the mentorship program, which was focused on MNCH in general and neonatal resuscitation in particular. The KNR tool was used because it reflected the information mentors were expected to facilitate with mentees about neonatal resuscitation during the TSAM practice-based mentorship program. The KNR instrument is a multiple choice-based tool and includes 18 questions related to what a health care professional needs to know and do in the ‘Golden Minute’ of a newborn’s life. Based on the fact that knowledge is a justified true belief (Hunt, 2003), the tool evaluated knowledge using correct/incorrect responses on a scale of 0 to 18 where 0/18 or 0% equals no knowledge of neonatal resuscitation, and 18/18 or 100% equals having a high level of knowledge about neonatal resuscitation.

Data Analysis Plan

Quantitative data from the study were analyzed using the Statistical Software Package for Social Sciences (SPSS) (version 25) (IBM, 2017). Before running the

statistical tests, data were cleaned for out of range values, errors of coding, and checked for missing data. Parametrical and non-parametrical assumptions relevant to tests were verified before each test was conducted (if relevant). The analysis included the description of participants' characteristics in relation to the major study variables, as well as a comparison of difference between baseline and final samples (N1=141, N2=123). This analysis was performed to assess the potential effect of the drop-out of 18 participants who did not participate in post-mentorship assessment. Chi-square and correlation tests were also used to examine the relationship of categorical variables of interest. The main hypothesis test employed was the paired t-test that was used to compare the means of nurses' and midwives' knowledge about neonatal resuscitation from pre- to post-mentorship program. The paired t-test was also used to compare the difference in means of nurses' and midwives' self-efficacy from pre-to post-mentorship program. Similarly, correlation was used to assess for a relationship between knowledge about and self-efficacy for neonatal resuscitation before and after the mentorship program. An alpha of .05 was used to determine the significance of all statistical tests.

Ethical Consideration

Ethical approval for the study was sought from the ethics review boards of the Office of Human Research Ethics at Western University (see Appendix C) and the University of Rwanda (see Appendix D). The approval letters were presented to the mayors of Rulindo, Gakenke, and Gicumbi districts (see Appendix H, I and J respectively) for requesting of permission to start recruitment and data collection. Permission letters from the districts were presented to the heads of health centers for them to then allow me to collect data. During the recruitment process, potential participants received a study letter of information (see Appendix C) and consent form

(see Appendix D) from the researcher. Prior to obtaining the participant's consent, the researcher offered to discuss any questions for clarification regarding the letter of information; thereafter each participant signed the consent. The researcher emphasized the participant's right to withdraw from this study without any negative impact on employment or involvement in the TSAM practice-based mentorship program.

CHAPTER THREE

STUDY RESULTS

At the time of pre-mentorship program assessment, all TSAM mentorship program participants (169) were asked to be involved in this study, and 141 mentees agreed to participate in the study. After mentee participants provided consent, they completed the demographic items, the KNR instrument, and the SENR instruments before the mentorship program (intervention) was initiated. After the mentorship program (intervention) was completed, which was a period of six months, a total of 123 mentees had participated in both the pre- and post-mentorship assessments. The main reason that hindered post-mentorship program study participation for some members was absence, as some participants were on leave or had changed their work place and did not participate fully in the mentorship program.

Table 1 includes the participants' characteristics as well as indicates that no differences were found between the two groups. Comparison of the different characteristics among participants in pre-and post-mentorship assessment in terms of change in numbers of participants shows no difference between the pre- and post-mentorship samples (refer to Table 1).

Using either 141 or 123 participants, the age, experience, overall KNR score and overall SENR score of participants is statistically the same. Thus, the description and analysis of the study variables used 123 participants that participated in study at both pre- and post-assessment. The analysis considered age, gender, education, marital status, profession, prior-mentorship training on HBB, and experience as determinant variables or outcome variables: knowledge about and self-efficacy for neonatal resuscitation.

Table 1

Demographic Characteristics of Participants

		Pre-mentorship frequency (n= 141)	Post-mentorship frequency (n=123)
Sex	Male	31.2% (n=44)	26% (n=32)
	Female	68.8% (n=97)	74% (n=91)
Status	Married	75.2% (n=106)	74.8% (n=92)
	Single	21.3% (n=30)	22% (n=27)
	All other status	3.5% (n=5)	3.2% (n=4)
Education	Secondary level	29.8% (n=42)	32.5% (n=40)
	Advanced diploma	65.2% (n=92)	65.0% (n=80)
	All other levels	5% (n=7)	2.5% (n=3)
Profession	Registered midwife	19.9% (n=28)	21.1% (n=26)
	Registered nurse	61.7% (n=87)	60.2% (n=74)
	All others	18.4% (n=26)	18.7% (n=23)
Prior training on HBB	Yes	31.9% (n=45)	32.5% (n=40)
	No	68.1% (n=96)	67.5% (n=83)
		Pre-mentorship mean(n=141)	Post-mentorship means (n=123)
Age of participants in years		35.84 (SD=7.8)	35.9 (SD=7.7)
Experience of participants in years		7.2 (SD=5.3)	7.2 (SD=5.9)
Overall KNR		78.6 (SD=12.2)	93.38 (SD=8.4)
Overall SENR		7.2(SD=1.9)	9.3(SD=0.8)

The mean age of participants (n=123) was M=35.89 years (SD=7.686), the minimum and maximum age being 24 and 59 years respectively. The mean maternity experience of participants was M=7.19 years (SD=5.94) with a range of 35 years. Female participants were 74% (n=91), and most participants were married 74.8% (n=92). Most participants had an advanced diploma (three years of education similar to a college diploma) of either nursing or midwifery education with 65% (n=80) while 32.5% (n=40) had secondary level of training in nursing education and 2.4% (n=3) had a bachelor's

degree in nursing or midwifery. With respect to neonatal resuscitation training, 67.5% (n=83) reported they never had any.

At the pre-assessment stage, the knowledge about neonatal resuscitation of females was significantly higher (M=79.74/100, $p=0.024$) compared to males (M=73.88/100). In relation to previous education about neonatal resuscitation, the average knowledge of those who reported they had neonatal resuscitation education was significantly higher (M=81.48/100, $p=0.047$) compared to those who did not have it (M=76.64/100). Similarly, self-efficacy for neonatal resuscitation was higher among those who reported that they had education about that topic before (M=7.8, $p=0.01$) the mentorship program compared to those who did not (M=6.86). However, there was no statistical difference in knowledge about neonatal resuscitation among participants in regard to past education at the post-mentorship program assessment ($p=0.572$) stage. Lastly, nurses with an advanced diploma (i.e., three years of education) had higher levels of self-efficacy for neonatal resuscitation at the pre-mentorship program assessment stage, as compared to their colleagues of 2 years at secondary level, with means of 7.52 and 6.36 respectively ($p=0.004$).

Test of Hypotheses 1 and 2

The first hypothesis examined whether involvement as a mentee in the practice-based mentorship program would increase nurses' and midwives' knowledge about neonatal resuscitation from pre-mentorship to post-mentorship. The second hypothesis examined whether involvement as a mentee in the practice-based mentorship program would increase nurses' and midwives' self-efficacy for neonatal resuscitation from pre- to post mentorship. Table 2 highlights the changes observed with the mentorship process, as an intervention, on knowledge about and self-efficacy for neonatal resuscitation.

Table 2

*Comparison of Overall Scores on KNR and SENR Instruments**Pre-and Post-Mentorship Program*

	Pre-mentorship program overall Mean (SD)	Post-mentorship program overall Mean (SD)	Mean value Difference (SD)	95% CI of difference		P-value
				Lower	Upper	
KNR	78.21 (12.68)	93.38 (8.37)	15.17(13.44)	12.768	17.573	P<0.001
SENR	7.17 (1.89)	9.34 (0.85)	2.17(1.83)	1.849	2.505	P<0.001

The study findings indicate the positive change of nurses' and midwives' knowledge about and self-efficacy for neonatal resuscitation after the mentorship process. Knowledge was measured in percentage while self-efficacy was measured on a scale out of 10. Nurses' and midwives' knowledge significantly increased from pre-test to post-test (Mean difference=15.17, 95% CI 12.8, 17.6). Similarly, the self-efficacy for neonatal resuscitation significantly increased from the pre-test mean to post-test mean (Mean difference=2.17, 95% CI 1.849, 2.505) among nurses and midwives involved in the TSAM practice-based mentorship program

When considering where change occurred the most, participants scored above 75% in most questions related to knowledge about neonatal resuscitation. Nevertheless, they scored less than 70% for some knowledge questions during pre-mentorship although the scores for these items generally increased the level of other questions (i.e. 88% and above) at post-mentorship (See appendix M): For example, with knowing what to do in the golden minute, the score increased from 69.5% to 88.9%, while the knowledge score for what to do when a baby is born quiet, limp and not breathing, increased from 60.1%

to 88.7%, and the knowledge score for caring for a baby who received ventilation, increased from 46.1% to 89.9%.

Similarly, with most items for self-efficacy, the scores were 7.4 and above for pre-mentorship but some scores were less than 7.0. The items that scored lowest in pre-mentorship all increased to above 9.0 in post-mentorship as well. For example, preparation for resuscitation was 6.73 in pre-mentorship and increased to 9.54 in post-mentorship. The average SE score for an action of what to do with a baby who is born quiet, limp and not breathing increased from 6.24 to 9.28. Lastly, the average SE score for what should be done when the chest of a baby is moving during ventilation increased from 6.76 to 9.2 and the SE score for appropriate care for a baby who received ventilation, increased from 6.51 in pre-mentorship to 9.32 in post mentorship.

Test of Hypothesis 3

For hypothesis three, it was posited that there would be a relationship between knowledge about and self-efficacy for neonatal resuscitation before the mentorship program and after the mentorship program. Table 3 indicates the relationship of knowledge and self-efficacy: for every knowledge increase, self-efficacy increased as well.

The findings in Table 3 show the moderate positive correlation of knowledge about and self-efficacy ($r=0.20$, $p=0.025$) for neonatal resuscitation at the pre-mentorship assessment stage. Similarly, knowledge and self-efficacy were significantly and positively correlated ($r=0.47$, $p<0.001$) at the post-mentorship assessment stage. In addition, the study shows the importance of refresher education for professional development since knowledge and self-efficacy was higher at the post-mentorship

assessment stage for those who reported they had prior education about neonatal resuscitation before the pre-mentorship assessment stage.

Table 3

Correlations of Variables

		1	2	3	4	5	6
Age (1)	Pearson Correlation	1					
Experience in maternity (2)	Pearson Correlation	.645*	1				
Pre-knowledge (3)	Pearson Correlation	-0.015	0.127	1			
Pre-self-efficacy means (4)	Pearson Correlation	-0.093	-0.066	.202*	1		
Post knowledge (5)	Pearson Correlation	0.033	0.112	.234*	-0.005	1	
Post self-efficacy (6)	Pearson Correlation	0.015	0.106	0.036	.293*	.473*	1

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

Discussion

In this section, the findings are discussed in relation to the study hypotheses. The discussion is grouped under six main sub-topics: Demographic variables in relation to the outcome variables of knowledge about and self-efficacy for neonatal resuscitation, relationship of knowledge and self-efficacy at the pre-mentorship assessment stage, relationship of knowledge and self-efficacy at the post-mentorship assessment stage, the

change in knowledge and self-efficacy from pre-mentorship assessment (baseline) to post-mentorship assessment stages.

Demographic Variables and Outcome Variables

This study examined participants' gender, age, experience, education level, professional qualification, and previous education related to HBB. Most participant characteristics were not statistically significantly related to the pre-mentorship outcome variables (knowledge about and self-efficacy for neonatal resuscitation) except previous education in HBB. The mean knowledge and self-efficacy scores of participants were higher in those who reported to have attended the training of HBB before the TSAM-mentorship program. Although findings suggest that education and experience are parameters that predict the knowledge and self-efficacy of participants (Jumoke & Mutula, 2019; Kasine, Babenko-Mould, & Regan, 2018; Kim & Lee, 2019), the mean values by education level of the participants were not statistically different. Similarly, participant's professional background of being a nurse or midwife could also affect the participant's knowledge and self-efficacy. However, the findings reveal no statistically significant difference for knowledge and self-efficacy among participants based on professional background of being a nurse or midwife. This could possibly be explained by the fact that resuscitation in the first minute of life was new knowledge which was never previously learned by either group (Nguyen, 2017). Thus, this could serve as an indication that these simple resuscitation skills are not being learned at school or through continuous professional development initiatives since education level, professional background of being the nurse or the midwife, and experience did not statistically influence the difference in pre-mentorship knowledge and self-efficacy scores.

Relationship of Knowledge and Self-Efficacy in Pre-and Post-Mentorship

Assessment

Among the outcomes of this study was the relationship of knowledge and self-efficacy in both pre-mentorship and post-mentorship assessment. Although there is contradictory literature regarding the relationship between knowledge and self-efficacy (Bandura, 1995; Scherer & Bruce, 2001; Stanley & Pollard, 2013), in this study the correlation of knowledge and self-efficacy was significant and positively related both in pre- and post-mentorship assessment ($r=0.20$, $p=0.025$) ($r=0.47$, $p<0.001$) respectively.

The tripartite theory of knowledge supports this result in the sense that belief is a first condition for knowledge (Joyce, 2014; Klubertanz, 2012; Larson et al., 2011). Hunt (2003) argues that the correct knowledge determines belief about the existence and behavior in the real world. Similarly, the findings in this study agree with the literature: Nurses and midwives who had a higher level of neonatal resuscitation knowledge also showed a higher self-efficacy as well (Eblovi et al., 2017; Odjidja, 2017; Wilson et al., 2017). Hunt (2003), argues that when a person has a self-efficacy for doing something it leads to better performance than for the one who does not. Thus, if the mentorship influenced the neonatal resuscitation knowledge increase, which consequently influenced the self-efficacy increase, this could potentially influence better practice regarding neonatal resuscitation.

Knowledge and Self-Efficacy Change Compared to Baseline Assessment

The findings from this study agree with the literature and extends the current understanding that a mentorship program can improve knowledge and self-efficacy. The TSAM mentorship program increased the knowledge of nurses and midwives about neonatal resuscitation with an increase of KNR means from 78.6% to 93.5%. The

findings show that for some knowledge questions that participants scored less in pre-mentorship (less than 70%), there were large increases to over 88% in post-mentorship. Similarly, SE items that participants scored lowest for in pre-mentorship (less than 7.0) increased substantially to more than 9.0 in post-mentorship. Surprisingly, those knowledge and SE questions on neonatal resuscitation that participants scored lowest on were related to what to do in a golden minute, what to do when a baby is born quiet, limb and not breathing, and caring for a baby who received ventilation are pillars for neonatal resuscitation. When the brain cells go longer without oxygen this can result in hypoxic-ischemic, and possibly lead to death or long term disabilities (Aslam, Strickland, & Molloy, 2019; Martinello, Hart, Yap, Mitra, & Robertson, 2017; Molloy & Beier, 2018). When the baby does not breathe at birth, it is imperative to follow appropriate procedure of resuscitation in the golden minute (first minute after birth) as well as appropriate care for a baby who received ventilation, otherwise the chances of death or disabilities increases (AAP, 2010). Thus, scoring lowest in both knowledge and SE for pre-mentorship assessment in this area, show the possible non-adherence or non-practice of important resuscitation procedures which is not a good indicator for quality neonate care.

The significant increase of knowledge and self-efficacy following the TSAM mentorship process could be associated with mentors' facilitation of mentees' learning about neonatal resuscitation during the mentorship process. Although, the study did not control other confounding factors, the mentorship program appears to have accounted for a significant change in knowledge and self-efficacy scores of participants based on their post-mentorship assessments. The kind of mentorship used, where mentors work with their mentees on basis of mutual respect, re-enforced by relationships in actual and contextual care environment is thought to yield better results when compared to other

forms of didactic training that often gather trainees in one place to instruct them on HBB principles (Martin, Kolomitro, & Lam, 2014; Masalimova, Usak, & Shaidullina, 2016).

Implications and Recommendations

Knowledge is very crucial when it comes to the performance of a task (Jumoke & Mutula, 2019; Kim & Lee, 2019; Kwon, Karim, Topaz, & Currie, 2019). Knowledge learned influences the belief to perform (Hunt, 2003). Relevant and current knowledge based on research findings is indispensable for delivering quality health care to patients. Attending school is one of the strategies that equip health care personnel with needed knowledge. However, in this study, education level was not associated with knowledge and self-efficacy of the participants. Although, the baseline mean for knowledge was 78.8% and for self-efficacy was 7.2/10, it did not statistically differ among the participants based on level of education (secondary, advanced diploma, or degree). Thus, neonatal resuscitation knowledge and self-efficacy based on the HBB principles appears to be the same irrespective of education level. While, students cannot learn all the evidence-based practices while at school, implementation of neonatal resuscitation-based AAP-HBB in developing countries like Rwanda has shown promise for its effectiveness to decrease neonatal mortality. The findings from this study highlight that pre-service nursing and midwifery education programs need to enhance the type and amount of facilitation provided to students about neonatal resuscitation so that graduates have a strong baseline knowledge about and self-efficacy for neonatal resuscitation that could be applied to practice.

Although neonatal resuscitation based on the AAP-HBB guidelines (2010) was introduced into practice in 2010, to the researchers' knowledge, this is the first study to assess the impact of a practice-based mentorship program on knowledge about and self-

efficacy for neonatal resuscitation among nurses and midwives in Rwanda. Similarly, the methodologies used in other studies that were conducted elsewhere used a training strategy other than mentorship. Participants of this study continued their daily work and mentors joined them at their work place. After six months, the participants' knowledge and self-efficacy increased significantly. Thus, the research findings recommend the relevancy of mentorship to increase the knowledge and self-efficacy of nurses and midwives for neonatal resuscitation. Nevertheless, this study design did not determine the impact of neonatal resuscitation mentorship on actual neonatal outcomes, hence further study is recommended to assess the link between knowledge, self-efficacy, and neonatal mortality.

In this study, the length of practice experience and education level of participants were not statistically associated with neonatal resuscitation knowledge and self-efficacy, rather mentorship process appears to have been responsible for the changes in knowledge and self-efficacy. This highlights the need of continuous professional development (CPD). Nurses and midwives in Rwanda reported the need for CPD to update their professional skills particularly for new evidence from research (Kasine et al., 2018). Nursing and midwifery associations and regulatory bodies should consider the use of mentorship to update practice. The study revealed a paradox finding that experience of participants was not a significant factor for knowledge and self-efficacy about neonatal resuscitation. This possibly highlights the need for CPD using a mentorship strategy to ultimately improve patient care. The literature points out the gap between research findings and the shift into practice (Rahman, Applebaum, Schnelle, & Simmons, 2012). Mentorship is a strategy that can facilitate or bridge the gap without hindering the routine practices at health facilities since mentors find mentees at their work places and work

with them (Harvey & Kitson, 2016; Kitson & Harvey, 2016a; Rwanda. Ministry of Health, 2014; Saunders, 2015; Svavarsdottir et al., 2015).

Health policy drives daily health practices. Policies that are based on reliable findings and reflected in real local context are guiding tools to improve healthcare delivery. The Rwanda Ministry of Health strives to improve the quality of care of its citizens (Rwanda. Ministry of Health, 2014). Gilson (2012) argues that policy based on research findings is more relevant and reassures the quality especially when research reflects local contexts. The findings from this study have revealed the relevancy of using mentorship to increase the knowledge and self-efficacy of nurses and midwives about neonatal resuscitation. In addition, the government of Rwanda, like other countries worldwide, has committed to reduce neonatal mortality to 12 deaths out of 1000 live births by the year 2030 through their commitment to reaching or surpassing the UN SDG. Hence, study findings recommend adopting neonatal resuscitation mentorship into the overall strategy to reduce neonatal mortality. Based on this perspective, mentorship is an option to keep on up-dating the knowledge of health care personnel particularly on critical issues like neonatal resuscitation.

Conclusions

The aim of this study was to assess the impact of mentorship on neonatal resuscitation knowledge and self-efficacy of nurses and midwives. The study assessed the knowledge and self-efficacy of nurses and midwives before and after the mentorship program. Moreover, the study analyzed the relationship of knowledge and self-efficacy with demographic factors like age, experience, education level, professional and past trainings related to neonatal resuscitations. The pre-mentorship and post-mentorship results revealed a significant correlation between knowledge and self-efficacy. Similarly,

the study findings show that participants who reported previous neonatal resuscitation training before mentorship had significantly higher baseline knowledge and self-efficacy compared to participants who reported not having a such prior training, although this difference disappeared at the post-assessment. However, other demographic factors like age, experience, professional and education level were not statistically associated with knowledge and self-efficacy of participants. Therefore, the analysis of post mentorship assessment compared to pre-mentorship assessment indicated a significant knowledge and self-efficacy increase potentially attributable to the mentorship intervention.

Limitation

The quasi-experimental (pre-and-post) design used in this study does not control all variables that can affect the knowledge and self-efficacy of nurses who attended the mentorship program about neonatal resuscitation (Polit and Beck, 2017). Moreover, the sampling process was not done by the researchers, and only three of the 30 districts of the country were used which may not be representative. The study also did not compare the knowledge and self-efficacy of nurses and midwives who did not attend the mentorship either in the same districts or from other districts (i.e. no control group was used). Thus, the overall impact of the mentorship used could not be directly assessed. The study did not involve health facilities like district and referral hospitals. In addition, the study did not compare knowledge and self-efficacy after the mentorship program to assess knowledge and self-efficacy retention and the need for refreshment mentorship. Thus, further studies in consideration of these limitations are recommended.

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CHAPTER FOUR

IMPLICATIONS, RECOMMENDATIONS, AND CONCLUSIONS

Summary of Key Findings

The study assessed mentees knowledge about and self-efficacy for neonatal resuscitation in two stages: pre-mentorship program assessment and post-mentorship program assessment. 141 nurses and midwives participated in the pre-assessment stage, with 123 participating in the post-assessment stage. While 18 participants did not complete the second assessment, there were no statistical differences between the sample characteristics (i.e. demographics) of the pre- versus post-mentorship participants. Thus, the analysis compared the pre-post scores for the 123 who participated in both assessments. Female participants were the majority 74% (n=91). The mean age of participants was 35.9 years old (SD=7.7) and experience in years for working in maternity was 7.2 (SD=5.9). Most participants had an advanced level of education (equivalent to a 3-year college diploma) 65% (n=80), while, 32.5% (n=40) had only secondary education level, and 2.4% (n=3) had a bachelor's degree in nursing. Among the participants, 67.5% (n=83) acknowledged to have had same prior training on neonatal resuscitation. The study findings revealed that the mentorship program significantly raised the mean averages of knowledge from 78.6% (SD=12.6) to 93.4% (SD=8.4)) and for and self-efficacy from 7.2 (SD=1.9) to 9.3 (SD=0.8). The study did not find a statistical difference in post-mentorship scores between males and females or based on education level. While years of experience working in maternity was significantly associated with self-efficacy at pre-mentorship, knowledge was not statistically different among the participants. Similarly, the pre-study means of knowledge about and self-efficacy for neonatal resuscitation were significantly higher among those participants

who reported to have had a prior-mentorship training on neonatal resuscitation compared to those who had never attended it. However, none of these differences were found after mentees involvement in the practice-based mentorship program. The implications and recommendations from this study are discussed under four themes: nursing education, nursing research, nursing practice, and health policy.

Implications and Recommendations

Nursing Education

It is well known that education is the foundation of knowledge and largely determines the level of confidence to perform (Hunt, 2003). Current and correct knowledge that matches the local contexts contributes substantially to the quality of health care (Jumoke & Mutula, 2019; Kim & Lee, 2019; Kwon et al., 2019). Rwanda's Vision 2020 highlights knowledge as a source of its economy and it is one of the fundamental pillars for Rwanda's development (Rwanda. Ministry of Finance and Economic Planning, 2000). It is in this context that health care personnel need current knowledge adopted to their local context to better equip them with the right skills for addressing current health issues.

Moreover, formal education is a reliable strategy for dissemination of knowledge from research findings. In this study, education was included as a variable that could determine knowledge and self-efficacy. However, neither knowledge nor self-efficacy was statistically associated with level of education. This could be explained by the fact that resuscitation is based on the HBB protocol which is a relatively current research finding and it is not yet in the Rwandan curriculum for nurses or midwives, even though, it is now nearly a decade old. Explicit strategies for dissemination of research findings through formal education is of paramount importance in terms of knowledge

dissemination. Clinical placement teachings and their adoption into the curriculum are among other recommended strategies.

Clinical instructors and preceptors are the people who work with students on a daily basis representing both their education and health institutions. These individuals are deemed to have correct and current knowledge that would facilitate the students' learning process. Educational strategies of exposing instructors and preceptors to relevant and current evidence-based findings would be a source of knowledge dissemination not only to students who will work in various places but also to the health institutions they work with. However, the study findings showed that recent nurses and midwives graduates had the same knowledge as those who graduated a long time ago. This is evidence to suggest that they did not have a chance to be exposed to neonatal resuscitation based on HBB knowledge during their time at school. Thus, for effective dissemination of neonatal resuscitation HBB knowledge, the training should start with clinical instructors and preceptors during pre-service (i.e. while still in nursing school).

In addition, educational institutions should consider adopting the HBB resuscitation procedures into their curricula. It is obvious the curriculum cannot change each year or at every release of new findings, but it should consider it as needed. In this study, the means of knowledge and self-efficacy were significantly higher in those who reported to have had past training on resuscitation based on HBB. This study reinforces what other studies highlighted, that there is a significant relationship between training/mentorship and nurses'/midwives' increases in knowledge and self-efficacy (Ashish et al., 2017; Golding et al., 2015; Manzi et al., 2017; Mduma et al., 2015): Thus, introducing training for resuscitation based on HBB into the curricula of nurses and midwives is of paramount importance.

Nursing Research

HBB resuscitation is an evidence-based practice developed according to the AAP (2010) findings. Studies, particularly those conducted in developing countries, have indicated the significant relationship between this procedure and the reduction of neonatal mortality. Based on the researchers' knowledge this study is the first of this kind to be conducted in Rwanda. Although, the study design did not include assessing the direct impact of mentorship on neonatal mortality, the program raised knowledge and self-efficacy of nurses and midwives directly involved in the delivering and resuscitation of neonates. Since the literature highlights the positive correlation of self-efficacy and performance, replication of similar mentorship studies that link directly to patient outcomes is recommended (Bandura, 1977; Hunt, 2003; Kamath-Rayne, Josyula, Rule, & Vasquez, 2017; Raymond & Sheppard, 2017; Stanley & Pollard, 2013). In addition, a comparison study (i.e. clinical trial) including those who haven't attended the mentorship could give more direct causal information about the importance of this resuscitation mentorship program, especially if a direct link to mortality outcome is included. Moreover, the research recommends the assessment of nurses' and midwives' skills related to HBB principles for neonatal resuscitation, since the study only assessed the knowledge and self-efficacy of participants.

Nursing Practice

Nursing as any other health professional practice is not static, it keeps on evolving to include new research findings. Scholars are working tirelessly to improve the quality of patient care through research. However, the literature highlights the gap between research findings and their integration in practice (Rahman et al., 2012). The best strategies to introduce research findings into practice should be welcomed by both

researchers and health professional practitioners. Supervision, mentorship, training, continuous professional development, and facilitation are among the strategies recommended to translate knowledge into practice (Harvey & Kitson, 2016; Kitson & Harvey, 2016a; Rwanda. Ministry of Health, 2014; Saunders, 2015; Svavarsdottir et al., 2015). Mentorship, which was used in this study was shown to have a positive influence on nurses' and midwife's knowledge and self-efficacy. Mentees (nurses and midwives) worked with their mentors once a month for a period of six months to improve their neonatal resuscitation knowledge and self-efficacy. After this mentorship period, the knowledge and self-efficacy of nurses and midwives increased. Thus, mentors are good vehicles to use for introducing a research finding into practice: prepared and facilitated mentors easily work with their mentees to adopt the new practice. Therefore, based on this study, the use of mentorship is recommended to improve the quality of perinatal care in Rwanda.

Policy

Health policy drives daily health practices. Health practice policy makers are always striving to improve the quality of care, particularly in developing countries, where resources are limited and the burden of diseases is still high (Rahman et al., 2012). The government of Rwanda, through the policy of human resource for health, highlights the pressing need to increase the quantity and quality of health professionals (Rwanda. Ministry of Health, 2014). The report argues for a streamlined and integrated supervision approach. In addition, the report highlights the use of “district hospital directors and all levels of supervisors that should be part of continuous professional development” (MoH-Rwanda, 2014 p.8). The strategy of mentorship that was used in this study, that directly involved multiple partners from different layers of the healthcare system, suggests it can

be used to improve nurses and midwives' knowledge and self-efficacy. In addition, to other endeavors, policy makers in Rwanda should consider the use of mentorship to improve the quality of health care.

Moreover, nurses or midwives from district hospitals, who supervise health centers on a regular basis while collecting data for monitoring and evaluation of patient care quality, should also consider mentorship. Instead of only supervising, the team can also mentor at lower levels like the level of health center for improving the quality of health care. The policy could clarify how health personnel at higher levels would be delivering the mentorship formally and continuously. Experienced and well-trained mentors could be assigned to a health center to improve a certain health care process not only limited to neonatal resuscitation, but also other health care procedures could be considered as well to improve a broader range of health care outcomes.

Conclusions

The study was designed to assess the impact of mentorship programs on nurses' and midwives' knowledge and self-efficacy about neonatal resuscitation: The study measured mentees' knowledge and self-efficacy using both their pre-and post-mentorship scores. The mentorship program was conducted once a month for the period of six months. Mentors worked with mentees for delivering and then providing resuscitation procedures together. Mentorship was based on the resuscitation manual based from the AAP (2010) guidelines for helping babies breathe and was adopted to the local context. The study found that the mentorship program significantly raised the average knowledge and self-efficacy of nurses and midwives for neonatal resuscitation. Similarly, the study revealed the correlation between knowledge and self-efficacy in both pre and post mentorship. Thus, it is of paramount importance to use mentorship for improving health care delivery

particularly for increasing knowledge and self-efficacy related to neonatal resuscitation in Rwanda.

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List of Appendices

Appendix A

Western University Ethics Approval



Date: 27 July 2018

To: Dr. Mickey Kerr

Project ID: 111859

Study Title: Assessing the impact of educational mentorship for nurses' and midwives' on knowledge and self-efficacy about helping babies breathe in the first minute of life after birth in selected health centers of Rwanda

Application Type: HSREB Initial Application

Review Type: Delegated

Full Board Reporting Date: August 7, 2018

Date Approval Issued: 27/Jul/2018

REB Approval Expiry Date: 27/Jul/2019

Dear Dr. Mickey Kerr

The Western University Health Science Research Ethics Board (HSREB) has reviewed and approved the above mentioned study as described in the WREM application form, as of the HSREB Initial Approval Date noted above. This research study is to be conducted by the investigator noted above. All other required institutional approvals must also be obtained prior to the conduct of the study.

Documents Approved:

Document Name	Document Type	Document Date
Gerard-Final proposal (clean)	Protocol	Received July 25, 2018
Instrument (clean)	Paper Survey	Received July 25, 2018
LOI Gerard-final (clean 2)	Written Consent/Assent	Received July 25, 2018

No deviations from, or changes to, the protocol or WREM application should be initiated without prior written approval of an appropriate amendment from Western HSREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.

REB members involved in the research project do not participate in the review, discussion or decision.

The Western University HSREB operates in compliance with, and is constituted in accordance with, the requirements of the TriCouncil Policy Statement: Ethical Conduct for Research Involving Humans (TCPS 2); the International Conference on Harmonisation Good Clinical Practice Consolidated Guideline (ICH GCP); Part C, Division 5 of the Food and Drug Regulations; Part 4 of the Natural Health Products Regulations; Part 3 of the Medical Devices Regulations and the provisions of the Ontario Personal Health Information Protection Act (PHIPA 2004) and its applicable regulations. The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

Please do not hesitate to contact us if you have any questions.


Sincerely,

Karen Gopaul, Ethics Officer on behalf of Dr. Joseph Gilbert, HSREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).

Appendix B

University of Rwanda Ethics Approval


UNIVERSITY OF RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 10th /07/2018

NYIRINGANGO Gerard
School of Nursing and Midwifery, CMHS, UR

Approval Notice: No 252 /CMHS IRB/2018

Your Project Title "*Assessing The Impact Of Educational Mentorship For Nurses And Midwives On Knowledge And Self-Efficacy About Helping Babies Breathe In The First Minute Of Life After Birth In Selected Health Centres Of Rwanda*" has been evaluated by CMHS Institutional Review Board.

Name of Members	Institute	Involved in the decision		
		Yes	No (Reason)	
			Absent	Withdrawn from the proceeding
Prof Kato J. Njunwa	UR-CMHS		X	
Prof Jean Bosco Gahutu	UR-CMHS	X		
Dr Brenda Asimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS	X		
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS	X		
Mr Kanyoni Maurice	UR-CMHS	X		
Prof Munyanshongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district		X	
Dr Gishoma Darius	UR-CMHS	X		
Dr Donatilla Mukamana	UR-CMHS	X		
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS	X		
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josee	CHUK	X		
Dr Mudenge Charles	Centre Psycho-Social	X		

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 6th June 2018, **Approval has been granted to your study.**

EMAIL: researchcenter@ur.ac.rw

Please note that approval of the protocol and consent form is valid for **12 months**.

You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrolment of participants.
3. All consent forms signed by subjects should be retained on file. The IRB may conduct audits of all study records, and consent documentation may be part of such audits.
4. A continuing review application must be submitted to the IRB in a timely fashion and before expiry of this approval
5. Failure to submit a continuing review application will result in termination of the study
6. Notify the IRB committee once the study is finished

Sincerely,

Date of Approval: The 10th July 2018

Expiration date: The 10th July 2019

Fob Professor Kato J. NJUNWA
Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR

Cc:

- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate Studies, UR

EMAIL: researchcenter@ur.ac.rw P.O. Box: 3286, Kigali, Rwanda WEBSITE: <http://cmhs.ur.ac.rw/> www.ur.ac.rw

Appendix C

Letter of Information



Letter of Information and Consent

Project Title: Assessing the impact of educational mentorship for nurses and midwives on knowledge and self-efficacy about helping babies breathe in the first minute of life after birth in selected health centres of Rwanda

Document Title: Letter of Information and Consent

Principal Investigator (Supervisor of the thesis)

Dr. Michael S. Kerr, PhD
Arthur Labatt Family School of Nursing
Western University
London ON, Canada

Co-Investigator

Gerard Nyiringango, (Masters student)
Graduate student, MScN candidate, leadership in Nursing education

Member (Committee member)

Yolanda Babenko-Mould, PhD
Arthur Labatt Family School of Nursing
Western University
London ON, Canada

1. Invitation to Participate

You are invited to participate in a study, referred as “Assessing the impact of educational mentorship for nurses’ and midwives’ on knowledge and self-efficacy about helping babies breathe in the first minute of life after birth in selected health centres of Rwanda”, which is being conducted by a Master’s student (Gerard Nyiringango) from the Western Ontario University, Canada under the supervision of his professors (Mickey Kerr PhD and Yolanda Babenko Mould, PhD). You have been approached to participate into this study because. You agreed to participate in a mentorship program of obstetric emergency care, which includes helping babies breathe in first minute after birth that is being conducted by the Training Support & Access Model (TSAM) project. The purpose of this letter therefore, is to provide you with information that will help you to decide whether to participate in the research study or not. You are encouraged to read this carefully and ask questions if anything is unclear to you.

2. Why this study is being done?

Helping babies breathe in the first minute of life after birth is a medical procedure used in resource scarcity environment to help neonates breathe. Studies on helping babies breathe in first minute after birth show effectiveness in improving new born care outcome. However, there are limited studies on how this is applicable in Rwandan context. Thus, this study will find out how helping babies breathe in first minute after birth can be implemented to improve newborn care in Rwandan context. Therefore, the purpose of this study is to explore the impact of mentorship on the knowledge and self-efficacy of nurses/midwives related to helping babies breathe in first minute after birth. The mentoring program is the responsibility of TSAM. For this study, the researcher will only assess knowledge and self-efficacy before you start the mentorship and immediately again after the mentorship program ends.

3. How long will you be in this study?

This study will be conducted using the following process: after enrolling in the mentorship program conducted by TSAM, you will be asked to participate in this study. Then, if you consent to participate in this study, you will be asked a series of questions before the mentorship begins. Thereafter, you will be mentored for the period of six months once a month according to the TSAM program. Immediately, after the last session of mentorship you will also answer the same questions that were asked prior to mentoring. The study will compare the pre- and post mentorship program. The TSAM mentorship program will take place at your work place over a period of six months, which is how long you will be in the study.

4. What are the study procedures?

You will be provided with a questionnaire at your workplace before you begin the mentorship and immediately after the mentorship is complete. The purpose of the questionnaire will be to compare your knowledge and self-efficacy about helping babies breathe in first minute after birth before and immediately after the mentorship program ends. The questionnaire will take about 20 to 25 minutes to complete. The information you provide is for research purposes only. You can choose not to answer any of the questions if you wish. Even though you will provide information on a questionnaire, these responses will not be reviewed by your workplace health care team as only the researchers will have access to these data. The data will be entered into a computer for statistical analyses without any participant identification, in such a way that your information will be anonymous and cannot be traced back to you. You are eligible to participate if you agree to the study procedures, sign a consent form, are a nurse/midwife working in labour and delivery department, and are enrolled in the TSAM mentorship program. Any nurse /midwife who is not working in the labour and delivery ward, who has participated in a similar mentorship program before, or is aged below 18 years old, is not be eligible to participate.

5. What are the risk and harms of participating in this study

There are no known or anticipated risks or harms associated with participating in this study.

6. What are the benefits of this study?

The TSAM, mentorship program was developed to improve your knowledge and skills in obstetric emergency particularly in resuscitation of neonates with breathing difficulties. By participating in this study, you may benefit from having an opportunity to evaluate how knowledgeable you are about helping babies breathe and which level of confidence do you have in managing babies with breathing difficulties. This may help you to move forward with extra knowledge and skills for managing babies with breathing difficulties immediately after birth and encourage your colleagues to attend future mentorship which aim to improve babies breathing outcomes. Further, the study will contribute to the research literature on management of babies with breathing difficulties.

7. Can participants choose to leave the study?

Your participation in this study is voluntary. You may decide not to be in this study, or to be in the study now and then change your mind later. You may leave the study at any time without affecting your employment status.

8. How will participant's information be kept confidential?

All data collected will remain confidential and accessible only to the investigators of this study. Paper copies will be stored in locked cabinets in the TSAM office in Kigali and then the principle investigators office in Canada and encrypted electronic data will be in password protected laptop but also without any form of participant's identifier. If the results are published, your name and name of your work place will not be used. If you choose to withdraw from this study prior to initiation of the data analysis phase, your data will be removed and destroyed from our database. Information collected from the surveys in this study will be kept for seven years and then be destroyed. Names and corresponding study ID codes will be requested for comparing pre-and-posttest assessment only. However, the list of names linked to study ID codes will be stored separately from the surveys, only study ID codes will appear on the stored surveys to ensure anonymity. Please note that Western's Research Ethics Board (REB) may review the study's data at any time. REB is a group of people at Western University who oversee the ethical conduct of research studies.

9. Are participants compensated to be in this study?

You will not be compensated by research team for your participation in this study.

10. What are the rights of the participants?

You do not waive any legal rights by signing this consent form. Volunteering for this study or not participating in it will not affect your enrollment in the TSAM mentorship program. In addition, you will receive a copy of this letter of information and a consent form to sign. You have the right to consent by signing the consent form or not. You also have a right to know the results of this study. Thus, if you would like to receive a copy of the overall results of this study, please put your name on a blank piece of paper and give it to the investigator when you return your questionnaire.

11. Whom do participants contact for questions?

If you require any further information regarding this research project or your participation in the study you may contact the principal investigator:

Michael S. Kerr, PhD.
Arthur Labatt Family School of Nursing
Western University
London ON, Canada

You can also contact the co-investigator:

Gerard Nyiringango, (Masters student)

Graduate student, MScN candidate, Leadership in Nursing Education, Western University

If you have any questions about your rights as a research participant or the conduct of this study, you may contact The Office of Human Research Ethics at Western

University..... The Health Service Research Ethics Board (HSREB) is a group of people at Western University who oversee the ethical conduct of research studies there. The HSREB is not part of the study team. Everything that you discuss with them will be kept confidential.

12. Consent

A consent form will be provided for you to sign prior to your participation in the study.

This letter is yours to keep for future reference.

Appendix D
Consent Form



Study code:

Participant's Consent form

STUDY TITLE: ASSESSING THE IMPACT OF EDUCATIONAL MENTORSHIP FOR NURSES' AND MIDWIVES' ON KNOWLEDGE AND SELF-EFFICACY ABOUT HELPING BABIES BREATHE IN THE FIRST MINUTE OF LIFE AFTER BIRTH IN SELECTED HEALTH CENTRES OF RWANDA

Principal Investigator: Michael Kerr, PhD

I HAVE READ THE LETTER OF INFORMATION, HAVE HAD THE NATURE OF THE STUDY EXPLAINED TO ME AND I AGREE TO PARTICIPATE. ALL QUESTIONS HAVE BEEN ANSWERED TO MY SATISFACTION.

Print Name of Participant (YYYY)	Signature	Date (DD-MMM-YYYY)
-------------------------------------	-----------	--------------------

Print Name of Person Obtaining (YYYY)	Signature	Date (DD-MMM-YYYY)
--	-----------	--------------------

Consent

My signature means that I have explained the study to the participant named above. I have answered all questions.

Appendix E
Demographic Instrument

Study code:.....

Study Questionnaire

Date.....

Instructions

1. Please do not write your name on the questionnaire
2. Please tick one most appropriate response on the brackets provided

SECTION A:

1. What is your age?..... years

2. What is your gender?

Male.....1 []

Female.....2 []

3. What is your current marital status?

Married.....1 []

Single2 []

Separated 3 []

Divorced.....4 []

Others.....6 []

Prefer not to answer.....5 []

4. What is your highest level of education?

A-Level1 []

Advanced diploma.....2 []

Bachelors degree.....3 []

Masters degree.....4 []

Other.....5 []

5. What is your professional qualification now?

Registered midwife.....1 []

Registered nurse..... 2 []

Associate nurse.....3 []

Registered nurse-midwife.....4 []

Any other? Specify.....5 []

6. How many years have you worked in a labour and delivery? years

7. Have you ever been trained on helping babies breathe before this TSAM mentoring project?

Yes.....1 []

No.....2 []

Appendix F

Knowledge about Neonatal Resuscitation

Select the best answer (ie only one choice per question) to each question or statement by checking one of the boxes1. What should you do in The Golden Minute?

Bathe the baby..... 1 []

Deliver the placenta.....2 []

Evaluate the heart rate.....3 []

Help a baby breathe if necessary.....4 []

2. To prepare for a birth

You identify a helper and review the emergency plan.....1 []

You ask everyone but the mother to leave the area.....2 []

You prepare equipment only when you need it.....3 []

You do not need a helper.....4 []

3 To prepare the area for delivery

Open all the doors and windows to get fresh air.....1 []

Darken the room.....2 []

Make sure the area is clean, warm, and well-lighted.....3 []

Keep the room temperature cold.....4 []

4. What should you do to keep the baby warm?

Open all the windows.....1 []

Give the baby a bath after birth.....2 []

Place hot water bottles next to the baby's skin.....3 []

Place the baby skin-to-skin with mother.....4 []

5. What should you do to keep the baby clean?

Wash your hands before touching the baby and help mother wash her hands before breastfeeding.....1 []

Reuse the suction device before cleaning.....2 []

Keep the umbilical cord tightly covered.....3 []

Do not touch the baby.....4 []

6. Which baby can receive routine care after birth?

A baby who is not breathing.....1 []

A baby who is gasping.....2 []

A baby who is crying and/or breathing well.....3 []

A baby who is limp.....4 []

7. Routine care for a healthy baby at birth includes

Drying, removing the wet cloth, and bathing the baby.....1 []

Drying, removing the wet cloth, and positioning the baby skin-to-skin.....2 []

Bathing and putting clean clothes on the baby.....3 []

Drying and wrapping the baby in the wet cloth.....4 []

8. When should the umbilical cord be clamped or tied and cut during routine care?

After the placenta is delivered.....1 []

Around 1-3 minutes after birth.....2 []

Immediately after the baby is born.....3 []

Before a baby has cried.....4 []

9. A baby is quiet, limp and not breathing at birth. What should you do?

Dry the baby thoroughly.....1 []

Shake the baby.....2 []

Throw cold water on the face.....3 []

Hold the baby upside down.....4 []

10. A newborn baby is quiet, limp and not crying. The baby does not respond to steps to stimulate breathing. What should you do next?

Slap the baby's back.....1 []

Hold the baby upside down.....2 []

Squeeze the baby's ribs.....3 []

Begin ventilation.....4 []

11. In which situation should a baby be suctioned?

When a baby is crying at birth.....1 []

When a baby is crying but there is meconium in the amniotic fluid.....2 []

When you see secretions blocking the mouth and nose.....3 []

Before drying the baby.....4 []

12. Suctioning a baby unnecessarily or frequently can

Cause a baby to stop breathing.....1 []

- Make a baby start coughing and breathing.....2 []
- Stimulate a baby to cry.....3 []
- Increase the baby's heart rate.....4 []

13. Which of the following statements about ventilation with bag and mask is TRUE?

- The mask should cover the eyes.....1 []
- Air should escape between the mask and face.....2 []
- Squeeze the bag to produce gentle movement of the chest.....3 []
- Squeeze the bag to give 80 to 100 breaths per minute.....4 []

14. A baby's chest is not moving with bag and mask ventilation. What should you do?

- Stop ventilation.....1 []
- Reapply the mask to get a better seal.....2 []
- Slap the baby's back.....3 []
- Give medicine to the baby.....4 []

15. You can stop ventilation if

- A baby is blue and limp.....1 []
- A baby's heart rate is slow.....2 []
- A baby's heart rate is normal and the chest is not moving.....3 []
- A baby's heart rate is normal and the baby is breathing or crying.....4 []

16. A newborn baby's heart rate should be:

- Faster than your heart rate.....1 []
- Slower than your heart rate.....2 []
- Checked before drying the baby.....3 []
- Checked only when the baby is crying.....4 []

17. A baby who received ventilation

- Needs continued observation with mother.....1 []
- Cannot be fed.....2 []
- Always needs advanced care.....3 []
- Should immediately receive antibiotics.....4 []

18. When should the bag and mask and suction device be disinfected?

- After every use.....1 []
- Only when they appear dirty.....2 []
- Weekly.....3 []
- Once a month.....4 []

Appendix G

Self-Efficacy for Neonatal Resuscitation Instrument

This survey addresses professional procedures for neonatal resuscitation as adapted from the Helping Babies Breath® program.. Please indicate *how confident you are to perform the following behaviours related to neonatal resuscitation*. Circle the number that best matches your response, e.g. a score of 10 means that you are 100% confident in your ability.

	Neonatal Resuscitation Actions	Not confident at all	Very confident
1.	Prepare area for delivery	0 1 2 3 4 5 6 7 8 9 10	
2.	Prepare area of newborn resuscitation	0 1 2 3 4 5 6 7 8 9 10	
3.	Prepare equipment for newborn resuscitation	0 1 2 3 4 5 6 7 8 9 10	
4.	Prepare environment to keep baby warm	0 1 2 3 4 5 6 7 8 9 10	
5.	Prepare solution for decontamination of materials	0 1 2 3 4 5 6 7 8 9 10	
6.	Identify a helper and make an emergency plan	0 1 2 3 4 5 6 7 8 9 10	
7.	Put the baby on the mother's abdomen	0 1 2 3 4 5 6 7 8 9 10	
8.	Evaluate the amniotic fluid	0 1 2 3 4 5 6 7 8 9 10	
9.	Keeping baby clean.	0 1 2 3 4 5 6 7 8 9 10	
10.	Dry the baby thoroughly and provide initial steps to stimulate the baby	0 1 2 3 4 5 6 7 8 9 10	
11.	Identify the need of helping baby breath.	0 1 2 3 4 5 6 7 8 9 10	
12.	Evaluate: Cry, colour, breath, and movement	0 1 2 3 4 5 6 7 8 9 10	
13.	Time of cutting umbilical cord.	0 1 2 3 4 5 6 7 8 9 10	
14.	Able to identify the size of cutting the umbilical cord.	0 1 2 3 4 5 6 7 8 9 10	
15.	Able to use chlorhexidine digluconate 7.1% routinely but 4% of chlorhexidine gel for care for home delivery.	0 1 2 3 4 5 6 7 8 9 10	
16.	Action to take with a baby who is quiet, limp and not breathing at birth.	0 1 2 3 4 5 6 7 8 9 10	
17.	Action to take with a baby who is quiet, limp and not crying and does not respond to the step of stimulating breathing.	0 1 2 3 4 5 6 7 8 9 10	


18.	Situation to which a baby should be sunctioned.	0 1 2 3 4 5 6 7 8 9 10
19.	Ventilation with bag and mask.	0 1 2 3 4 5 6 8 9 10
20.	Action to take if a baby's chest is not moving with bag and mask ventilation.	0 1 2 3 4 5 6 7 8 9 10
21.	Time when you need to stop ventilation.	0 1 2 3 4 5 6 7 8 9 10
22.	Normal range of baby's heart rate.	0 1 2 3 4 5 6 7 8 9 10
23.	Action to take for a baby who received ventilation.	0 1 2 3 4 5 6 7 8 9 10
24.	Time of disinfecting bag and mask and suction device used.	0 1 2 3 4 5 6 7 8 9 10

Thank you very much for your participation in this study

Appendix H

Data Collection Permission Approval from Rulindo District

REPUBLIC OF RWANDA



NORTHERN PROVINCE
RULINDO DISTRICT
Ref: Health Unit

Rulindo *30.1.2018*
N° *587*/07.0401.04


✓ To: Mr Gerard NYIRINGANGO

RE: PERMISSION TO CONDUCT A STUDY



Reference made to your letter requesting a permission to conduct a study entitled "Assessing the impact of educational mentorship for nurses and midwives on knowledge and self-efficacy about helping babies breathe in the first minute of life after birth" in all health centres of Rulindo district from 30th august 2018 to 15th February 2018, I would like to inform you that you are allowed to conduct the above said study.

I also take this opportunity to request you to provide a copy of a study report to the management of Rulindo district after its completion.

Sincerely,



Emmanuel A. IRAMBA
Mayor of Rulindo District

CC:

- Governor of the Northern Province
- Heads of health centres.....(all)


E-mail: rulindodistrict@rulindo.gov.rw Mob: 0788527312

Appendix I

Data Collection Permission Approval from Gakenke District

Gakenke, 29/08/2018
N: 443/07.04.02/DHU

REPUBLIC OF RWANDA



NOTHERN PROVINCE
GAKENKE DISTRICT
PO BOX 152 RUHENGERI
E-mail:

✓ Gerard NYIRINGABO
CMHS/School of Nursing and Midwifery /KIGALI
Contact:
E-mail:

Re : Study Approval.


Dear Gerard,

Reference is made to your letter of 27th August 2018, requesting an authorization to carry out a study in all health centers in Gakenke health facility catchment area.

We are pleased to let you know that you are given a go ahead to start your study entitled « assessing the impact of educational mentorship for nurses and midwives on knowledge and self-efficacy about helping babies breathe in the first minutes of life after birth ».

Sincerely,

NZAMWITA Deogratias
Mayor of GAKENKE District

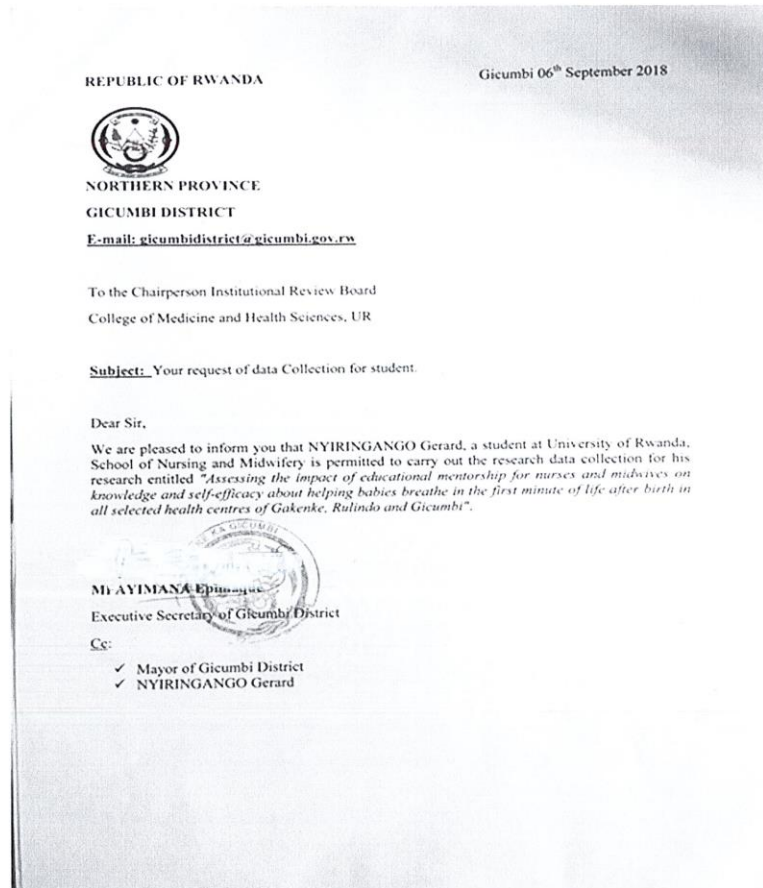


Cc :

- Vice Mayor in charge of Social Affairs/GAKENKE
- Acting Executive Secretary of District/GAKENKE
- Director General of Nemba and Ruli hospital/GAKENKE
- Director of Health Unit/GAKENKE
- Acting Head of health center (All)/GAKENKE.

Appendix J

Data Collection Permission Approval from Gicumbi Ddistrict



Appendix K

Request and Permission to Use Instrument

Dear in-charge of research tools at AAP organization,

I am writing for the request to use your tool “**Knowledge check (HBB 2nd Edition)**” in my study entitled “Mentorship Based on the Theory of Self-Efficacy to Improve Nurses’ and Midwives’ Knowledge about Helping Babies Breathe”.

I am Gerard Nyiringango, a master’s student in nursing sciences at the Western University of Ontario in Canada. I am intending to conduct my study in Rwanda (one of developing countries in Africa). My study will involve HBB mentorship of nurses/midwives. The tool “**knowledge check (HBB 2nd Edition)**” will be used to assess the knowledge of nurses/midwives before and immediately after the mentorship under the supervision of Dr. Michael Kerr (mkerr@uwo.ca) a faculty at Western University in nursing school. The study will be conducted for academic purposes of obtaining a master’s degree in nursing sciences. If allowed, the study will start in July of this year (2018).

I am looking forward to hearing your favorable consideration towards my request.

Best regards

Gerard Nyiringango

RN, BScN, Master’s student candidate at Western University

Dear Gerard – and Hello Dr. Kerr,

We are so pleased to hear from you and your interest in Helping Babies Breathe. As it turns out, you are free to use the training tools and no special permission is required. In fact, we really appreciate you having asked us as now we are aware of your work in Rwanda. The only thing we ask is that you please send us your research article/report once the study is complete. In addition, please notify us if articles pertaining to this study end up being accepted for publication in a scientific journal. Should that happen, we would like to share the article on our website.

Lastly, let me remind you to please record your HBS courses on our website. Here is the link to that section entitled “Record & View Courses”.

It certainly sounds like a very interesting study. We look forward to seeing the results!

Kind regards,

Nancy A. Kostka

Global Child Health and Life Support Helping Babies Survive
American Academy of Pediatrics

Appendix L

Pre and Post-Mentorship Table Results of All Knowledge Questions

		Pre-mentorship	Post-mentorship
1	What to do in a golden minute	69.5	88.9
2	Preparation for birth	87.9	90.2
3	Preparation for area of delivery	92.9	94.5
4	What to do to keep baby warm	97.2	98
5	What to do to keep baby clean	81	91.4
6	A baby who can receive routine care after birth	63.1	90.7
7	Routine care for a health baby	94.3	93
8	The time for cutting of umbilical cord	85	90.6
9	What to do for a baby who is born quite, limb and not breathing	60.1	88.7
10	The next step to a baby who is born quite, limb and not breathing and is not responding to first step	86.5	95.3
11	The situation in which a baby is sunctioned	86.5	96.2
12	What happens to a baby who is sunctioned unnecessarily	80.9	95.7
13	Proper placement of mast for ventilation	37	95.1
14	What is done during ventilation when the chest is not moving	90.2	98
15	When to stop ventilation	46.1	93.1
16	The new borns heart rate compared to an adult	69.3	93.1
17	What to do for a baby who received ventilation	83	89.9
18	When to disinfect the used material	97.2	98.4
	Total average	78.21	93.38

Appendix M

Pre and Post-Mentorship Table Results for All Self-Efficacy Items

	Pre-mentorship	Post-mentorship
Prepare area for delivery	7.87	9.7
Prepare area of newborn resuscitation	6.76	9.54
Prepare equipment for newborn resuscitation	7.25	9.17
Prepare environment to keep baby warm	7.5	9.54
Prepare solution for decontamination of materials	6.99	9.76
Identify a helper and make an emergency plan	7.33	9.63
Put the baby on the mother's abdomen	8.33	9.67
Evaluate the amniotic fluid	7.28	9.51
Keeping baby clean.	7.79	9.46
Dry the baby thoroughly and provide initial steps to stimulate the baby	7.26	9.59
Identify the need of helping baby breath.	7.48	9.71
Evaluate: Cry, colour, breath, and movement	7.9	9.49
Time of cutting umbilical cord.	7.77	9.65
Able to identify the size of cutting the umbilical cord.	7.58	9.3
Able to use chlorhexidine digluconate 7.1% routinely but 4% of chlorhexidine gel for care for home delivery.	4.09	6.07
Action to take with a baby who is quiet, limp and not breathing at birth.	6.24	9.28
Action to take with a baby who is quiet, limp and not crying and does not respond to the step of stimulating breathing.	6.43	9.17
Situation to which a baby should be suctioned.	7.18	9.34
Ventilation with bag and mask.	7.34	9.34
Action to take if a baby's chest is not moving with bag and mask ventilation.	6.76	9.2
Time when you need to stop ventilation.	6.86	9.53
Normal range of baby's heart rate.	7.65	9.62
Action to take for a baby who received ventilation.	6.51	9.32
Time of disinfecting bag and mask and suction device used.	7.84	9.5
Total average	7.17	9.34

Curriculum Vitae

Gerard Nyiringango

EDUCATION

Degree	University	Department	Graduation Year
MScN	Western University	School of Nursing	2019
BScN	Mount Kenya University	School of Nursing	2014
Advanced Diploma	Kigali Health Institute	Department of Nursing Sciences	2006

EMPLOYMENT HISTORY

Rank	University	Department	Year
Tutorial Assistant	University of Rwanda	School of Nursing Department Nursing Sciences	2014 - 2019
Clinical Instructor	University of Rwanda	School of Nursing Department of Nursing Sciences	2012 – 2014
Blood Donor Selection Officer	National Center for Blood Transfusion	NCBT Karongi	2011 - 2015
Clinical Instructor	Kigali Health Institute	Department Nursing Sciences	2006 – 2012
Staff nurse	University Hospital of Butare	Theatre and Emergency	2006

PUBLICATION

Articles

1. Tumusiime, A., Nyiringango, G., Uwimana, P., & Uwimana, C. (2008). Skills lab cost.