UNIVERSITY of RWANDA

QUALITY OF BASIC CARE DURING NEONATAL RESUSCITATION AT BIRTH AMONG HEALTH CARE PROVIDERS AT THREE DISTRICT HOSPITALS IN KIGALI CITY.

Kellen MUGANWA

College of Medicine and Health sciences

School of nursing and health sciences

Master of sciences in Nursing (Neonatal Track)

2019

UNIVERSITY of RWANDA

QUALITY OF BASIC CARE DURING NEONATAL RESUSCITATION AT BIRTH AMONG HEALTH CARE PROVIDERS AT THREE DISTRICT HOSPITALS IN KIGALI CITY.

By

Kellen MUGANWA

Registration Number: 215042773

A dissertation submitted in partial fulfilment of the requirements for degree of

MASTER OF SCIENCES IN NURSING

In the College of Medicine and Health sciences

Supervisor: Dr PAMELA Meharry

Co-Supervisor: Alice MUHAYIMANA

June, 2019

Declaration

I Kellen MUGANWA, I hereby declare that this work submitted in partial fulfillment of the requirements for the degree of Master of Science in Nursing (Neonatology) to the University of Rwanda is my own work and has not presented elsewhere in higher institution degree. All sources of information have been acknowledged by references.

Kellen MUGANWA

Registration Number: 215042773

12th June, 2019

Dedication

I sincere dedicate my work;

To my lovely husband and children

To family especially; my mother

To all my brothers, sisters and friends,

To all people who contribute to this work

Finally, my classmates for the moments shared together,

Acknowledgements

I thank God for his care through this course of master's program. I would like to express my inmost gratitude to my supervisors Alice MUHAYIMANA and Dr. Pamela Meharry for their value support through time, patience and collaboration, and mentorship throughout this project

Great thanks goes to the University of Rwanda for all support to upgrade my level through this course of Master's program, the College of Medicine and Health Sciences/ School of Nursing and Midwifery administration, to all academic faculties and Human Resource for Health staff for their support.

I would like to extend thanks to my classmates whom I always shared academic activities, social events, guidance and support over this period of master's program. Finally, my sincere gratitude goes to all people who contributed to this work, in one way or another.

May almighty God bless you much!

Abstract

Background: Globally, about 10 % of neonates require extra respiratory support to initiate breathing in the first minutes after birth. Almost 2.7 million of neonates died as an outcome of birth asphyxia and other related problems, then the most occur in low- and middle-income countries (LMICs). Quality of care (QoC) interventions could be done at birth to prevent neonatal deaths through basic care during neonatal resuscitation.

Objective: To determine the QoC of basic neonatal resuscitation (NR) at birth among health care providers at district hospitals in Kigali.

Method: Observational cross sectional study was conducted from February 20th, 2019 to May 15th, 2019 on 36 health care providers (HCPs) working in three district hospitals in Kigali city. A structured checklist tool was used to collect data. Descriptive and inferential statistics were used to analyze the data, which was presented in tables and figures.

Results: The majority of participants had good QoC scores for drying/stimulation at 74.7%, and fair QoC score for airway clearance (85.1%). A limited number had poor QoC scores for advanced bag and mask ventilation (13%). Years of maternity work experience was associated with good drying/stimulation (β =1.76, Cl= 1.23-2.93, p=0.032), airway maintenance (β = 1.46, CI = 1.13-2.13, P = 0.042) and initial bag and mask ventilation (β=1.66, CI = 1.73-2.97, = 0.019).

Conclusion. Quality of care in neonatal resuscitation reflects the preparation, drying and stimulation, airway maintenance, and ventilation, which are critical to save neonates lives. Mentorship and follow up with periodic refresher training can improve the care provided to neonates

Key words: Neonate, Quality of care, basic care, resuscitation, Health care provider.

List of symbols and acronyms

%: Percentage

AAP: American Academy of Pediatrics

BMV: Bag and mask ventilation

ETAT: Emergency Triage Assessment and Treatment

HBB: Helping Babies Breathe

HCPs: Health Care Providers

LMICs: Low-Income and Middle-Income Countries

MCSP: Maternal neonatal child survival program

NISR: National Institute for Statistics of Rwanda
NR: Neonatal Resuscitation

PALS: Pediatric Advanced Life Support

Qoc: Quality of care

SDGs: Sustainable Development Goals

SONU: Soins Obstétricaux et Néonataux d'Urgence

SPSS: Statistic package for social sciences

SSA: Sub Sahara Africa

UNICEF: United Nations Children's Fund

WHO: World Health Organization

TABLE OF CONTENTS

Declaration i

Dedication ii

Acknowledgements iii

Abstract iv

List of tables ix

List of figures x

CHAPTER ONE: INTRODUCTION 1

1.1. INTRODUCTION 1

1.2. BACKGROUND 1

1.3. PROBLEM STATEMENT 3

1.4. THE AIM OF THE STUDY 3

1.5. RESEARCH OBJECTIVES 4

1.6. RESEARCH QUESTIONS 4

1.7. SIGNIFICANCE OF THE STUDY 4

1.8. DEFINITION OF CONCEPTS 5

1.9. STRUCTURE/ORGANIZATION OF THE STUDY 5

1.10. CONCLUSION 5

CHAPTER TWO: LITERATURE REVIEW 6

2.1. INTRODUCTION 6

2.2. THEORETICAL LITERATURE 6

2.2. EMPIRICAL LITERATURE 7

2.2.1. Availability of Equipment in Neonatal Resuscitation 7

2.2.2. Health Care Providers' Skills 9

2.2.3. Outcome related to Basic Neonatal Resuscitation in providing Quality of Care 11

2.3. CRITICAL REVIEW AND RESEARCH GAP IDENTIFICATION FROM THE STUDY 11

2.5. CONCEPTUAL FRAMEWORK 11

CHAPTER THREE: METHODOLOGY 13

3.1. INTRODUCTION 13

3.2. RESEARCH DESIGN 13

3.3. RESEARCH APPROACH 13

3.4. RESEARCH SETTING 13
3.5. POPULATION 14
3.6. SAMPLING 14
3.6.1. Sample Size 14
3.6.2. Sampling Strategy 15
3.7. VALIDITY AND RELIABILITY OF RESEARCH INSTRUMENT 15
3.7.1. Validity 15
3.7.2. Reliability of the Instrument 16
3.8. MEASURES 17
3.9. DATA COLLECTION 18
3.9.1. DATA COLLECTION INSTRUMENTS 18
3.9.2. DATA COLLECTION PROCEDURE 19
3.10. DATA ANALYSIS. 20
3.11. ETHICAL CONSIDERATIONS 20
3.12. DATA MANAGEMENT 21
3.13. DATA DISSEMINATION 21
3.14. LIMITATIONS AND CHALLENGES 21
3.15. CONCLUSION 21
4.0. INTRODUCTION 22
4.1. SOCIO DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS 22
Socio-demographic Characteristics of Participants 23
4.2 .AVAILABILITY OF THE BASIC EQUIPMENT IN NEONATAL RESUSCITATION AT BIRTH AT SELECTED DISTRICT HOSPITALS. 24
4.3. BASIC EQUIPMENT AVAILABLE IN NEONATAL RESUSCITATION AT BIRTH. 24
4.4 SKILLS OF BASIC CARE IN NEONATAL RESUSCITATION AT BIRTH 25
4.4.1 Quality of Care Scores for the 4 Principle Steps in Neonatal Resuscitation 25
4.6. Performances mean scores for each of the neonatal resuscitation steps 27
4.7. Mean scores for the main steps in neonatal resuscitation 28
4.8 logistic regression of the Qoc scores with hcps' characteristics. 29
4.9. Infection prevention practices 31
CHAPTER 5. DISCUSSION 32
5.1. INTRODUCTION 32

5.3. HEALTH CARE PROVIDERS' SKILLS 33
5.4. OUTCOME OF BASIC NEONATAL RESUSCITATION IN PROVING QUALITY OF CARE 34
CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS 35
6.1. Introduction 35
6.2. Conclusions 35
6.3. Recommendations 35
REFERENCE 37
APPENDICES 44

List of tables

Table 1 Shows the content validity, applied model and sections with items 16
Table 2: Socio demographic characteristics of participants 23
Table 3: Availability of the basic equipment in neonatal resuscitation at birth at selected district hospitals. 24
Table 4: Basic neonatal resuscitation equipment at birth 24
Table 5: Performances mean scores for each of the neonatal resuscitation steps 27
Table 6. Logistic regression of the QoC scores with HCPs' characteristics. 29
Table 7. Infection prevention practices 31

List of figures

Figure 1. Adapted from Donabedian conceptual model, 2005 12
Figure 2: Quality of care scores for the 4 principle steps in neonatal resuscitation. 25
Figure 3: The outcomes of neonatal resuscitation in proving quality 26
Figure 4. Mean scores for the main steps in neonatal resuscitation 28

CHAPTER ONE: INTRODUCTION

1.1. INTRODUCTION

The introductory part of the research comprises the background, problem statement, the aim of the study, the research objectives, research questions, significance of the study, definition of concepts, structure/ organization of the study, and lastly conclusion should be involved for the chapter one.

1.2. BACKGROUND

Worldwide every year, about 2.7 million of neonatal babies died as a result of birth asphyxia and other related complications (Carvajal–Aguirre, et al., 2017 p4). One of the most frequent causes of early death, birth asphyxia accounting almost 23% of the 4 million neonatal deaths seen worldwide each year (Mistry, et al.,2018 p.2; Dempsey, et al., 2015), with ninety nine per cent of deaths in low and middle income countries(LMICs), (Carvajal–Aguirre, et al., 2017 p.4). Therefore up to 10 % of all neonates require extra respiratory support at birth in order to initiate breathing in the first minutes of life (Mistry, et al., 2018 p.2). According to world health organization shows that 10 million of neonates do not breathe at birth, then 6 million of them require basic neonatal resuscitation (WHO, 2014 p.13). The study conducted by de Graft-Johnson, et al., 2017 , he revealed that drying and Stimulation are required to initiate breathing in approximately 10 million neonates at birth every year worldwide. Basic neonatal resuscitation at the time of birth comprises a set of interventions require to establish breathing and circulation in a neonatal who is not spontaneously breathing or crying (Berhe, 2017). Most term neonates can be resuscitated with room air, but preterm babies especially those both at or less 32 weeks gestation with often require oxygen for resuscitation. Approximately 10% of all neonates require resuscitation at birth (Dempsey, 2015), and Less than 1% of neonates require advanced resuscitation and ongoing inpatient specialized care, (Enweronu-Laryea, et al., 2015) .

An essential care strategy to reduce neonatal mortality is to improve quality of basic neonatal resuscitation and care after delivery, and an estimation of neonatal mortality rate in low-resource settings for full term infant deaths reduced by 30 %, (Trevisanuto, et al., 2016).

In Malawi study done shows that the accessibility of equipment in all delivery areas is essential. A current review of data from six African countries such as Ethiopia, Kenya, Madagascar, Mozambique, Rwanda and Tanzania presented that the percentage of delivery areas with equipment for supporting neonatal breathing ranged from 8 to 22 % (De Graft-Johnson, et al., 2017 p. 6). The NR algorithms and the essential equipment at primary referral level and advanced in low-resource settings are recommended by international institutions such as World Health Organization (WHO) and American Academy of Pediatrics (AAP), essential equipment include: gloves, towels/ cloths, suction device, ventilation device, stethoscope and timer, (Trevisanuto, et al., 2016). Evidence has shown that training of healthcare providers in Helping Babies Breathe (HBB) intervention can contribute to a 47% decrease in early neonatal mortality, (Msemo, 2013 p.4)

Conditions such as perinatal birth asphyxia and hypothermia are directly linked to quality of care during delivery and are averted by the availability and use of good quality care via helping neonates to initiate and sustain breathing, (Chikuse, et al., 2012 p.2, WHO, 2018).

After war in 1994, Rwanda has put effort in social and health improvements started to lessen health inequities and child mortality rate. It has played a lot to achieve Millennium development goals(MDG) 4 that is to decrease neonatal mortality rate as the results from demographic health surveys in 2015 (Musafili, 2015, p.14). The national demographic health survey 2015 shows that the problem is quiet high at 20 deaths per thousand live births neonatal mortality rate currently (NISR, 2015). However, challenges are influencing healthcare systems in many low income countries in terms of delivering quality of care recommended in life saving interventions due to inadequate material and human resources and gaps in skills among health care providers working within the health care facilities, (Hategeka., et al., 2017). More strength is highly needed to achieve quality of care for neonates' health as sustainable development goals (SDGs) goal 3, to ensure healthy lives and promote well-being for all and most were preventable causes, (DESA, 2016).

The leading causes of neonatal deaths in Rwanda are prematurity (41 %), 22 asphyxia (33 %) and neonatal sepsis (10%). In 2012, most (94%) neonatal deaths occurred in the early neonatal period and of these, 68% occurred at the time of birth (MOH, 2018). Quality of care in neonatal resuscitation (NR) at birth could contribute to reduction in neonatal mortality rate associated with birth asphyxia and could prevent neonatal deaths by 30 percent as well as improve the

outcomes of neonates delivered with birth asphyxia. This has been demonstrated in low resource settings in Sub-Saharan Africa and developing world (Makene, 2014). The aim of this study was to determine the quality of care provided during the NR in order to contribute towards evidence-based efforts to reduce neonatal deaths attributable to birth asphyxia.

1.3. PROBLEM STATEMENT

The research shows that, birth asphyxia and other related complications account around 2.7 million neonates died each year worldwide, then 99 percent (%) of them occurring in LMICs (Carvajal–Aguirre, et al., 2017 p1, Shikuku, et al., 2017 p1). Most neonatal deaths occur in LMICs. Therefore 2/3 of all neonatal mortality could be preventable and treatable conditions, it is reported from 12 countries, six of which are in sub-Saharan Africa including Rwanda, (WHO and UNICEF, 2015 p.10). Approximately 10 million do not breathe at birth, six million of them require basic neonatal resuscitation including bag and mask ventilation with room air, can have a big impact on neonates' survival, (Carvajal–Aguirre., et al., 2017 p1; De Graft-Johnson., 2017). Birth asphyxia is directly linked to quality of care during childbirth (Al-Shaikh., et al., 2017; Persson., 2017 p.5). The most important indicator that neonatal resuscitation is needed for neonates who fail to breathe after birth.

In Rwanda the neonatal mortality rate due to asphyxia is still high at 33% next to prematurity the effort is still required to guiding effectively interventions to address this major health problems (MOH-Rwanda., 2018. p.11). The major causes of neonatal deaths in Rwanda district hospitals include birth asphyxia (39%) (Khurmi, -2017; Uwingabire, 2017).

This high rate of neonatal mortality due to birth asphyxia worldwide, in sub-Sahara Africa including Rwanda is an indicator of the serious lack of basic quality neonatal resuscitation care (Ndayisenga, 2016). At the knowledge of the researcher, there is limited data available about the quality of basic care during neonatal resuscitation at birth among health care providers in Rwanda.

1.4. THE AIM OF THE STUDY

The aim of this study is to determine the quality of basic care during neonatal resuscitation by health care providers at birth at selected district hospitals.

1.5. RESEARCH OBJECTIVES

1. To assess the basic equipment available in neonatal resuscitation at birth at selected district hospitals.
2. To assess the skills of basic care in neonatal resuscitation at birth among health care providers at selected district hospitals
3. To identify the outcomes of neonatal resuscitation in proving quality care at selected district hospital.

1.6. RESEARCH QUESTIONS

The research questions of this study are the following:

1. What are the equipment available to handle basic neonatal resuscitation care are present at delivery wards of selected district hospitals?
2. What are the skills do health care providers provided in neonatal resuscitation at selected district hospitals?
3. What are the outcomes to performing basic care in neonatal resuscitation at selected district hospital?

1.7. SIGNIFICANCE OF THE STUDY

This study will be highly contribute to different categories such as

Nursing practice: This study will remind practicing midwives, nurses and other health care professionals to think twice so that they can correct themselves in provision of quality of basic care to neonatal resuscitation as early as possible at birth.

Administration: The institution will be reminded the gap and what is needed to maintain the quality of basic care during neonatal resuscitation.

Nursing education: Also to identify areas that will require to strengthen the curriculum to meet up with current trends in nursing practice. It will help in teaching to emphasize in practice to provide quality of care

Researcher: The findings will give impressions to other researchers for further research to improve the quality of basic care for neonatal resuscitation in nation and international.

1.8. DEFINITION OF CONCEPTS

Quality of care (Qoc): World health organization defines as the extent to which health care delivered to individuals to improve the desired outcome (Tunçalp, et al., 2015). In this research defines quality of care as health services given to individuals and increase a desired health outcomes.

Health care provider: is a person that provides a health care services to neonates who did not initiate and sustain spontaneous breathing. For example; registered nurses, midwives, Medical doctors.

Basic neonatal resuscitation: this study basic neonatal resuscitation is immediate intervention after a neonate is born to breath (Enweronu-Laryea et al., 2015 p2)

Essential care: initial care or treatment given to ensure or stabilize the patient (Enweronu-Laryea et al., 2015 p2)

Neonatal resuscitation, defined as the set of interventions at the time of birth to support the establishment of breathing and circulation. It is an intervention done to assist neonates to recovery from difficult breathing (Enweronu-Laryea, et al., 2015 p2; Lee et al., 2011).

Birth asphyxia: the research defines as the failure to initiate and sustain breathing for a neonate after birth and extra respiratory support needed via neonatal resuscitation, (Hill et al, 2014 p.7)

1.9. STRUCTURE/ORGANIZATION OF THE STUDY

This study comprises six chapters. The first chapter introduces and gives a description of the background, problem statement, study significance, aim and research questions and objectives of the study. Chapter two focuses on the readings review of the literature related to quality of basic care in neonatal resuscitation at birth, and the conceptual framework. Chapter three talks on methodology of the study. The fourth chapter presents the demographic characteristics of respondents and presentation of findings as aligned with the objectives, chapter five gives discussion of the study and then chapter six includes conclusions, and recommendations.

1.10. CONCLUSION

All in all, neonatal mortality is still high in sub-Sahara Africa including Rwanda, this is an indicator that there is a lack of quality of care at birth and this could contribute to reduction in mortality rate associated with birth asphyxia.

CHAPTER TWO: LITERATURE REVIEW

2.1. INTRODUCTION

Literature review, focus on arguments of other researchers basing on variables such as skills, and other resources that can contribute to the quality of care during neonatal resuscitation among health care providers in delivery room at selected district hospitals- Kigali city. This part of literature review involves introduction, theoretical, empirical, Critical review and Research gap identification, Conceptual framework and conclusion. Different approaches or strategies were undertaken during assessment to ensure the quality of care given to neonatal to reduce neonatal deaths. The engine source of this literature consulted in different areas of electronic databases such as Cochrane library, HINARI, PUBMED Central, Google Scholar, and Rwanda Journal of Medicine and Health Sciences. Harvard referencing style was used in the entire writing.

2.2. THEORETICAL LITERATURE

It is important to consider past experience of the care providers, according to nursing theorists; Virginia Henderson was a North America nursing academic developed a nursing theory focus on individual care related to 14 human needs. In her concept model breathing is the first need in human living to assisting the patient to breathe comfortable without distress, (Watson, .2013 p.3). She described the role of health care providers for supporting the person to become independent (Younas, and Sommer, 2015). Likely to this study providing quality of basic care during neonatal resuscitation after birth for the neonates born without spontaneous breathing and start to initiate breathing. However, Donabedian model assess how the quality care could be delivered. He urged that to satisfy the client or family's need, needs to pay attention (Ghaffari, 2014 p.3). This model was developed by a researcher called Donabedian Avedis born in 1991 in Beirut, Lebanon and studied medicine, later he led the faculty and health services of students of the American University. In this experience an interest of how medical care is delivered in society from small to large health care system. In 1961, he was appointed to the University of Michigan, he started to work and develop the ways to measure the quality of health care. In his article 1966, Donabedian explained three things include structure, process and outcome to assess the quality of care outcome (Ayanian and Markel, 2016.p.205).

Quality of care are provided by health care providers that expected to minimize the risk of adverse neonatal outcomes and providing prompt evidence-based actions, (Ameh, et al.,2015

p.6). In addition, poor quality of care (QoC) in many facilities becomes a leading barrier in our pursuit to end preventable mortality and morbidity. QoC during labor in health facilities reflects the availability of equipment, health care providers with skills and ability to deal with complications that may require prompt life-saving interventions (Tunçalp, et al., 2015:p.11).

According to Donabedian theory model describes the quality of care in which it is assessed in three main categories include structure, process and outcome (Ayanian, et al., 2016.p.205). In his definition of the first category; structure, comprises the setting, providers'qualifications, administrative system in line with this research it explains as social demographic data such as age, gender, attended neonatal resuscitation training, experience; protocols and guidelines; NR equipment. The second category is Process, this model explains the process as the components of the care delivered similarly to this study it includes preparation for neonatal resuscitation, drying and stimulation, checking airways, applying bag , mask and ventilation, and support improve ventilation to those neonates who are unable to initiate and sustain breathing which result to neurological insult, respiatory distress, liver, and pulmonary hypertension (Gillam-Krakauer and Gowen Jr, 2018). Respiratory distress is the most common condition that require admission of neonates in intensive care unit. The definition of respiratory distress depends on presence of at least two from three main features such as tachypnea- respiration rate is above 60 per minute, retraction both sternal or suprasternal, intercostal and subcostal, and noisy respiration with grunt, stridor. It might be or not related with cyanosis or desaturation on pulse oximetry (MKishore, et al., 2015 p.2). The last category is the Outcome indicates the combined effects of structure and process, and defined as recovery or survival. In otherwords, the impact of the care on neonatal health status. Then this mentions the effects of health care given depending on the condition of the neonates after doing intervention such as breathing well, breathing on oxygen therapy, special care that deals with critical neonates especially in neonatal intensive care unit (Ayanian, et al., and 2016 p.206).

2.2. EMPIRICAL LITERATURE

2.2.1. Availability of Equipment in Neonatal Resuscitation

In national heath surveys done in Asia and Africa, reveal that the provision of health care services for the trained health care providers and neonatal resuscitation equipment are not always

accessible in all health facilities. Other studies done in countries such as: Kenya, Ethiopia, Cameroon and Nepal have shown the missing equipment in health settings.

Research done by (De Graft- Johnson, et al., 2017) for 209 asphyxiated neonates, 106 had stimulation through drying and back rubbing and their heads positioning to confirm that the patency of their airways. The rest 103 neonates were not dried immediately, did not receive back stimulation, or did not positioned their heads to ensure the open of their airways. Nearly half 45 of 106 neonates got stimulation and right head positioned, while 61 were not normally breathing, 50 of 61 had received bag and mask ventilation; then forty five recovered and fifty were dead. The 11 of 61 did not get bag and mask ventilation; eight started breathing spontaneously and three were confirmed dead. Thirty of the 103 neonates who were not dried and no back stimulation was done or well positioned heads to open their airways initiated breathing spontaneously, one was dead, and 72 continued to be asphyxiated. 44 of the 72 asphyxiated neonates received BMV, and 36 well improved while eight died. The remaining twenty six who did not get BMV, 21 recovered and 5 died. Overall, out of the 209 observed asphyxiated neonates, the majority of neonates recovered, then the least 22 died and outcome data had lost two.

Researchers shown in most areas that there was inadequate accessibility of equipment considered as important in the surveyed centers: stethoscopes more than half (68.0 %), clock (50.3 %), clothes (29.5 %). The percentage of centers equipped with room air source (1.9 %) was very small, (Trevisanuto, et al., 2016).

Furthermore, in study done by (Makene, et al., 2014) shows that the area of the study was poorly equipped in neonatal resuscitation equipment.

A cross-sectional study in Afghanistan was done to assess the association of the capacity for neonatal resuscitation with care providers' skills, over ninety per cent of health facilities had important equipment for neonatal resuscitation such as a mucus extractor, bag, and mask. More than eighty per cent of providers had been trained on neonatal resuscitation, but midwives were more likely than doctors to receive training, (Kim, et al., 2013).

During neonatal resuscitation time recording is an important activity unexpectedly, almost half of the hospitals confirmed that a clock was not accessible and only 12.3 % of hospitals reported the accessibility of a head cap for preventing low body temperature of neonatal in the delivery room (Trevisanuto, et al., 2016).

In all delivery settings availability of adequate equipment is crucial. The WHO and AAP endorse that in low-resource settings to possess neonatal resuscitation algorithms and lists of essential equipment at primary and higher referral level such as head cap, clock, towels/ cloths, suction device, ventilation device, and stethoscope.

In LMIC in Africa and Asia had a shortage of appropriate guidelines and policies for providing quality health care to neonates' important equipment for resuscitation such as bag and mask are not readily accessible at the site of use to providing quality of care. The quality of care in health facilities where deliveries and neonatal services are accessible as poor or inadequate due to low hygienic standards, poor health care providers attitude, poor adherence or observance to guidelines and protocols (Enweronu-laryea et al., 2015).

Lack of these essential supplies leads to poor quality of neonatal resuscitation after birth in low income countries especially sub Saharan Africa including Rwanda, (Kim, et al., 2013) .

Observational Cross-sectional assessment done in health services across six sub-Saharan African countries such as: Rwanda, Kenya Ethiopia, Tanzania, and Madagascar and found that towels and blankets were found as largest gaps required to dry and put the neonates on mothers' skin to skin contact, then encourage thermoregulation, which were available in 40.5% of all health services across countries, the greater supply found in Rwanda at (80.6%). Generally of all facilities ranging from 8.2% to 52.7% was poor in availability of all neonatal care supplies (De Graft-Johnson, et al., 2017).

Neonatal resuscitation equipment could help in prevention of neonatal death from complications linked with birth asphyxia. The present adopt and utilization of neonatal resuscitation equipment the Tanzania government takes the priorities as selected as a focal point and participants supporting the prevention of deaths from associated birth asphyxia complications to improve the recognized barriers and gaps in health care (Equipment, 2014 p5).

2.2.2. Health Care Providers' Skills

Study done in Kenya, the research shows that the risk of death increases in delaying to initiate ventilation by 16 % every 30 seconds up to six minutes and 6 % for every minute to apply bag and mask ventilation. This indicates inadequate provider's skills as barrier to perform neonatal resuscitation. However, the evidence has shown that training of health care providers in Helping Babies Breathe intervention can give to a 47% discount in early neonatal death. Therefore,

efforts to improve child health have to focus on reducing neonatal deaths, in particular early deaths within the first minutes, (Shikuku, et al., 2017)

The study done to 12 LMICs through Systematic analysis reveals that the performance of care providers is the serious limitation in all health care organization. The countries lack adequate and competent health care providers to provide quality care to neonates who had serious condition, mainly basic neonatal resuscitation at health levels of care provision. In addition skilled care during the early postnatal period, mainly on the first day of life offers chance to identify and resolve the problems that may result in early neonatal mortality providing quality of care during neonatal resuscitation when required, could prevent almost 10 % preterm and 30% of term neonatal mortality rate (Enweronu-laryea et al., 2015).

According to the study done in Malawi over half of neonates needing resuscitation could be recognized before birth if the mother is observed correctly for the risk factors. The occurrence of birth asphyxia is reported to be higher in the developing countries and Sub-Saharan Africa the neonatal death are as high as forty to fifty per thousand live births (Chikuse, et al., 2012).

The research in Zambia reveals that, there were no alteration among trained health care providers compared to those who did not receive trainings to support unresponsiveness of the neonates. For health care providers who have had previous neonatal resuscitation training shown that no significant correlation evidence to the study (Mistry, et al, 2018 p.4).

To reduce neonatal mortality rate is the best strategy of intervention to increase the quality of neonatal resuscitation. Basic neonatal resuscitation and care next to birth may decline neonatal death up to 30% in low-resource settings (Trevisanuto, et al., 2016). Then achievement of neonatal resuscitation based on clinical skills of health care providers as well as availability of equipment (Kim, et al., 2013) .

The study done in Kenya using direct observations found that quality of care scores were good for airway clearance (83%) Suctioning in meconium presence (40%) was poorly performed. The period of experience working in maternity were associated with good drying/stimulation and

airway maintenance; nurses were poor compared to doctors during initial bag and mask ventilation (Shikuku et al., 2017).

2.2.3. Outcome related to Basic Neonatal Resuscitation in providing Quality of Care

Basic neonatal resuscitation next to delivery can decrease up to 30 % of neonatal mortality in low-resource settings (Trevisanuto, et al., 2016).

In the study done by de Graft-Johnson, et al.2017 revealed that main insufficiencies of neonatal resuscitation equipment, as well as health care provider's skills to assist neonates who did not breath at birth, through intervention the majority alive on their own or vigorous steps taken by care provider via helping with early stimulation and ventilation then 11% of neonates died.

2.3. CRITICAL REVIEW AND RESEARCH GAP IDENTIFICATION FROM THE STUDY

After reviewing the literature about the quality of basic care during neonatal resuscitation after birth, the studies shown some weakness, the researchers were limited on providers' actual performance of neonatal resuscitation procedures and on individual or facility-level characteristics associated with that performance and availability of neonatal resuscitation equipment. Rwanda, an analysis of a national service provision assessment found no significant associations between provider or health organization characteristics and the performance of recommended neonatal care procedures, but they did not look at actual neonatal resuscitation. The strength of this research is that, the researcher has observed how the health care providers applied their skills on actual situation.

2.5. CONCEPTUAL FRAMEWORK

This conceptual frame work is defined as an end outcome of bringing together a number of linked concepts (Imenda, 2014p. p.5). The conceptual framework used is Donabedian model by measuring quality of care in three main groups such as outcome, process and structure and categorized as independent variables (structure and process) and dependent variables (outcome).

Independent variables include: Health care providers, age, level of education, experience, Basic supplies equipment: Oxygen source, bag and mask, Suction machine, Clock, Suction tube and the process which deals with personal skills related to prepare area for resuscitation, check

availability of resuscitation equipment, Identify a helper, Drying/Stimulating, Check/Open Airway, Bag and Mask Ventilation, Support Ventilation (Improve), Infection Prevention practices.

Dependent variables related to the outcome or condition of the baby after interventions such as Baby breathing well with mother, Baby alive on oxygen therapy, Baby alive in special care Area/unit or, Not breathing.

CONCEPTUAL FRAMEWORK

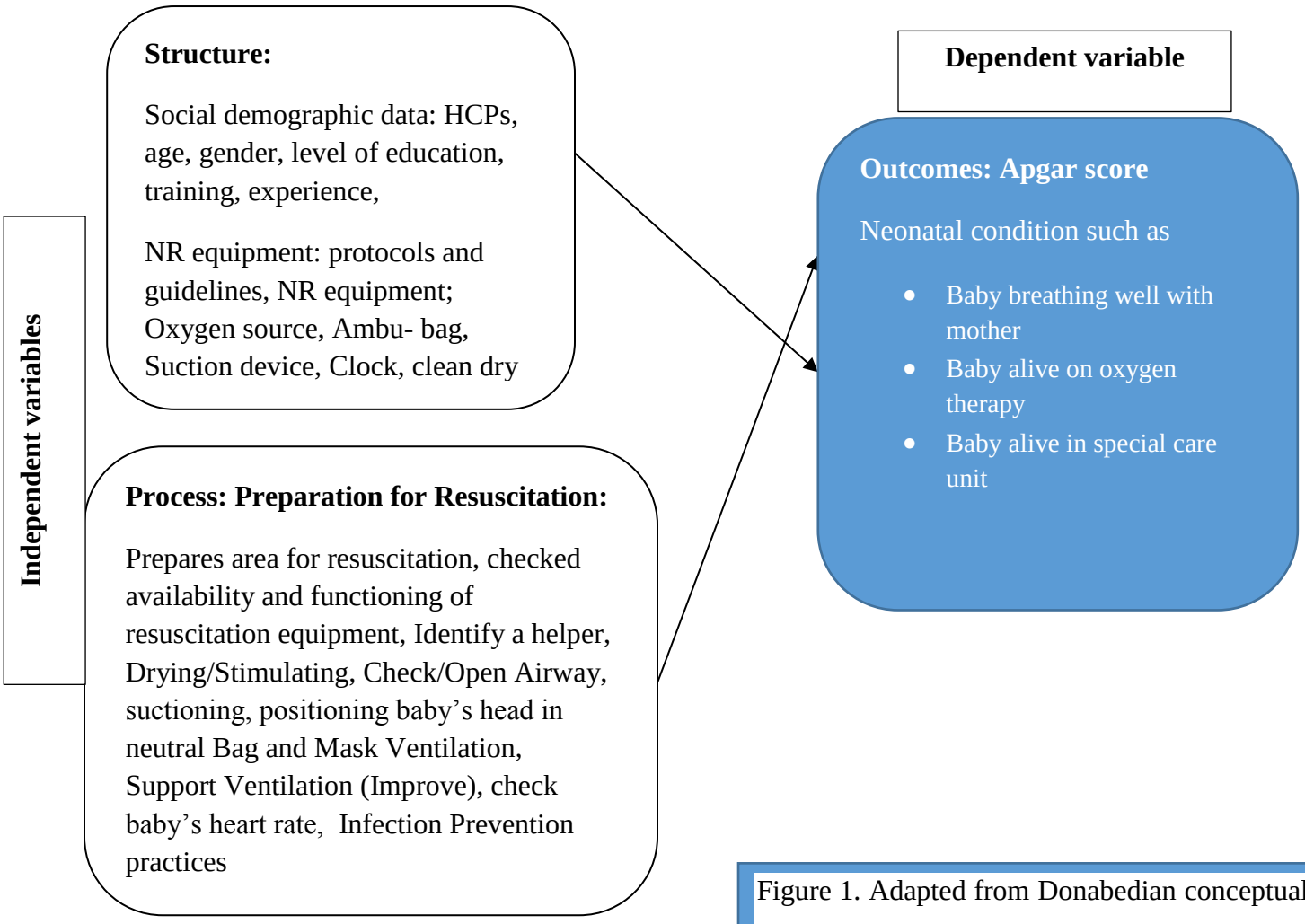


Figure 1. Adapted from Donabedian conceptual model, 2005

CHAPTER THREE: METHODOLOGY

3.1. INTRODUCTION

The chapter shows a plan that a researcher was used in order to meet the study objectives. It brings a detailed description about research design, research approach, research setting, population, sampling, sampling strategy, the inclusion and exclusion criteria, sample size, how data were attained, ethical considerations, limitation and challenges were noted and the conclusion.

3.2. RESEARCH DESIGN

A descriptive cross-sectional study was applied. According to Akhtar, 2016 with other related definition describes the research design is taken as a structure or glue that holds the elements together. The design was used to identify the problem, hence to assist the researcher for further investigation in quality of basic care during neonatal resuscitation.

3.3. RESEARCH APPROACH

Quantitative approach was used. It was used to compute the problem by the way of making numerical data or data that can be altered into practical statistics (DeFranzo, 2011 p.6). This study statistically was analyzed the quality of care in neonatal resuscitation in numbers

3.4. RESEARCH SETTING

The study started from February 20th, 2019 to May 15th, 2019 in the delivery room and theatre of maternity ward in three selected district hospitals-Kigali city such as Muhima district hospitals in Nyarugenge district, it has a catchment area of 11 health centers , Masaka district hospital located in Kicukiro district and has a catchment area of 11 heath centers, and Kibagabaga district hospital in Gasabo district, it has a catchment area of 12 health centers and both are in Kigali city and their areas are considered as a teaching district hospitals for various health institutions in Rwanda. In addition, they were selected based on the highest number delivered and studied cases available. These areas were selected because the highest neonatal mortality as a consequence of birth asphyxia counts 39 % in district hospital (Khurmi, 2017, and Uwingabire, 2017). Thus extra breathing support is needed to initiate and sustain spontaneous breathing through providing quality of care in neonatal resuscitation to rescue or save neonates, (Carvajal–

Aguirre., et al., 2017 p1). A random sampling was used to pick one from two district hospitals located in Gasabo district to carry out the study, it permits researcher to make accurate assumptions or generalizations from the sample to the population under the study. These are places where there is a high demand for NR with high number of deliveries per month with a range between 450 to 600 deliveries, 1 to 10 neonates delivered could require a support to initiate breathing after birth. Every twelve-hour shift, three nurses/ midwives should be on duty. There are 40 HCPs in study setting in maternity unit, only 36 HCPs participated in the study due to different circumstances such as on leave (annual and maternity), workshops or training and others related to the institution activities and plan. Therefore, there is a need for updated and evidence-based practices among health care providers.

3.5. POPULATION

The population in the research is classified as accessible and target population. It is well-defined as the people who encounter the operational definition of the target population. Target population denotes to the population that a researcher is intended in the study (Asiamah, et al., 2016 p.8). The population of this study was all health care providers assigned in delivery room and maternity theatre who were conducted basic care during neonatal resuscitation and meet the inclusion criteria and voluntarily consented to participate in the study.

3.6. SAMPLING

Sampling is the process of choosing a limited number from the whole population number with the similar characteristics. The role of sampling is that it allows a researcher to get near accurate results in small time (Taherdoost, 2016 p.6). It was appropriate to calculate a sample size in the research process even though, there are no 'rules of thumb' to determine sample size for quantitative research (Christensen, 2011 p.19). The sample size was not calculated in this study because of the limited number at the area. Though, the number of sample size was not increased due to the limitations and feasibility of the researcher.

3.6.1. Sample Size

In the study, the total population sampling was used where all 40 health care providers who involved in neonate resuscitation procedure and consented to contribute therefore the confidence

interval 95% and p-value 0.05 were assumed. Only 36 HCPs participated in the study, others were absent due to different circumstances such as leaves, sickness, and institution trainings.

3.6.1.1. Inclusion Criteria

The HCP who were involved in neonatal resuscitation in the delivery room or maternity theatre and consented to participate in the study.

3.6.1.2. Exclusion Criteria

The exclusion criteria include all health care providers who were not involved in neonatal resuscitation.

3.6.2. Sampling Strategy

Convenience sampling is a method for selecting participants who are available at the area of the study. It is inexpensive and an easy selection compared to other sampling techniques, (Taherdoost, 2016 p.6). Other sampling strategies could be used in the study thus convenience sampling was the choice to dealing with the presence of health care provider on the duty. The convenience strategy was applied to collect the data according to the participants dealing with neonates who needs support to initiate and sustain breathing. Health care providers were observed for two to three times providing NR care. Evidence shows that, with the continued presence of the observer over time, the provider tends to forget because of human nature and thus returning back to their routine care, thus the need for repeated observations (Polit and Beck, 2004.).

3.7. VALIDITY AND RELIABILITY OF RESEARCH INSTRUMENT

3.7.1. **Validity**

Heale and Twycross, 2015 define validity that it states that it is the degree to which a concept is exactly measured in a quantitative study. The next value measurement in a quantitative study is reliability, or the exactness of an instrument. It's significant to consider validity and reliability in conducting research to ensure its accuracy and consistency.

Content validity

It is the degree to which a research instrument correctly measures all parts of a construct. It looks if the tool is adequately covers the whole objectives of the study.

Face validity, is a division of content validity wherever experts are inquired their judgement about whether the tool measurement of the concept intended. The tool was revised by the supervisors of this study before collecting the data (Heale and Twycross, 2015).

Construct validity

The level to which a research tool measures the proposed construct (Heale, and Twycross, 2015). The tool was based on the international standardized tool (Helping Babies Breathe) and national protocols. The structured checklist tool was adapted from the validated tool with entitled of "Quality of Care during Neonatal Resuscitation for neonatal with birth asphyxia in Kakamega County General Hospital, Kenya" which was validated by pre-test conducted in Mulago hospital in Uganda, prior to the real data collection time to maintain their reliability and validity.

Table 1 Shows the content validity, applied model and sections with items

Table 3.1. Objectives of the study.	Conceptual framework	Section with measures items
Assess the basic equipment available in NR at birth	Donabedian model	Section 1, all items, section 2, all items, section 3, all items
Assess the skills of basic care in NR at birth	Donabedian model	Section 4, all items, section 6, section 7, section 9, all items
Identify the outcomes of NR in providing quality of care	Donabedian model	Section 5, all items, section 8, all items.

3.7.2. Reliability of the Instrument

Reliability refers to the consistency of measures through overtime (test- retest reliability), across items (internal consistency), and across different researchers (inter-rater reliability). The internal consistency is the commonly used and it is measured using reliability coefficient analysis (Cronbach alpha) many methodologists recommend a minimum alpha coefficient which is between 0.65 and 0.80 to be accepted, to measure the strength of that consistency (Mohajan, 2017). This test is used to the questions with more than two answers. It was shown that the dichotomous (binary) item and its content represented as single factor and shown that the range was not specified accurately (Mohajan, 2017). Then correlation variables seemed to be low. If

the sum of the item covariance is negative it tends to be negative and hence the reliability becomes negative**.** Instruments with questions that have more than two responses can be used in this test. The evidence of validity and reliability are prerequisites to assure the integrity and quality of a measurement instrument (Mohajan, 2017; Kimberlin and Winterstein, 2008). In this study only pilot study was tested to reassure the feasibility of the tool and it was good to be used by the researcher. The tool used in the study was adapted from international guidelines of neonatal resuscitation (Shikuku., et al., 2017 p.3; American Academy of Pediatrics, 2016).

3.8. MEASURES

The data collection tool was done in nine (9) sections and these are included:

Section 1: Social demographic characteristics include: age, gender, HCP level, highest qualification level of training, neonatal resuscitation training, prior NR training attended, duration since last NR training, support supervision in NR, Staff supervision, supervisor, most recent staff supervision, practice in maternity unit, the number of HCPs and resuscitated neonates (11items). All items were measured in frequencies (table 2).

Section 2. Clinical protocols and guidelines include: visual NR action plans present in resuscitation areas, HCPs use NR action plans and guidelines during resuscitation, flip charts of NR provided in labor ward (3 items). Variables were measured as “Yes” or “No” and reported as frequencies (table 3).

Section 3. Basic NR equipment in labor ward and maternity theatre were assessed for permanent equipment (items 5) and temporary equipment (items 6). They were measured as “present” or “absent” and displayed as frequencies (table 4).

Section 4. Skills of basic care via four principle steps in NR include; drying and stimulation, airway clearance, initial BMV, and advanced or improved BMV (4 items). The variables were measured in frequencies and categorized “poor” (missed all or majority items in recommended steps), “fair” (half the recommended steps performed), “good” (performed all or majority items in recommended steps), (Shikuku., et al., 2017) (figure 2).

Section 5. The outcome variables of NR on improving quality care included the response of neonates to drying and stimulation, clearing airway, initial BMV, assisted/ improve BMV and assisted/ support ventilation (5 items)and were all measured in frequencies (figure 3).

Section 6. The performance mean score for NR steps include preparation for NR (4 items); drying and stimulation (3items); airway clearance (5 items), initial BMV (2items); advanced or improved BMV (5 items); support ventilation (2 items). All 21 variables were measured in frequencies, mean score, and standard deviation (table 5).

Section 7. The mean score for preparation NR steps include; preparation for NR (4 items), drying and stimulation (3items), check / open airways (3 items), BMV (2 items), and advanced or support ventilation (2 items); all 14 items were measured as mean scores (figure4).

Section 8. The QoC scores drying and stimulation, airway maintenance, initial BMV, advanced/ improve BMV (4 items) and social demographic characteristics include; professional training (2items), NR training (2items), maternity experience (3 items), support supervision (2items) associations were measured via logistic regression (table 6).

Section 9. Infection prevention practices provided by HCPs include; cleaning and disassembled device while wearing gloves, decontamination in chloride solution 5 % for 10-20 minutes, all parts washed with soap and water and rinsed with clean water, parts dried completely (4items)were measured as “Yes” or “No” and reported as frequencies (table 7).

3.9. DATA COLLECTION

The structured and validated tool (checklist) was used to support the researcher to collect the data towards the eligible participants and the approaches were used via data collection instruments, pilot study and data collection procedure as follows.

3.9.1. DATA COLLECTION INSTRUMENTS

A structured direct observation checklist was adapted from Shikuku, et al., 2017. It was adapted and revised its contents by Supervisors before collecting. It was composed of structural characteristics, and the health care provider (HCP) characteristics; the processes, NR process with items based on the principle areas of NR process as per National guidelines and

international guidelines, preparation for resuscitation, drying/stimulation, airway clearance and maintenance, bag and mask ventilation (and advanced care/support ventilation)

It is validated tool used by other researchers in the study "quality of care during neonatal resuscitation for neonatal with birth asphyxia in Kakamega general Hospital- Kenya." And tool was tested in Mulago hospital in Uganda, prior to the real data collection time. The neonatal resuscitation observation items were based on the Helping Babies Breathe algorithm and National protocols.

The pilot study was done on 10 % of total sample population which was 4 HCPs were consented and observed using structured checklist tool to ensure its feasibility of the study. The instrument was understandable and reliable to the study and takes 20 minutes to complete the checklist. The tool was very good measure of quality basic care during NR among HCPs. The pilot population number was also included in study because the tool was maintained in researcher's hand not exposed to the participants.

3.9.2. DATA COLLECTION PROCEDURE

The researcher used three Data collector assistant and were selected in each selected district hospitals in maternity unit more especially in postnatal unit so that he/ she could help principal researcher. The data collector assistants were trained on the objectives; benefit of the study, individual's right, informed consent and how the structured checklist tool was used. The principal researcher was selected one staff from other services especially in postnatal with experience and who have had NR training to be a data collector Assistant and each HCP to be assessed for two to three times while giving NR care to minimize the Hawthorne effect. This was an assumption that the HCPs are less likely to change their practices when being observed by another HCP in the same unit as opposed to an observer from outside the hospital. The observer was followed with the delivery that comes first. The principal researcher and data collector assistant tried the best to stand beside the resuscitation table not to interfere NR process as it is non-intrusive. Most of the HCPs had to be approached on an individual basis by the researchers due to different working shifts. However, consented participants were recruited and requested to complete the structured observation checklist on the social demographic data including information on training and qualifications, working experience, and refresher training attended

and informed that any time researcher committed to come to observe the actual resuscitation no subsequent reminders during the actual procedure.

At the first week of data collection at each site the principal researcher worked closely with data collector assistants during the day and evening hours to ensure that she/ he is able to complete the direct observation structured checklist in same way, to correct any mistake happen at the end of each day. Among selected assistants did well during supervised with principal. The principal researcher should receive a report from each assistant. The data collection took two month and half to complete data collection.

3.10. DATA ANALYSIS.

It is the method that presents the data in graphs to identify the structure and patterns of data collected (Peersman, 2014). Data was collected using structured checklist tool and calculated by data analysis using Statistic package for social sciences (SPSS) version 21. Using descriptive and inferential statistics such as ordered logistic regression and Significance level and association of variables were tested by using 95% confidence interval (C.I) and P-value less than 0.05. Data were presented in form of tables, graphs and diagram. Descriptive analyses were done by using frequency distribution tables and percentages (Christensen, 2011 p.11). The variables in each of item areas of assessing quality outcome variable were defined quality of care. Responses from the nominal scale were scored as 1 (for yes) or 0 (for no). Higher scores of responses reflected to higher quality for the nominal scale. For process indicators, descriptive statistics were summarized using the mean and standard deviation. Quality of Care (QoC) was assessed in detail by analyzing the performance at each step of resuscitation. QoC was classified as good (if all the recommended steps performed), fair (half the recommended steps performed), and poor (majority of the recommended steps missed).

3.11. ETHICAL CONSIDERATIONS

The study was approved by the Institutional Review Board (IRB) of University of Rwanda, College of medicine and health sciences and the ethical committee and permission to collect data was obtained and submitted to ethical research committee of three selected district hospitals, with requested letters were written to the Directors of district hospitals (Masaka, Kibagabaga and Muhima) in Kigali city to allow the researcher to conduct the data. After receiving the approval/ permission letters from the requested district hospitals, Written informed consent was requested

from health care providers prior to the participation of the study and researcher was ensured their confidentiality and anonymous and participant has right to withdraw from the study at any time. In addition, the HCP was also requested to complete the structured observation checklist on the social demographic data form including information on training and qualifications, working experience, and refresher training attended by the principal researcher or data collector assistant.

3.12. DATA MANAGEMENT

Electronic data collected were kept strictly confidential on a computer with personal password. All data collected were securely kept until after five years then destroyed and hardcopies will be burnt. The data information was stored and protected for their safeguard, then saved in a protected flash drive, personal e- mail for the backup in case there is a storage device destroyed

3.13. DATA DISSEMINATION

Data will be disseminated in University of Rwanda, College of medicine and health sciences through written report and oral presentation, as well as three selected District hospitals. Data will be also presented in conferences and published in medical journal to help other researcher in their study.

3.14. LIMITATIONS AND CHALLENGES

There was a risk of the observer to feel obliged to assist during the resuscitation in case the babies are not well treated. The bias since the data collector was recruited from the staff of the same hospital in other services. This was minimized by training of the data collector to understand the study procedures and supervision. The health care providers (HCPs) were known why the researchers were there. The Short period was also a limitation during data collection and analysis because some health care providers were absent but if the study was prolonged they might be involved. Similarly the researcher was limited to the research settings. The data conducted in only three selected district hospitals in Kigali and findings were not generalized.

3.15. CONCLUSION

This chapter discusses the methodology the researcher was used to conduct the study. It shows the research design and all procedures that were used to get a sample, and how data could be analyzed. Shows how ethical was respected.

CHAPTER FOUR: RESULTS

4.0. INTRODUCTION

This chapter presents the analysis of findings. A total of 40 participants were included, only 36 were presented in the study. The findings described in various factors, and outcomes of interest and association between them

4.1. SOCIO DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

Participant's Socio demographic characteristics are presented in table 1. The mean age of participants was 30.0 years (SD ± 4.8) and a large proportion 88.9% was above 25 years old. Nearly all proportion 94.4% were Nurses and midwives. Over half of them 58.3% were female, and registered advanced diploma holders 75.0%. Majority 86.5% reported being trained on Neonatal resuscitation, with most having 93.8% Helping Babies Breath (HBB) the duration since the last NR training was assessed in this study, and a large proportion over half was above 12 months. Majority 63.9 has been supervised in NR and a large proportion said that the time since most recent staff supervision above 12 months. Unit manager was reported by the majority 48.0% of participants as supervisor. The majority 83.3% reported an experience of between one and five years working in maternity unit. The matter regarding distribution of Neonatal Babies during NR, Nurses and Midwives provided NR for the majority of the neonatal babies 93.3%. Advanced diploma holders resuscitated 88.5% of the neonatal. Those who reported being trained on NR resuscitated the majority 87.4% of the neonatal babies. Those who reported an experience of between 1 and 5 years resuscitated large number 80.4% neonates. The table below shows the Socio demographic characteristics of participants.

SOCIO DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

Table 2: Socio demographic characteristics of participants

Socio-demographic Characteristics of Participants

HCPs Characteristic	HCPs(n=36) n(%)	Neonatal resuscitated (n=87) n (%)
Age (years)		
>25	4 (11.1	9 (10.3)
≥25	32 (88.9)	78 (89.7)
Gender		
Male	15 (41.7)	38 (43.7)
Female	21(58.3)	49 (56.3)
HCP level		
Midwife/ Nurse	34 (94.4)	82 (94.3)
Medical doctor	1 (2.8)	4 (4.6)
Specialist (Obs/gyn	1 (2.8)	1 (1.21)
Highest qualification level of training		
Diploma	27 (75.0)	77 (88.5)
Bachelor's degree	8 (22.2)	9 (10.4)
Master's degree	1 (2.8)	1 (1.1)
Training in NR		
Yes	31 (86.1)	76 (87.4)
No	5 (13.9)	11 (12.6)
Prior NR training attended (n= 31)		**n=76**
HBB		
Yes	30 (96.6)	43 (56.6)
No	1 (3.2)	33 (43.4)
PALS/ Advanced cardiac support		
Yes	16 (51.6)	70 (18.4)
No	15 (48.4)	6 (92.1
ETAT		
Yes	14 (45.1)	35 (46.1)
No	17 (54.8)	41(53.9)
SONU		
Yes	1 (3.2)	50(70.1)
No	30 (96.8)	26 (26.2)
Duration since the last NR training		**n=61**
<6 months	15 (48.4)	20 (32.7)
≥12 months	16 (51.6)	41 (67.3)
Support supervision in NR		
Yes	18 (63.9)	38 (78.6)
No	13 (36.1)	23 (21.4)
Staff supervision(n=23		
<6 months	3 (13.0)	7 (11.5)
6-12 months	5 (21.8)	12 (19.6)
≥12 months	15 (65.2)	42 (68.9)
Supervisor		
Manager	11 (48.0)	27 (44.3)
MCSP team	6 (26.0)	15 (24.5)
Ward mate/ colleague	6 (26.0)	19 (31.2)
Practice in maternity unit (year)		
<1	9 (13.9)	13 (11.4)
>1-5	12 (83.3)	40 (80.4)
≥5	2 (2.8)	8 (9.2)

HCPs: Health Care Providers, **NR**: Neonatal Resuscitation, **HBB:** Helping Babies Breathe, **PALS**: Pediatric Advanced Life Support, **ETAT:** Emergency Triage Assessment and Treatment, **SONU:** Soins Obstetricaux et neonatal d'urgence, **MCSP:** Maternal Child Survival Programme

4.2 .AVAILABILITY OF THE BASIC EQUIPMENT IN NEONATAL RESUSCITATION AT BIRTH AT SELECTED DISTRICT HOSPITALS.

Table 3: Availability of the basic equipment in neonatal resuscitation at birth at selected district hospitals.

JOB AIDS / protocol and guideline	Yes n (%)	No (%)
Visual NR action plans and guidelines present in resuscitation areas	48 (55.2)	39 (44.8)
HCPs use NR guidelines/action plans during resuscitation	30 (34.5)	57 (65.5)
Flip charts for NR are provided are in the labor unit	39 (44.8)	48 (55.2)

Availability of the basic equipment in neonatal resuscitation at birth is presented in table 3. During resuscitation, over half (55.2%), of Visual NR action plans/guidelines were present at resuscitation areas. However, during resuscitation the majority 65.5% did not refer to NR guidelines/action plans. Over half (55.2%) of resuscitation flip charts for neonatal resuscitation were not provided in the labor unit.

4.3. BASIC EQUIPMENT AVAILABLE IN NEONATAL RESUSCITATION AT BIRTH.

Table 4: Basic neonatal resuscitation equipment at birth

Equipment	Labor Ward n (%)		Maternity Theatre n (%)	
	Present	Absent	Present	Absent
PERMANENT ITEMS				
Warmer/ resuscitative	65 (89.0)	8 (11.0)	13 (92.9)	1 (7.1)
Oxygen source	53 (72.6)	20 (27.4)	12 (85.7)	2 (14.3)
Suction machine	59 (80.8)	14 (19.2)	11 (78.6)	3 (21.4)
Ambu bag (500mls)	46 (63.0)	27 (37.0)	12 (85.7)	2 (14.3)
Clock	3 (4.1)	70 (95.9)	0 (0)	14 (100.0)
TEMPORARY ITEMS				
Suction tube (6F, 8F, 10F)	49 (67.1)	24 (32.2)	11(78.6)	3 (21.4)
Bulb suction device (Penguin)	50 (68.5)	23 (31.5)	13 (92.9)	1 (7.1)
Face mask (preterm: size 0; term: size 1)	17 (23.3)	56 (76.7)	10 (71.4)	4 (28.6)
Oxygen (nasal catheter, prongs, face mask)	45 (61.6)	28 (38.4)	12 (85.7)	2 (14.3)
Oxygen tubing	44 (60.3)	29 (39.7)	14 (100.0)	0 (0.0)
Clean dry towels (2)	36 (49.3)	37 (50.7)	12 (85.7)	2 (14.3)

The presence of permanent and temporary items are presented in table 4. Permanent items, warmer/ resuscitaire 89.0%, Oxygen source 72.6%, suction machine 80.8%, ambu bag (500mls) 63.0% were present in labor ward. Clock was absent in 95.9% resuscitations in labor ward. In maternity theatre Permanent items, warmer/ resuscitaire 92.9%, Oxygen source 85.7%, suction machine 78.6%, ambu bag (500mls) 85.7% were present. Clock was absent in 100.0% resuscitations. Concerning temporary items Suction tube (6F, 8F and 10F) 67.1%, Bulb suction device (penguin device, colored bulb sucker) 68.5%, Face mask (preterm: size 0; term: size 1) 23.3%, Mode of oxygen delivery (nasal catheter, nasal prongs, face mask) 61.6%, Oxygen tubing 60.3%, Clean dry towels 49.3% were present in labor ward. In maternity theatre, Suction tube (6F, 8F and 10F) 78.6%, Bulb suction device (penguin device, colored bulb sucker) 92.9%, Face mask (preterm: size 0; term: size1) 1.4%, Mode of oxygen delivery (nasal catheter, nasal prongs, face mask) 85.7%, Oxygen tubing 100.0, Clean dry towels 85.7 were present

4.4 SKILLS OF BASIC CARE IN NEONATAL RESUSCITATION AT BIRTH

4.4.1 Quality of Care Scores for the 4 Principle Steps in Neonatal Resuscitation

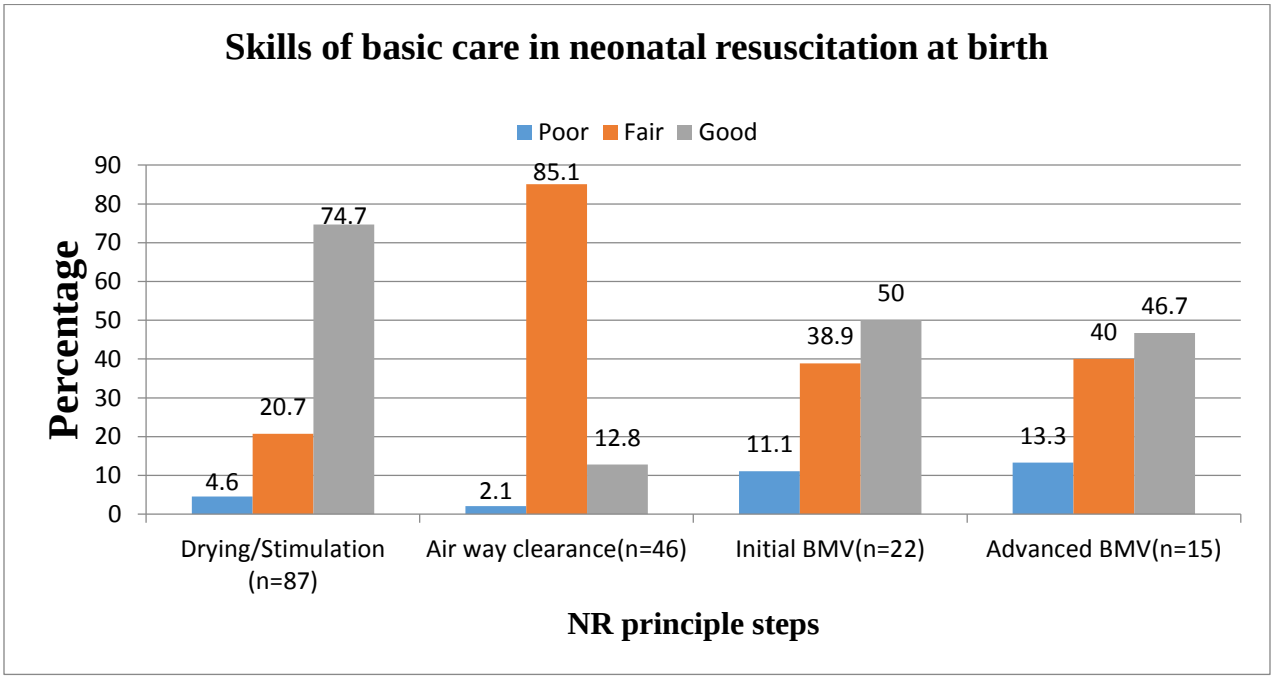


Figure 2: Quality of care scores for the 4 principle steps in neonatal resuscitation.

The Quality of care scores for the 4 principle steps in neonatal resuscitation is presented in figure 2.

The majority had good for drying and stimulation at 74.7%, initial BMV 50% and advanced BMV 46.7%. Though, the majority of 85.1% HCPs providing air way clearance was fair, and only a limited number 12.8 % provided good care.

4.5 THE OUTCOMES OF NEONATAL RESUSCITATION ON IMPROVING QUALITY CARE

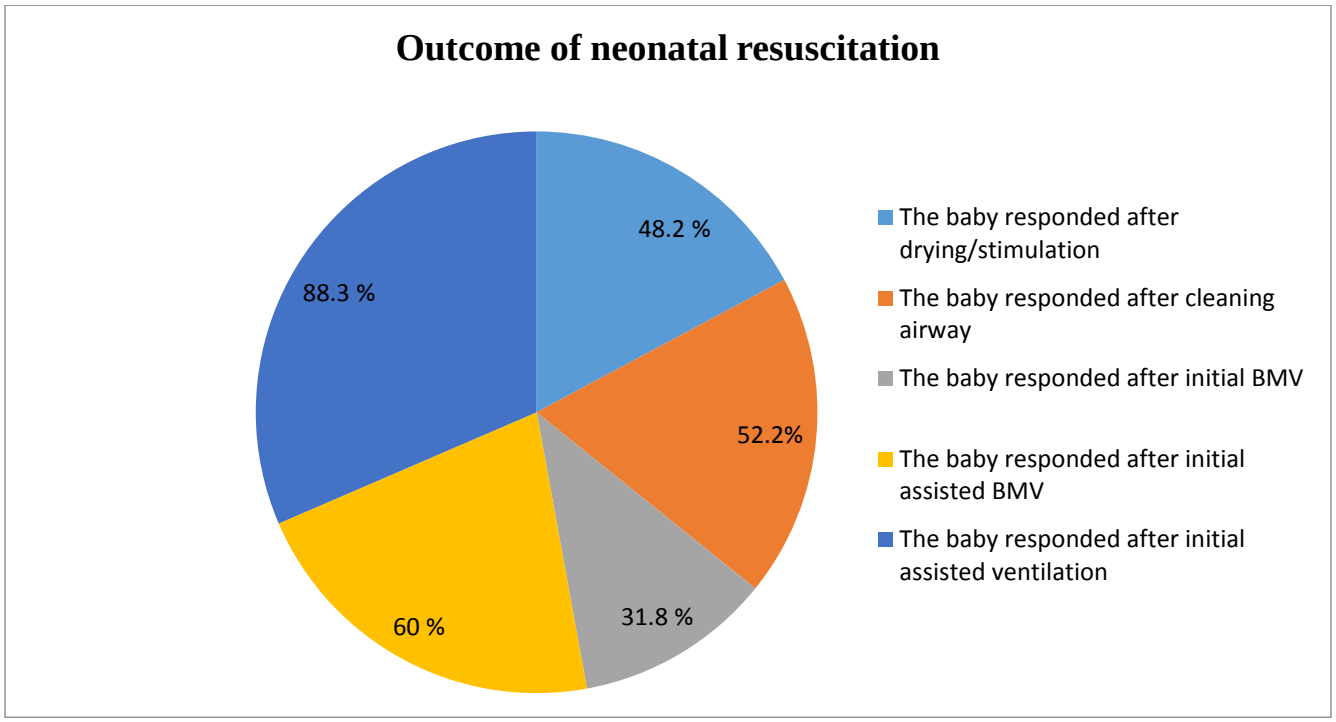


Figure 3: The outcomes of neonatal resuscitation in proving quality

The outcomes of neonatal resuscitation in providing quality is presented in figure 3

Among resuscitated babies 47.1% of them responded to drying/stimulation, among those who did not respond to drying/stimulation 52.1% responded to airway clearance. Among those who did not respond to air way clearance 31.8% babies responded to initial BMV, and those who did not respond to initial BMV 60% responded to assisted BMV. Those who did not respond to assisted BMV, of them 83.3% responded to support or improve ventilation.

4.6. Performances mean scores for each of the neonatal resuscitation steps

Table 5: Performances mean scores for each of the neonatal resuscitation steps

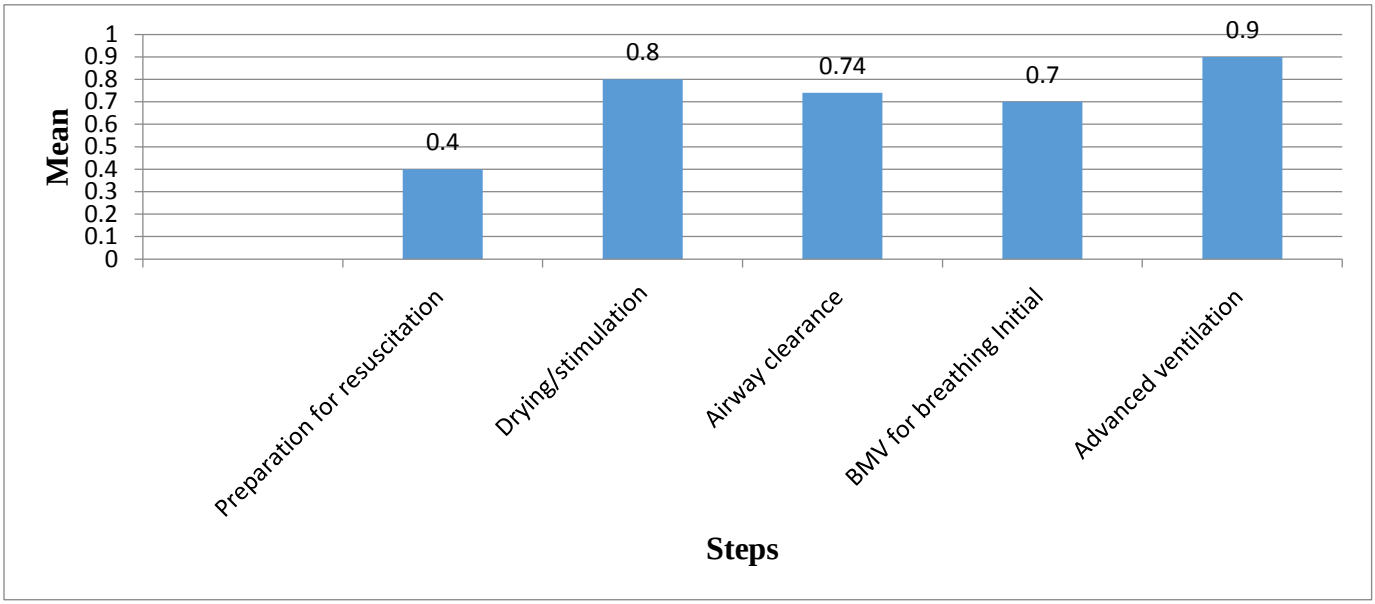
Step in neonatal resuscitation	Yes	No	Mean	SD
	n (%)		score 0-1	
Preparation for resuscitation* (n=87)			0.4	
Preparation for resuscitation area	37(42.5)	50(57.5)	0.4	0.49
Check NR equipment availability	28(32.2)	59(67.8)	0.3	0.46
Check NR equipment functioning	35(40.2)	52(59.8)	0.4	0.49
Identify a helper	44(50.6)	43(49.4)	0.5	0.50
Drying/stimulation* (n=87)			0.8	
Baby dried thoroughly	83(95.4)	4(4.6)	0.9	0.2
Wet cloth removed	64(73.6)	23(26.4)	0.7	0.4
Baby kept warm	84(96.6)	3(3.4)	0.9	0.1
Airway clearance* (n=46)			0.74	
HCP looked into airway	20(41.3)	26(56.5)	0.4	0.4
If meconium, suction done pre stimulation the	27(58.7)	19(41.3)	0.6	0.5
baby breaths before suctioning	43(93.5)	3(6.5)	0.9	0.2
Airway cleared with suction bulb if unresponsive	43(93.5)	3(6.5)	0.9	0.2
Baby's head in neutral position	44(93.6)	3(6.4)	0.9	0.2
BMV for initial breathing* (n=21)			0.7	
BMV initiated	19(90.5)	2(9.5)	0.9	0.2
BMV initiated within the Golden minute	17(81.0)	4(19.0)	0.8	0.3
Advanced (n=15)				
HCP call for help	13(86.7)	2(13.3)	0.8	0.3
Correct mask size used during BMV	13(86.7)	2(13.3)	0.8	0.3
Chest movements observed with each ventilation	11(73.3)	4(26.7)	0.7	0.4
BMV rate within 30–50 Bpm	9(60.0)	6(40.0)	0.6	0.5
Baby's HR checked at 1 min	8(53.3)	7(46.7)	0.5	0.4
Advanced ventilation* (n=6)			0.9	
Effective breath with chest compressions	5(83.3)	1(16.7)	0.8	0.4
Supportive oxygen	6(100)	0(0.0)	1.0	0.0

* Overall mean score Bpm: breaths per minute

The Performance mean scores for each of the resuscitation steps is presented in table 5.

Over half (57.5%) did not perform preparation for resuscitation. In 56.5% cases, health care providers did not look into airway. If meconium, suctioning was not done before stimulation in 41.3% cases. On Bag and mask ventilation for breathing Initial, Chest movements observed with each ventilation was not performed in 26.7% cases out of 15 cases. BMV rate within 30–50 breaths and minute was not performed in 40% cases and Baby's HR checked at 1 min was not performed in 46.7% cases.

4.7. Mean scores for the main steps in neonatal resuscitation



BMV: Bag and mask ventilation

Figure 4. Mean scores for the main steps in neonatal resuscitation

Overall mean scores indicated that advanced ventilation for babies who did not respond for previous steps was the most. Commonly performed principle NR step (mean score 0.9) Preparation for resuscitation was the least (mean score 0.4)

4.8 logistic regression of the Qoc scores with hcps' characteristics.

Table 6. Logistic regression of the QoC scores with HCPs' characteristics.

HCP characteristics	β	95% Cl	p
***Drying and stimulation professional training**			
Medical doctors (ref)			
Nurses and midwives	0.45	0.124-1.433	0.33
NR training			
No (ref)			
Yes	0.32	0.101-3.82	0.21
Maternity experience			
<1 year (ref)			
1–5 years	1.76	1.23-2.93	0.03
>5 years	1.97	1.83-3.87	0.01
Support supervision			
No (ref)			
Yes	1.76	1.65-2.31	0.21
***Airway maintenance professional training**			
Medical doctors (ref)			
Nurses and midwives	0.95	0.72-2.43	0.13
NR training			
No (ref)			
Yes	1.32	0.11-1.82	0.41
Maternity work experience			
<1 year (ref)			
1–5 years	1.46	1.13-2.13	0.04
>5 years	1.57	1.33-2.87	0.03
Support supervision			
No (ref)			
Yes	1.16	1.25-2.71	0.41
*** Initial BMV professional training**			
Medical doctors (ref)			
Nurses and midwives	0.65	0.32-1.93	0.43
NR training			
No (ref)			
Yes	0.72	0.12-2.82	0.11
Maternity work experience			
<1 year (ref)			
1–5 years	1.66	1.73-2.97	0.02
>5 years	1.87	1.43-3.13	0.02
Support supervision			
No (ref)			
Yes	1.76	1.65-2.31	0.21
***Advanced BMV professional training**			
Medical doctors (ref)			
Nurses/midwife	0.85	0.174-2.43	0.13
NR training			
No (ref)			
Yes	0.92	0.801-2.12	0.31
Maternity work experience			
<1 year (ref)			
1–5 years	1.66	1.53-2.13	0.03
>5 years	2.07	1.71-3.47	0.02
Support supervision			
No (ref)			
Yes	1.86	1.85-2.41	0.20

Logistic regression was used to assess the effect of demographic characteristic on quality of NR (table 6), The results revealed that those who reported having 1–5 years maternity experience were more than 1 time more likely to provide good quality care drying/stimulation (β = 1.76, CI = 1.23–2.93, P = 0.032) than those with only 1 year, while those with 2 years of experience were 2 times more likely to provide good quality at drying/stimulation) (β = 1.97, CI = 1.83–3.87, P = 0.009) than those with 1 year . On airway maintenance those with 1–5 years of experience in maternity were more than 1 time more likely to provide good quality at drying/stimulation (β = 1.46, CI = 1.13–2.13, P = 0.042) than those with 1 year, and those with 2 years of experience were 1 time more likely to provide good quality at air way maintenance (β = 1.57, CI = 1.33–2.87, P = 0.029) than those with 1 year. on Initial BMV those with 1–5 years of experience in maternity were more than 1 time more likely to provide good quality at drying/stimulation (β = 1.46, CI = 1.13–2.13, P = 0.042) than those with 1 year, and those with 2 years of experience were 1 time more likely to provide good quality at initial BMV (β= 1.57, CI = 1.33–2.87, P = 0.029) than those with 1 year. Participants who reported having 1–5 years of experience in maternity were more than 1 time more likely to provide good quality at drying/stimulation (β = 1.67, CI = 1.73–2.973, P = 0.019) than those with 1 year, while those with 2 years of experience were about 2 times more likely to provide good quality at drying/stimulation) (β = 1.86, CI = 1.43–3.13, P = 0.022) than those with 1 year. In advanced BMV Participants who reported having 1–5 years of experience in maternity were more than 1 time more likely to provide good quality at drying/stimulation (β = 1.66, CI = 1.53–2.13, P = 0.032) than those with 1 year, while those with 2 years of experience were 2 times more likely to provide good quality at advanced BMV (β = 2.07, CI = 1.71–3.47, P = 0.019,) than those with 1 year. Other variables remain constant. Other variables that were not statistically significant included profession training, NR training, and support supervision.

4.9. Infection prevention practices

Table 7. Infection prevention practices

Prevention Practices	Yes n (%)	No (%)
Cleaning: ventilation bag and mask device disassembled (suction device if possible) while still wearing gloves	22(25.3)	65(74.7)
Decontamination: all parts soaked in a 5% chloride/solution for 10-20 minutes	3(3.4)	84(96.6)
All parts washed with soap and water and rinsed carefully with clean water to remove all soap.	42(48.3)	45(51.7)
Dry completely and keep clean until next use	43(49.4)	44(50.6)

Infection prevention practices were assessed in this study is presented in table 7. Cleaning: ventilation bag and mask device disassembled (suction device if possible) while still wearing was not observed in 65(74.7) cases, Decontamination: all parts soaked in a 5% chloride/solution for 10-20 minutes were not observed in 84(96.6) cases, All parts washed with soap and water and rinsed carefully with clean water to remove all soap was not observed in 45(51.7) cases and dry completely and keep clean until next use was not observed in 44(50.6) cases.

CHAPTER 5. DISCUSSION

5.1. INTRODUCTION

In this study is aimed to determine the quality of basic care during neonatal resuscitation by 36 health care providers in three selected district hospitals in Kigali city.

The initial steps of resuscitation are similar whether in the most advanced or resource- limited setting and include assessment of every neonatal immediately at birth and rapid response if the baby is not breathing, (WHO, UNICEF, 2014).

5.2. AVAILABILITY OF EQUIPMENT DURING NEONATAL RESUSCITATION

Availability of NR equipment including; warmer, oxygen source, suction device, Ambu bags and were presented over a half in the resuscitation area which was similar to the study done on six sub-Saharan African countries by de Graft-Johnson, et al., 2017 p.9 reported that most facilities had some supplies of neonatal resuscitation equipment. It also likely the same to the study done in Vietnam (Trevisanuto, et al., 2016 p.6). Also it is contrary to the study done on basic neonatal care and neonatal resuscitation using maternal and neonatal bottleneck analysis tool to 12 countries in Africa and Asia as part of the Every Neonatal Action Plan process (Enweronu-Laryea, et al., 2015 p.9). Also urge that no available equipment are ready in point of use.

Furthermore, in this study the availability of other relevant basic equipment such as clock, clothes included in the WHO and HBB list were clearly insufficient.

Basic neonatal resuscitation equipment for provision of neonatal warmth, airway maintenance and ventilation were present in labor ward and maternity theatre more than half, similar to the study done in Kenya (Shikuku, et al., 2017 p.9).

Some of the basic equipment for neonatal resuscitation such as: suction devices, Face mask, clean dry towels, and clock were scarce. In such that time recording is a significant activity during neonatal resuscitation, surprisingly, majority of the hospitals area a clock was not available in delivery rooms more than 95.7 % and maternity theatres 100.0% were totally absent similarly to the study done on resuscitation and support of transition of babies at birth (Wyllie, et al, 2015).

More to that, the protocol and guidelines were present in range ; over half in visual NR action plans and guidelines and nearly half in flip charts of neonatal resuscitation provided on labor and maternity theater units and, this can ensure that health care providers are lucky to perform standardized NR procedure to neonates with birth asphyxia though, they did not refer to them during neonatal resuscitation intervention which was contrary to the study done in Kenya, (Shikuku, *et al.*, 2017) and a research conducted on 12 countries in Africa and Asia (Enweronu-Laryea, et al., 2015, p10) shown that there were having poor adherence to guidelines and protocols, and non-implementation of quality improvement activities. Furthermore, the researchers shown that many low- and middle income countries (LMIC) lacked appropriate policies and guidelines for providing quality health care to neonates, (EKim, et al, 2015 p.S1).

5.3. HEALTH CARE PROVIDERS' SKILLS

The highest number of health care providers received NR training and a large proportion at 93.8% reported being trained on Helping Babies Breath (HBB), this study is similar to the study conducted in low resource setting by (Mukhtar-Yola, 2018 p.4). In systemic literature review done in low and middle income countries found that NR training can significantly increase health care providers' skills (Reisman, et al., 2016 p.11).

Midwives and Nurses provided NR for the majority of the neonatal babies compared to other health care providers at three district hospitals. It is similar to the study conducted by (Mistry, et al., 2018 p. 6) on neonatal resuscitation skills in health care providers. Advanced diploma holders resuscitated neonatal at 88.5% of the neonatal (Diaz-Rosello, et al., 2012). Experience in practice is also mattering. This study shows a large number of neonates were resuscitated by those with above one year of experience compared to HCPs with less than one year. This findings was in the line with a study conducted by Shikuku, et al., 2017 showing that with longer periods of working in the same unit, the HCPs enhance their clinically practice and self-efficacy and competences in NR skills.

In addition, supportive supervision were inadequate to more than half during their practice after receiving NR training also goes with the study done here in Rwanda, HCPs reported that they did not receive supervisions, Hategeka, Mwai, and Tuyisenge, 2017 p.6. Other similar studies done by Enweronu-Laryea, et al., 2015 and Kim et al 2013, p7, emphasizing supervisions and in-

service training to identify the performance gaps and weakness. These data could be useful for guiding a health care provider to prepare equipment, to ensure that all birthing facilities in the district hospitals have the essential supplies.

Unfortunately, this study findings show no statistically significant association between the HCPs with trainings and quality of care at the principle steps of NR. Besides, completion of resuscitation training does not imply that an individual is competent to perform NR as demonstrated by the American Heart Association (AHA) neonatal resuscitation programme (NRP) Shikuku, 2017 p9. It has however been demonstrated elsewhere that training courses in NR can effectively increase the competency of HCPs in conducting NR and reducing potentially harmful practices, (Opiyo and English, 2015 p. 5).There is evidence that NR training alone may not be enough to ensure change in practice and retention of skills but may need to be followed up with regular refresher training, as frequently as every six months to prevent loss of skills acquired (Bang, et al., 2016).

In case of infection prevention, the study shows that three quarters did not respect the cleaning of the equipment such as bag and mask device and disassembled while wearing gloves. Then more than 96.6 % did not respect the duration decontamination soaked all parts in chloride solution for 10 to 20 minutes, similarly to the study in kenya shows that no high level disinfection for these equipment (Shikuku, 2017 p9). In this observational study shows that the majority of the health care providers, nurses and midwives are more likely to prepare the neonatal resuscitation equipment similarly to the study done in the middle income countries, (Trevisanuto, 2016).

5.4. OUTCOME OF BASIC NEONATAL RESUSCITATION IN PROVING QUALITY OF CARE

Most neonates responded to oxygen support and near to half responded to drying and stimulation. In this study no neonates died as the researcher did not proceed with advanced neonatal resuscitation contrary to the study done in six LMIC shows that 89% either recovered on their own or through active steps taken by the provider through resuscitation with initial stimulation and/or ventilation then 11% of neonates died (de Graft-Johnson, et al.2017).

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1. Introduction

In this chapter, it involves the summary of the findings as conclusion and arguments from researcher to different areas of the research.

6.2. Conclusions

The findings of this study shows that maternity work experience more than one year was statistically significant in providing quality of care in neonatal resuscitation equipment hence neonatal death reduced related to birth asphyxia. Delay from receiving quality of basic care during neonatal resuscitation for neonatal life-saving in low-resource settings as well as Rwanda is concerned. Efforts are needed in quality improvement to overcome critical gaps and then neonatal mortality prevalence will be reduced.

6.3. Recommendations

Ministry of health

To provide equipment related to neonatal resuscitation procedures

Refresher training and supervisions to the health care providers and health facilities

Hospitals

Provide equipment to health care providers for neonatal resuscitation

Refresher training should be scheduled on neonatal resuscitation, this can assist them to refresh the mind how this should be done in providing quality of care. Supervisions should be planned to emphasize those who are weak or incompetence in skills

Health care providers

Quality care in NR is highly needed to reduce neonatal mortality died after birth, emphasize on preparation of neonatal preparation should be present before the baby born.

The permanent equipment should be checked every time to ensure their function more specifically on timing everything works on time even to save life.in this study wall clock was totally the problem in maternity theatre and few in the labor ward.

University Rwanda

Quality of care during neonatal resuscitation should be emphasized in all academic levels of students

Other researchers

Further researches are highly needed to improve quality care in neonatal resuscitation towards neonate condition.

REFERENCE

Akhtar, D.M.I., 2016. Research Design. *Available at SSRN 2862445*.

Al-Shaikh, G.K., Ibrahim, G.H., Fayed, A.A. and Al-Mandeel, H., 2017. Grand multiparity and the possible risk of adverse maternal and neonatal outcomes: a dilemma to be deciphered. *BMC pregnancy and childbirth*, *17*(1), p.310.

Ameh, C.A. and van den Broek, N., 2015. Making it happen: training health-care providers in emergency obstetric and neonatal care. *Best Practice & Research Clinical Obstetrics & Gynaecology*, *29*(8), pp.1077-1091.

American Academy of Pediatrics, 2016. Helping babies breathe. *Provider guide 2nd edition*.

Asiamah, N., Mensah, H.K. and Oteng-Abayie, E.F., 2017. General, target, and accessible population: Demystifying the concepts for effective sampling. *The Qualitative Report*, *22*(6), pp.1607-1621.

Ayanian, J.Z. and Markel, H., 2016. Donabedian's Lasting Framework for Health Care Quality. *The New England journal of medicine*, *375*(3), p.205.

Bang, A., Patel, A., Bellad, R., Gisore, P., Goudar, S.S., Esamai, F., Liechty, E.A., Meleth, S., Goco, N., Niermeyer, S. and Keenan, W., 2016. Helping Babies Breathe (HBB) training: What happens to knowledge and skills over time?. *BMC pregnancy and childbirth*, *16*(1), p.364.

Berhe, A.K., Tinsae, F. and Gebreegziabher, G., 2017. Knowledge and practice of immediate neonatal care among health care providers in eastern zone public health facilities, Tigray, Ethiopia, 2016. *BMC pediatrics*, *17*(1), p.157.

Carvajal–Aguirre, L., Vaz, L.M., Singh, K., Sitrin, D., Moran, A.C., Khan, S.M. and Amouzou, A., 2017. Measuring coverage of essential maternal and neonatal care interventions: an unfinished agenda. *Journal of global health*, *7*(2).

Chikuse, B., Chirwa, E., Maluwa, A. and Odland, J., 2012. Midwives' adherence to guidelines on the management of birth asphyxia in Malawi. *Open Journal of Nursing*, *2*(04), p.351.

Christensen, L.B., Johnson, B., Turner, L.A. and Christensen, L.B., 2011. Research methods, design, and analysis.

De Graft-Johnson, J., Vesel, L., Rosen, H.E., Rawlins, B., Abwao, S., Mazia, G., Bozsa, R., Mwebesa, W., Khadka, N., Kamunya, R. and Getachew, A., 2017. Cross-sectional observational assessment of quality of neonatal care immediately after birth in health facilities across six sub-Saharan African countries. *BMJ open*, *7*(3), p.e014680.

DeFranzo, S.E., 2011. What's the difference between qualitative and quantitative research. *Prieiga per internetą:< https://www. snapsurveys. com/blog/qualitative-vs-quantitativeresearch*. accessed on 4th June, 2019

Dempsey, E., Pammi, M., Ryan, A.C. and Barrington, K.J., 2015. Standardised formal resuscitation training programmes for reducing mortality and morbidity in neonatal infants. *Cochrane* Database *of Systematic Reviews*, (9). https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD009106.pub2/pdf. accessed on 3/ 5/2019

DESA, U., 2016. The Sustainable Development Goals Report 2016. *United Nations, New York, NY.[Google Scholar]*. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=The+Sustainable+Development+Goals+Report+2017&btnG= accessed on 14thMarch, 2019

Diaz-Rosello, J.L., Gisore, P., Niermeyer, S., Paul, V.K., Quiroga, A., Saugstad, O.L., Silvestre, M.A., Singhal, N., Sugiura, T. and Uxa, F., 2012. Guidelines on basic neonatal resuscitation 2012. *Geneva: World Health Organization*.

Donabedian, A., 2005. Evaluating the quality of medical care. *The Milbank Quarterly*, *83*(4), pp.691-729

EKim, D., VMary, K., GSarah, M., Joanne, A., Nabila, Z., Aline, S.K., Gaurav, S., JKate, K. and Bernadette, D., 2015. Gülmezoglu Metin A, Mathai Matthews, Nyange Christabel, Baye Martina, Lawn EJoy: Scaling up quality care for mothers and neonatals around the time of birth: an overview of methods and analyses of interventionspecific bottlenecks and solutions. *BMC Pregnancy Childbirth*, *15*(Suppl 2), p.S1.

Enweronu-Laryea, C., Dickson, K.E., Moxon, S.G., Simen-Kapeu, A., Nyange, C., Niermeyer, S., Bégin, F., Sobel, H.L., Lee, A.C., von Xylander, S.R. and Lawn, J.E., 2015. Basic neonatal care and neonatal resuscitation: a multi-country analysis of health system bottlenecks and potential solutions. *BMC pregnancy and childbirth*, *15*(2), p.S4.

Equipment, R. (2014) 'mHealth and Opportunities to Increase Adoption and Utilization of Neonatal Neonatal Resuscitation', (March).

Etikan, I., Musa, S.A. and Alkassim, R.S., 2016. Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, *5*(1), pp.1-4.

Ghaffari, F., Jahani Shourab, N., Jafarnejad, F. and Esmaily, H., 2014. Application of Donabedian quality-of-care framework to assess the outcomes of preconception care in urban health centers, Mashhad, Iran in 2012. *Journal of Midwifery and Reproductive Health*, *2*(1), pp.50-59.

Hategeka, C., Mwai, L. and Tuyisenge, L., 2017. Implementing the Emergency Triage, Assessment and Treatment plus admission care (ETAT+) clinical practice guidelines to improve quality of hospital care in Rwandan district hospitals: healthcare workers' perspectives on relevance and challenges. *BMC health services research*, *17*(1), p.256.

Hategeka, C., Shoveller, J., Tuyisenge, L., Kenyon, C., Cechetto, D.F. and Lynd, L.D., 2017. Pediatric emergency care capacity in a low-resource setting: an assessment of district hospitals in Rwanda. *PloS one*, *12*(3), p.e0173233.

Heale, R., and Twycross, A., 2015. Validity and reliability in quantitative studies.bmj evid based Nurs july 2015 v. 18 no.3. 10.1136/eb-2015-102129.
https://ebn.bmj.com/content/ebnurs/18/3/66.full.pdf

Hill, K., Clark, P., Narayanan, I., Wright, L.L. and Vivio, D., 2014. Improving quality of basic newborn resuscitation in low-resource settings: a framework for managers and skilled birth attendants. *Published by the USAID ASSIST Project. Bethesda, MD: University Research Co. LLC*.

Imenda, S., 2014. Is there a conceptual difference between theoretical and conceptual frameworks?. *Journal of Social Sciences*, *38*(2), pp.185-195.

Khurmi, M.S., Sayinzoga, F., Berhe, A., Bucyana, T., Mwali, A.K., Manzi, E. and Muthu, M., 2017. Neonatal Survival case Study in Rwanda-Bottleneck Analysis and Projections in key maternal and child mortality rates using Lives saved Tool (LiST). *International journal of MCH and AIDS*, *6*(2), p.93

Kim, Y.M., Ansari, N., Kols, A., Tappis, H., Currie, S., Zainullah, P., Bailey, P., Semba, R., Sun, K., van Roosmalen, J. and Stekelenburg, J., 2013. Assessing the capacity for neonatal resuscitation and factors associated with providers' knowledge and skills: a cross-sectional study in Afghanistan. *BMC pediatrics*, *13*(1), p.140.

Kimberlin, C.L. and Winterstein, A.G., 2008. Validity and reliability of measurement instruments used in research. *American journal of health-system pharmacy*, *65*(23), pp.2276-2284.

Makene, C.L., Plotkin, M., Currie, S., Bishanga, D., Ugwi, P., Louis, H., Winani, K. and Nelson, B.D., 2014. Improvements in neonatal care and neonatal resuscitation following a quality

improvement program at scale: results from a before and after study in Tanzania. *BMC pregnancy and childbirth*, *14*(1), p.381.

Ministry of health, Rwanda, Maternal neonatal and child health national strategy: July 2013-june 2018: http://rbc.gov.rw/fileadmin/user_upload/maternal_neonatal_and_child_health_national_strategy_july_2013-_june_2018.pdf Accessed on 25th May, 2019

Mistry, S.C., Lin, R., Mumphansha, H., Kettley, L.C., Pearson, J.A., Akrimi, S., Mayne, D.J., Hangoma, W. and Bould, M.D., 2018. Neonatal Resuscitation Skills in Health Care Providers at a Zambian Tertiary Center, and Comparison to World Health Organization Standards. *Anesthesia & Analgesia*, *127*(1), pp.217-223.

Mohajan, H.K., 2017. Two criteria for good measurements in research: Validity and reliability. *Annals of Spiru Haret University. Economic Series*, *17*(4), pp.59-82.

Msemo, G., Massawe, A., Mmbando, D., Rusibamayila, N., Manji, K., Kidanto, H.L., Mwizamuholya, D., Ringia, P., Ersdal, H.L. and Perlman, J., 2013. Neonatal mortality and fresh stillbirth rates in Tanzania after helping babies breathe training. *Pediatrics*, *131*(2), pp.e353-e360.

Mukhtar-Yola, M., Audu, L.I., Olaniyan, O., Akinbi, H.T., Dawodu, A. and Donovan, E.F., 2018. Decreasing birth asphyxia: utility of statistical process control in a low-resource setting. *BMJ Open Qual*, *7*(3), p.e000231.

Musafili, A., 2015. *Child survival in Rwanda: Challenges and potential for improvement: Population-and hospital-based studies* (Doctoral dissertation, Acta Universitatis Upsaliensis).

NDAYISENGA, T., 2016. Maternal and neonatal risk factors associated with neonatal mortality in Gitwe District Hospital in Ruhango District, Rwanda. *International Journal of Medicine and Public Health*, *6*(2).

Nesbitt, R.C., Lohela, T.J., Manu, A., Vesel, L., Okyere, E., Edmond, K., Owusu-Agyei, S., Kirkwood, B.R. and Gabrysch, S., 2013. Quality along the continuum: a health facility assessment of intrapartum and postnatal care in Ghana. *PloS one*, *8*(11), p.e81089.

NISR, M., 2015. Rwanda Demographic and Health Survey 2014–15. *Key indicators*.

Opiyo, N. and English, M., 2015. In-service training for health professionals to improve care of seriously ill neonatals and children in low-income countries. *Cochrane Database of Systematic Reviews*, (5).

Peersman, G., 2014. *Overview: Data collection and analysis methods in impact evaluation*. UNICEF Office of Research-Innocenti.

Persson, L.Å., 2017. Bridging the quality chasm in maternal, neonatal, and child healthcare in low-and middle-income countries. *PLoS medicine*, *14*(12), p.e1002465.

Polit, D.F. and Beck, C.T., 2004. *Nursing research: Principles and methods*. Lippincott Williams & Wilkins.

Reisman, J., Arlington, L., Jensen, L., Louis, H., Suarez-Rebling, D. and Nelson, B.D., 2016. Neonatal resuscitation training in resource-limited settings: a systematic literature review. *Pediatrics*, *138*(2), p.e20154490.

Shikuku, D.N., Milimo, B., Ayebare, E., Gisore, P. and Nalwadda, G., 2018. Practice and outcomes of neonatal resuscitation for neonatals with birth asphyxia at Kakamega County General Hospital, Kenya: a direct observation study. *BMC pediatrics*, *18*(1), p.167.

Taherdoost, H., 2016. Sampling methods in research methodology; How to choose a sampling technique for research.

Trevisanuto, D., Cavallin, F., Arnolda, G., Chien, T.D., Lincetto, O., Xuan, N.M., Tien, N.V., Hoi, N.T.X. and Moccia, L., 2016. Equipment for neonatal resuscitation in a middle-income country: a national survey in Vietnam. *BMC pediatrics*, *16*(1), p.139.

Tunçalp, Ö, Were, W.M., MacLennan, C., Oladapo, O.T., Gülmezoglu, A.M., Bahl, R., Daelmans, B., Mathai, M., Say, L., Kristensen, F. and Temmerman, M., 2015. Quality of care for

pregnant women and neonatals—the WHO vision. *BJOG: an international journal of obstetrics & gynaecology*, *122*(8), pp.1045-1049.

Uwingabire, F., 2017. *The prevalence of birth asphyxia, associated factors and outcomes at a district Hospital in Kigali, Rwanda* (Doctoral dissertation, University of Rwanda).

WHO, U., 2014. Every neonatal: an action plan to end preventable deaths. *Geneva: World Health Organization* Available from:

World Health Organization and UNICEF, 2015. Every neonatal action plan: progress report, May 2015.

World Health Organization, 2014. Every Newborn: An action plan to end preventable deaths. https://apps.who.int/iris/bitstream/handle/10665/127938/9789241507448_eng.pdf accessed on 18/5/2019

World Health Organization, 2018. World health statistics 2018: monitoring health for the SDGs, sustainable development goals

Wyllie, J., Bruinenberg, J., Roehr, C.C., Rüdiger, M., Trevisanuto, D. and Urlesberger, B., 2015. European Resuscitation Council Guidelines for Resuscitation 2015: Section 7. Resuscitation and support of transition of babies at birth.

Younas, A. and Sommer, J., 2015. Integrating nursing theory and process into practice; Virginia's Henderson Need Theory. *International Journal of Caring Sciences*, *8*(2), pp.443-450.

APPENDICES

From: "duncan shikuku" <dnshikuku@yahoo.com>

To: "alice Muhayimana" <hayiali@yahoo.fr>

Sent: Sun, May 13, 2018 at 20:31

Subject: Re: Requesting for research checklist tool

Dear Alice,

Please receive my apologies for the delays caused. True, it has been tight this end. Please find the requested tool, hope it helps.

Shikuku Duncan

Reproductive, Maternal, Newborn, Child and Adolescent Health/Family Planning Specialist

Tel: +254 725 523 716

On Sunday, May 13, 2018, 11:58:13 AM GMT+3, alice Muhayimana <hayiali@yahoo.fr> wrote:

Hello

Dear Dr Duncan,

I come back to you

Probably you've been too busy, I kindly remind about the research tool I requested.

Thanks and best regards

Alice

Le vendredi 27 avril 2018 à 10:09:01 UTC+1, duncan shikuku <dnshikuku@yahoo.com> a écrit :

Dear Alice,

Thanks for the request, will revert next week as earlier requested.

Shikuku Duncan

Reproductive, Maternal, Newborn, Child and Adolescent Health/Family Planning Specialist

Tel: +254 725 523 716

On Thursday, April 26, 2018, 3:31:32 PM GMT+3, alice Muhayimana <hayiali@yahoo.fr> wrote:

boxbe alice Muhayimana (hayiali@yahoo.fr) is not on your Guest List | Approve sender | Approve domain

Greetings

Dear Sir,

My name is Alice Muhayimana, I am Rwandan and working at University of Rwanda, School of Nursing and Midwifery.

I am currently writing proposal on quality of care in neonatal resuscitation.I come across with your article entitled *"Quality of Care during Neonatal Resuscitation in Kakamega County General Hospital, Kenya: A Direct Observation Study"* when I saw the name of Benson Milimo who was my lecturer when I was student at Moi University in Kenya, I am excited to request from him the observation checklist there after he refers me to you, We promise that we'll not forget to cite your article and checklist as well.

Yours

Alice

STRUCTURED OBSERVATIONAL CHECKLIST

SECTION A

HEALTHCARE PROVIDER BACKGRROUND (THIS SECTION REFERS TO THE HEALTHCARE PROVIDER WHO PERFORMED THE NEWBORN RESUSCITATION).

(*Please respond by ticking in the box next to the answer most suitable for you)*

PARTICIPANT CODE: _____ DATE: _____ /_____/_____
1. YOUR AGE (YEARS): _____

2. SOCIAL DEMOGRAGRAPHIC DATA

MALE		FEMALE	

GENDER:

TRAINING AND QUALIFICATION

3. HEALTH PROVIDER LEVEL

1	Specialist (Obs/Gyn)	
2	Medical doctor	
3	Registered Nurse/ Midwife	
4	Unit manager/matron	
5	Other	

4. HIGHEST QUALIFICATION ACHIEVED HEALTH PROVIDER LEVEL OF TRAINING

1	Master's Degree	
2	Bachelor's Degree	
3	advanced Diploma	
4	Certificate	
5	Other	

5. HAVE YOU EVER ATTENDED A NEONATAL RESUSCITATION TRAINING?

YES……..... (PROCEED TO QUESTION 6)
NO……. (PROCEED TO QUESTION 8)

6. PRIOR NR TRAINING ATTENDED (TICK ALL THAT APPLY)

1	Helping Babies Breath (HBB)	
2	Pediatric Advanced Life Support (PALS) /advanced cardiac support	
3	Emergency Triage Assessment and Treatment(ETAT)	
4	Other (please specify)	

7. DURATION (MONTHS/YEARS) SINCE LAST NR TRAINING (INCLUDE FOR ALL TRAININGS ATTENDED)
YEARS……..MONTHS…….
SUPERVISION AND EXPERIENCE

8. HAVE YOU EVER HAD SUPPORT SUPERVISION IN NR IN THE WARD?

YES …… (PROCEED TO QUESTION 9)
NO…… (PROCEED TO QUESTION 11)

9. TIME SINCE MOST RECENT STAFF SUPERVISION

1	< 6 months	
2	6 - 12 months	
3	> 12 months	

10. WHO DID THE SUPERVISION?

1	Ward In – Charge	
2	Unit Manager	
3	Public health Nurse/DN	
4	Ward mate/Colleague	

11. DURATION OF PRACTICE IN MATERNITY UNIT (MONTHS/YEARS):

SECTION B

CLINICAL PROTOCOLS AND GUIDELINES (Tick where applicable)

This section to be completed by the principal researcher or Data collector assistant

	JOB AIDS	YES	NO	REMARKS
1	Are visual NR action plans/guidelines present at the resuscitation areas?			
2	Do the healthcare workers refer to the NR guidelines/action plans during resuscitation?			
3	Are there flip charts for on job resuscitation training among healthcare providers in the labor unit?			

SECTION C:

BASIC NEONATAL RESUSCITATION EQUIPMENT CHECKLIST

(To be filled in at the start of each resuscitation by the principal researcher or Data collector assistant)
Instructions: Please tick in appropriate column to indicate if equipment is present or absent. The percentages will be calculated later.

STATION*: LABOR WARD ___ MATERNITY THEATRE____*

PERMANENT ITEM	PRESENT	ABSENT	IN WORKING CONDITION
Warmer/ resuscitaire			
Oxygen source			
Suction machine			
Ambu bag (500mls)			
Clock			

TEMPORARY ITEM	PRESENT	ABSENT	IN WORKING CONDITION
Suction tube (6F,8F and 10F)			
Bulb suction device (penguin device, colored bulb sucker)			
Face mask (preterm: size 0; term: size 1)			
Mode of oxygen delivery (nasal catheter, nasal prongs, face mask)			
Oxygen tubing			
Clean dry towels (2)			

SECTION D

NEWBORN RESUSCITATION OBSERVATION CHECKLIST

Instructions: *Please tick to the choice that applies to resuscitation being observed*
NO. OF OBSERVATIONS: …….. /5 DATE…….
SHIFT: DAY..….. EVENING….. … NIGHT……
STATION: LABOR WARD……..MATERNITY THEATRE…….
RESUSCITATION PROCEDURE (*please tick yes/ no depending on observation made during resuscitation)*

PARAMETER	OBSERVATION	YES	NO
PREPARATION FOR NEWBORN RESUSCITATION			
A. PREPARATION FOR RESUSCITATION	1. Prepares area for resuscitation		
	2. Checked availability of resuscitation equipment		
	3. Check equipment: Ventilation bag, Full term mask, Preterm mask, Suction bulb, Warmth (warmer/clothing).		
	4. Identify a helper		
Remarks			
IMMEDIATELY AT BIRTH (FOR NEWBORN WHO DID NOT BREATHE AT BIRTH)			
B.DRYING/ STIMULATING	1. Was the baby dried thoroughly? (by gently rubbing the back)		
	2. Was the wet cloth removed?		
	3. Was the baby kept warm?		
	Did the baby respond after drying/stimulating?		
	OUTCOME		
	REMARKS		
IF BABY NOT BREATHING AND/OR CRYING AFTER DRYING AND STIMULATION			
C. CHECK/OPEN AIRWAY	1. Looked into airway?		
	a. *Was meconium/ Or secretions present?		
	b. If yes, was suctioning of airway done before drying/stimulating?		
	*Was the child breathing before suctioning?		
	2. Was the baby's airway cleared with a suction bulb if unresponsive?		
	3. Was the baby's head positioned in a neutral position? *Did the baby respond after clearing the airway?		
	OUTCOME		
	REMARKS		

IF BABY DOES NOT RESPOND TO INITIAL RESUSCITATION EFFORTS (POOR OR NO BREATHING/GASPING)			
D. BAG AND MASK VENTILATION	1. Was bag – and – mask ventilation (BMV) initiated?		
	*Time BMV initiated after birth (seconds)		
	2. Was BMV initiated within the Golden minute (60s)?		
	*Did the baby respond after this initial BMV?		
	IF BABY DID NOT RESPOND AFTER THE INITIAL BMV (ADVANCED BMV)		
	1. Did the healthcare provider call for help?		
	2. Was the correct mask size used during BMV? (Covers nose, mouth and makes a tight seal)		
	3. Were there chest movements with each ventilation?		
	4. Was the ventilation rate within 30 – 50 per minute?		
	5. Was the baby's heart rate checked at 1 min?		
	Did BMV continue if baby still unresponsive?		
	*Did the baby respond after this assisted BMV?		
	OUTCOME		
	REMARKS		
IF POOR OR NO BREATHING/GASPING AFTER BMV			
E. SUPPORT VENTILATIO N (IMPROVE	1. Was 1 effective breath for every 3 compressions for 1 min done?		
	2. Did the baby require support breathing (supportive oxygen)?		
	*Did the baby respond after the support ventilation?		
	OUTCOME		
	REMARKS		

NAME OF OBSERVER: ……

SECTION E

NEONATAL PROGRESS MONITORING AND OUTCOME FORM

Gestational Age (weeks):……..Birth weight (grams):……
Mode of delivery: SVD ☐ Assisted delivery ☐ Caesarean section ☐ Breech ☐

OUTCOME	PARAMETER	YES	NO
AT 1 MIN APGAR SCORE.....	Did The Baby Cry/Breathe After Drying/Stimulating at 1 Min?		
	Did The Baby Respond To Clearing Of Airway?		
	Others (specify)		
AT 5 MIN APGAR SCORE……..	A - Skin color pink?		
	G- Crying or active withdrawal?		
	R- Good cry?		
	A-Active motion?		
AT 10 MIN APGAR SCORE…….	A - Skin color pink?		
	G- Crying or active withdrawal?		
	A-Active motion?		
	R- Good cry?		
	Others (specify)		
AT 1 HOUR	Baby breathing well with mother		
	Baby alive on oxygen therapy		
	Baby alive in special care area/unit		
	Others (specify)		

SECTION F

INFECTION PREVENTION PRACTICES

To be completed after completion of NR procedure by the principal researcher or research assistant.

	TASK	YES	NO
1	CLEANING: Ventilation bag and mask device disassembled (suction device if possible) while still wearing gloves.		
2	DECONTAMINATION: all parts soaked in a 0.5% chlorine/ solution for 10- 20 minutes.		
3	All parts washed with soap and water and rinsed carefully with clean water to remove all soap.		
4	Dry completely and keep clean until next use		
5	REMARKS		

Adapted tool from "Shikuku, D. N. *et al.* (2017)

UNIVERSITY OF RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 14/01/2019
Ref: CMHS/IRB/024/2019

MUGANWA Kellen
School of Nursing and Midwifery, CMHS, UR

Dear MUGANWA Kellen

RE: ETHICAL CLEARANCE

Reference is made to your application for ethical clearance for the study entitled ***"Quality of Basic Care in Neonatal Resuscitation at Birth among Health Care Providers at Selected District Hospital".***

Having reviewed your protocol and found it satisfying the ethical requirements, your study is hereby granted ethical clearance. The ethical clearance is valid for one year starting from the date it is issued and shall be renewed on request. You will be required to submit the progress report and any major changes made in the proposal during the implementation stage. In addition, at the end, the IRB shall need to be given the final report of your study.

We wish you success in this important study.

Professor Jean Bosco GAHUTU
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

04/02/2019

MUGANWA Kellen

University of Rwanda/College of Medicine Health Sciences

School of Nursing and Midwifery

Tel: +250785438257/+250788850452

E-mail:muganwakellen@gmail.com

30th January, 2019

To: The Director of KIBAGABAGA District Hospital

Dear Sir,

Re: Request for permission to conduct a research study

I hereby requesting for permission to conduct a research study at your hospital.

Sir, I am a student in Masters of Sciences in Nursing (Neonatology track) in the School of Nursing and Midwifery/ College of Medicine and Health Sciences/ University of Rwanda. And I would like to conduct my dissertation entitled **"Quality of basic care in neonatal resuscitation at birth among health care providers" at selected district hospitals in Rwanda.**

I sincerely requesting the permission to conduct this research among health care providers working in delivery and theatre services in KIBAGABAGA District Hospital. Here is attachment of University of Rwanda/Institutional Review Board (UR/IRB).

Your approval to conduct this study will be highly appreciated

Yours faithfully

Kellen MUGANWA

Student in Neonatology track

REPUBLIC OF RWANDA

11st/12/2018
REF 184/MSK/DH/2018

KIGALI CITY
DISTRICT KICUKIRO
HOPITAL MASAKA
B.P 3472 KIGALI
E-mail: masaka.hospital@moh.gov.rw

To: MUGANWA Kellen

Re: PERMISSION TO CONDUCT DATA COLLECTION

Dear Madam,

Reference made by decision of Director General of Masaka district hospital on your research proposal entitled ***"Quality of basic care in Neonatal resuscitation at birth among health care providers at Masaka Hospital"*** The management of Masaka District Hospital is pleased to inform you that, you have authorization to conduct a study in our hospital.

Sincerely

Dr. Marcel UWIZEYE
Director General Masaka Hospital

REPUBLIC OF RWANDA

Kigali, February 18nd 2019

KIGALI CITY
NYARUGENGE DISTRICT
MUHIMA HOSPITAL
P.O. BOX 2456 KIGALI
Tél. /Fax : +252 50 37 7
E-mail : muhima.hospital@moh.gov.rw

MUGANWA Kellen

Re: Your request for conducting a study at Muhima District Hospital

Dear Kellen,

Reference made to your letter received on February 4th 2019 requesting to conduct a study at Muhima District Hospital for your research project entitled: *Quality of basic care in neonatal resuscitation at birth among health providers at selected district hospital in Rwanda.*

I would like to inform you that your request is approved and at the end the administration of Muhima hospital shall need to be given the final report of your study.

Yours sincerely,

MANIRAGUHA YEZE Aimée Victoire

Chief Ethic Committee

MUHIMA HOSPITAL
ETHIC COMMITTEE

Cc:
- Clinical Director
- Director of Nursing

INFORMED CONSENT FORM

STUDY TITLE: Quality of basic care in neonatal resuscitation at birth among health care providers at selected district hospitals in Rwanda.

Dear Participant, My name is Kellen MUGANWA, a student in Masters of Nursing (Neonatology track) at University of Rwanda, College of Medicine and Health Sciences. I am carrying out study on "Quality of basic care in neonatal resuscitation at birth among health care providers at selected district hospitals in Rwanda" **under the supervision of Mrs. Alice MUHAYIMANA and Dr. Pamela MEHARRY.**

In fact this study might not benefit you immediately but the findings may help to improve the quality of care in practice. The information will be obtained from the participants giving neonatal resuscitation using checklist as an observational study.

Your participation in this study is voluntary, you are free to withdraw from the study any time without any penalty. A total of 40 health care providers working in delivery room and maternity theatre will participate in the study. No harmful or invasive procedures shall be conducted on you feel free to ask any questions at any time of conducting study. All information obtained will be confidential and your name will be anonymous.

I invite you to participate in my study. At the end of the study, recommendations for intervention measures will be given. For any query contact the supervisor of this research on **0788687626** or use my number is **0785438257/ 0788850452**

Participant CONSENT form

The study described above has been explained to me and I have read and understand this information to my full understanding I agree to participate voluntarily in this study.

Participant's Signature.....**Date**.....

Researcher's Signature.....**Date**.....