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**Nurses' Knowledge, Attitudes and Practices regarding feeding of low and very low birth weight infants: a cross-sectional study at tertiary referral hospitals in Rwanda.**

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College of Medicine and Health Sciences

School of Medicine and Pharmacy

Master of Pediatrics and child health

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**Nurses' Knowledge, Attitudes and Practices regarding feeding of low and very low birth weight infant: a cross-sectional study at tertiary referral hospitals in Rwanda.**

By

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

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In the College of Medicine and Health Sciences, University of Rwanda

Supervisor: **Dr MUSAFILI Aimable**

Co-Supervisor: **Dr AGABA Faustine**

**October 2021**

## **DECLARATION**

I declare that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Rwanda or any other institution.

**BULOZE Frederic**

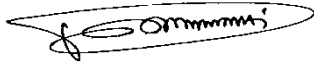


Signed

Date: 24 / 10 / 2021

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Date: 24 / 10 / 2021

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## **ABSTRACT**

**Background:** Neonatal enteral nutrition is a pillar of any management and care for a preterm neonate. To make it adequate, nurses need sufficient knowledge, positive attitude and good practice.

**Objectives:** This study aimed to assess knowledge, attitudes and practices of nurses regarding nutrition of neonates, especially preterm infants in neonatal units at tertiary referral hospitals in Rwanda.

**Methods:** This study is a descriptive, cross-sectional study. It was conducted on all nurses working in neonatal units of the tertiary referral hospitals in Rwanda that are CHUB, CHUK and RMH. A questionnaire with Likert scale was used to collect data. This study was carried out through two months, from January to February 2020. Data analysis was done with SPSS version 20.

**Results:** In total, 47 respondents have completed the evaluation. Of these, 83% were female and 85% were married. The mean age was 43 years. The percentage of correct answers was 65% upon knowledge evaluation. Most of these correct answers (57%) were provided by nurses aged between 31 and 40 years. Low rate of correct answers was noticed for the items, including recommended trophic feeding volume (57%, n=24), calories required for a newborn growth (21%, n=10), and agreement with the benefit of starting feeding before 4 days of life (43%, n=20). On attitudes' evaluation, 53% of respondents disagreed that another person who was not a nurse could feed a newborn infant. 43% of respondents disagreed that early initiating oral feed could cause NEC versus to 38% who agreed. 64% of nurses disagreed that late initiating oral feeding is better than earlier. On practical evaluation, 36% of nurses reported to always delay feeding because of being busy with other activities while one nurse reported to have never inserted an orogastric tube.

**Conclusion:** Nurses working in tertiary referral hospitals have shown an acceptable level of knowledge, a positive attitude and, for most of them, a relative high level of practice regarding infant nutrition. However, they are lacking updated knowledge in some areas of their daily practices.

## **KEY WORDS**

**Extremely low birth weight (ELBW) infant:** is a neonate infant whose weight at birth is less than 1000g.

**Low birth weight (LBW) infant:** is a neonate infant whose weight at birth is below 2500 g.

**Pre-term:** is a neonate born before completed 37 weeks of gestational age.

**Severe preterm:** is neonate born before 32 weeks or whose weight at birth is less than 1.2kg

**Small for gestational age (SGA):** is a neonate infant whose birth weight is below the 10<sup>th</sup> centile.

**Very low birth weight (VLBW) infant:** It is an infant whose weight at birth is between 1000 and 1500 g.

## **GLOSSARY OF TERMS**

BW:	Birth weight
CHUB:	University Teaching Hospital of Butare
CHUK:	University Teaching Hospital of Kigali
DH:	District Hospital
EBM:	Expressed breast milk
GA:	Gestation age
GI:	Gastrointestinal
HBM:	Human breast milk
IRB:	Institutional Review Board
IUGR:	Intrauterine growth restriction
KAP:	Knowledge, attitudes and practices
NEC:	Necrotizing enterocolitis
NGT:	Nasogastric tube
NICU:	Neonatal intensive care unit
OGT:	Orogastric tube
RMH:	Rwanda Military Hospital
SGA:	Small for gestational age
TEF:	Trophic Enteral Feed
UK:	United Kingdom

**Table of Contents**



**UNIVERSITY of  
RWANDA**

	i
DECLARATION .....	i
ACKNOWLEDGEMENTS .....	ii
ABSTRACT.....	iii
KEY WORDS.....	iv
GLOSSARY OF TERMS .....	v
Table of Contents .....	vi
LIST OF TABLES.....	ix
LIST OF FIGURES .....	x
Keywords: Nurse, Knowledge, Attitudes, Practices, Low birth weight infant, Rwanda .....	1
Chapter 1. INTRODUCTION.....	1
1.1 Background.....	1
1.2 Problem statement.....	1
1.3 Objectives of the study.....	2
1.3.1 Aim .....	2
1.3.2 Specific objectives .....	2
1.4 Research questions.....	2
1.5 Justification of the study .....	2
Chapter 2. LITERATURE REVIEW .....	3
2.1 What is optimal nutrition in hospitalized newborn infants? .....	3
2.1.1 Timing.....	3
2.1.2 Type of milk.....	3
2.1.3 The way to feed.....	3
2.1.4 Volume and target.....	3
2.2 Current trends in newborn nutrition globally and in East Africa.....	4



2.3 Healthcare provider knowledge regarding nutrition in admitted newborns.....	4
2.4 Healthcare provider attitudes regarding nutrition in admitted newborns.....	4
2.5 Healthcare provider practices regarding nutrition in admitted newborns .....	5
Chapter3. MATERIAL AND METHODS .....	6
3.1 Study design and setting.....	6
3.2 Study population.....	6
3.3 Study period.....	6
3.4 Outcomes .....	6
3.5 Selection of study participants .....	6
Inclusion criteria .....	6
Exclusion criteria .....	6
3.6 Study procedures.....	7
3.6.1 Data collection tool.....	7
3.6.2 Procedures at enrolment.....	7
3.6.3 Data management and analysis .....	7
3.6.3.1 <i>Data management</i> .....	7
• To change from Likert score to numeric knowledge’s score, all correct answers (agree and strongly agree) were given score 1, and the incorrect answers (disagree, strongly disagree and unsure) were given score 0. ....	7
• Descriptive statistics were applied to generate frequency tables, and bivariate analysis performed to find out factors related to knowledge. Odds Ratios (OR) and p-values were calculated. ....	7
• The knowledge score was set at 65%, so that the respondents with knowledge score below 65% were considered as poorly knowledgeable or not having passing score. This cutoff of passing score corresponded with the general average of knowledge score obtained by respondents.....	7
3.6.4 Ethical considerations .....	7
Chapter 4. RESULTS.....	9
Table 1 Distribution of questionnaires by site .....	9
Table2. Socio-demographic characteristics .....	10
Table 3 Nurses knowledge on neonatal nutrition.....	11
Figure 1. Who’s responsible for preterm neonate nutrition? .....	13
Table 4 Relationship between socio-demographic characteristics and Knowledge .....	13
Table 5 Relationship between socio-demographic characteristics and Knowledge .....	14
Table 6 Nurses attitude (n=47) .....	15
Table 7 Self-reported nursing practice in nutrition of preterm babies .....	16
Chapter 5. DISCUSSION .....	17

STRENGTHS AND LIMITATIONS .....	19
Chapter 6. CONCLUSION AND RECOMMENDATIONS .....	20
6.1 Conclusion .....	20
6.2 Recommendations.....	20
REFERENCES: .....	21
APPENDICES .....	25
APPENDIX 1: Questionnaire .....	25
APPENDIX 2: Information form for the study participants .....	30
APPENDIX 3: CERTIFICATE OF CONSENT.....	32
APPENDIX 4: IRB Approval.....	33

## LIST OF TABLES

Table 1 Distribution of questionnaires by sites .....	9
Table2. Socio-demographic characteristics .....	10
Table 3 Nurses knowledge on neonatal nutrition.....	11
Table 4 Relationship between socio-demographic characteristics and Knowledge .....	13
Table 5 Relationship between socio-demographic characteristics and Knowledge .....	14
Table 6 Nurses attitude (n=47) .....	15
Table 7 Self-reported nursing practice in nutrition of preterm babies .....	16

**LIST OF FIGURES**

Figure 1. Who's responsible for preterm neonate nutrition? ..... 13

**Keywords: Nurse, Knowledge, Attitudes, Practices, Low birth weight infant, Rwanda**

## **Chapter 1. INTRODUCTION**

### **1.1 Background**

Neonatal failure to grow is a common issue in sick preterm neonates, especially in those admitted in hospital. In the UK, 1–2% of newborn infants is very preterm or has very low birth weight. Preterm birth is the major risk factor for infant mortality, with 73% of neonatal deaths happening in preterm infants. The outcomes for neonatal infants are affected by strategies that reduce infection rates, lower NEC rates, promote adequate growth, and maintain access to tertiary level facilities. Optimizing nutritional strategies affects all of these outcomes (1).

In Kenya, in 2000, SGA infants represent 37% of the neonatal death. The neonatal survival rate for LBW infants is still much lower than that observed in other centers of the developing world where there are no neonatal intensive care facilities. This survival rate is also lower than that reported from developed countries prior to the advent of neonatal intensive care services. And it has been shown that the lack of nutritional support associated to dehydration impacted negatively on LBW neonatal survival (1).

Until 2018, prematurity was the leading cause of neonatal deaths (41%) in Rwanda, followed by birth asphyxia and sepsis, and the underweight status contributed to poor maternal health and later to birth outcomes. One of the main strategies that Rwanda has implemented to reduce neonatal death was to struggle against all forms of malnutrition, through reducing maternal under nutrition (2).

### **1.2 Problem statement**

To ensure good development for a newborn infant, a good nutrition should be well conducted. This involves good knowledge, acceptable attitude and good practice on neonatal nutrition from healthcare providers. Nurses play a central role in this area. But in Rwanda there are very limited researches conducted to show nurses' competency regarding neonatal nutrition. Thus, our study had been conceived to answer some of the questions related to this important aspect of newborn care.

### **1.3 Objectives of the study**

#### **1.3.1 Aim**

The aim of this study was to evaluate knowledge, attitudes and practices of nurses regarding low and very low birth weight infant feeding at tertiary referral hospitals in Rwanda.

#### **1.3.2 Specific objectives**

- To assess the knowledge of the nurses regarding low and very low birth weight infants feeding.
- To assess the attitudes of nurses regarding low and very low birth weight infants feeding.
- To assess the practices of nurses regarding low and very low birth weight infants feeding.

### **1.4 Research questions**

1. What was the knowledge of nurses regarding low and very low birth weight infants feeding?
2. What were the attitudes of nurses regarding low and very low birth weight infants feeding?
3. What were the practices of nurses regarding low and very low birth weight infants feeding?

### **1.5 Justification of the study**

For the reasons below this study has been conducted to assess the level of knowledge and practices of nurses working in tertiary referral hospitals in Rwanda regarding low and very low birth weight neonatal feeding.

- In Rwanda, neonatal care is currently taking a higher level of expansion.
- There was limited literature relating to nurses competency on neonatal nutrition.
- Nurses are in frontline of caring newborns, yet their competency in preterm infants feeding has to be known.

## **Chapter 2. LITERATURE REVIEW**

### **2.1 What is optimal nutrition in hospitalized newborn infants?**

There is no global guidance on feeding the VLBW and ELBW baby. The optimal enteral feed of VLBW and ELBW infants varies from country to another, from sector to another, from clinician to another, etc. However, despite this variation the following parameters are commonly taken into consideration (3). In our side, the current WHO guidance will be our main reference.

#### **2.1.1 Timing**

The time of enteral feed initiation is between day 1 to 3 of life. This is important as it has been demonstrated that the duration of the hospital stay of the neonate depends mainly on the timing of initiation of oral feeding (4,5). Earlier feeding initiation is, shorter is the hospital stay. In contrast, the late feeding initiation can lead to prolonged hospital stay of the neonate.

#### **2.1.2 Type of milk**

The human milk is the appropriate type of milk to give to the newborn infants (6–8). The first choice is the own mother's expressed breast milk or colostrum. The fresh milk is preferable; where this is impossible, it is recommended to provide previously frozen milk in the same sequence in which it was expressed: first in first out. The second choice is donor human milk, and the third choice is preterm formula (9).

#### **2.1.3 The way to feed**

According to the current WHO guidelines, the way to feed varies depending on the size of the infant. The human breast milk is given by bolus intermittent feeding by using a cup for LBW infants or through an appropriate nasogastric or orogastric tube inserted for VLBW and ELBW infants, with 2-3 hours interval (9).

#### **2.1.4 Volume and target**

The initial feeding volume for severe preterm neonate infant, known as trophic enteral feed (TEF), is 10-24 ml/kg/d which should not last more than one week (4,5,10,11). TEF has been shown to have beneficial physiological and clinical effects on an individual basis: it improves tolerance, shortens the time to full enteral feeding, improves postnatal growth, and reduces cases of jaundice and sepsis (5,10). After one week of TEF, the increase starts by 10-25ml/kg/d for slow advancement or  $\geq 30$  ml/kg/d for rapid advancement (12). The target is to achieve a tolerated total enteral feed amount of 150ml/kg/d or 110-120kcal/kg/d (3,5,13).

After attainment of full enteral feeds at 150ml/kg/day, feeds are increased further by 20–35ml/kg/d to a maximum of 200ml/kg/d for breast milk and 160–180ml/kg/d for formula feeds (14).

## **2.2 Current trends in newborn nutrition globally and in East Africa**

Even if there are very limited researches in East Africa countries, those few studies found in Africa have emphasized on the role of nurses on neonatal nutritional support (15,16). Currently in Malawi, there is no scientific data about nurses' tube feeding competency and challenges faced when providing enteral feeding (16).

However, there are few data about neonatal nutrition throughout the world, especially in low-income countries (17). In developed countries, 3-7% of newborns are classified as IUGR. And in Europe, 10% of perinatal mortality cases are due to the unrecognized severe growth restriction (11). And yet, LBW-specific morbidity and mortality can be substantially reduced by optimizing enteral infant nutrition (17).

## **2.3 Healthcare provider knowledge regarding nutrition in admitted newborns**

Numerous studies have reported that, in spite of being a significant concern in hospitals, nutrition has low priority and literature on this subject is very scanty (16,18,19). It has been found that nurses lack adequate knowledge on neonatal nutrition status (16).

Mula et al. found that the mean nutrition knowledge of nurses assessed was  $49.44 \pm 10.95$ , and this was not depending upon time on work. Only 42% have recognized this practice being in their scope (16).

## **2.4 Healthcare provider attitudes regarding nutrition in admitted newborns**

Positive attitudes regarding neonatal feeding are also required, but some clinical experiences can constitute a barrier for nurses. Malhotra et al. in his study has found among the barriers to initiating TEF in VLBW and ELBW infants was nurses' fear of NEC. Therefore, 100% of the nurses interviewed stated that they resisted early feeding as well as advancement (20). Also, despite our knowledge and understanding of the importance of feeding in the care of preterm neonates, most of the time the NICU staff members are too busy with bedside care, procedures, and interventions and thus put feeding at the lower position on their list of activities (21).



## **2.5 Healthcare provider practices regarding nutrition in admitted newborns**

One of the goals for preterm infant feeding is to achieve the optimal growth rate of 15g/kg/d for preterm, and 20 g/d for term infants (10). Therefore, any feeding practice that cannot attain this goal should be considered as inadequate and then re-evaluated or changed. And the assessment of nutritional status is the only way to determine the adequacy of feeding. In Kenya, poor infant feeding practice has been found to contribute to high rates of malnutrition (22). Mula C. has found that Nurses lacked adequate knowledge on assessment of patients' nutritional status. Only 22.4% of nurses asked have acknowledged assessing patients' nutritional status. He also found as well that no one among nurses surveyed had acknowledged to have inserted orogastric tube (16).

## **Chapter3. MATERIAL AND METHODS**

### **3.1 Study design and setting**

This study was descriptive, quantitative, prospective cross-sectional study. It has been conducted at three sites considered as tertiary referral hospitals in Rwanda: University Teaching Hospital of Butare (CHUB), University Teaching Hospital of Kigali (CHUK) and Rwanda Military Hospital (RMH). All these hospitals have busy neonatal units with approximately 60-80 admissions per month. These admissions mostly included complicated cases referred from district and provincial hospitals. Catchment areas of each of the three hospitals covered a population of 3 million inhabitants on average.

### **3.2 Study population**

We have conducted this study on all nurses working in neonatal units and/or NICU of the tertiary referral hospitals mentioned above.

### **3.3 Study period**

This study was carried out on two months from January to February 2020.

### **3.4 Outcomes**

The expected outcome was to know the level of knowledge, attitudes and practices of nurses working in tertiary referral hospitals in Rwanda regarding preterm neonatal feeding.

### **3.5 Selection of study participants**

All nurses working in neonatal unit and NICU were involved in the study, except those who were absent during the period of research or data collection, and those who refused to participate to the study. The total number of nurses expected to participate to this study were seventy-two. Forty-seven (two-third) have accepted voluntarily to participate.

The enrolment was opportunistic. No sample size calculation was needed.

### **Inclusion criteria**

All nurses working in neonatal unit and NICU

### **Exclusion criteria**

- Absence of nurse during the period of research
- Refusal to participate to the research

## **3.6 Study procedures**

### **3.6.1 Data collection tool**

To collect data we have used a questionnaire with Likert scale, designed, developed and adapted from which we found in Marie McLaughlin thesis. This questionnaire had 4 sections as follows: section 1 for demographic information, section 2 for Knowledge, section 3 for Attitudes and section 4 for Practices. It also has close-ended and open-ended questions. The time that this questionnaire required to be fully completed is around twenty to thirty minutes.

### **3.6.2 Procedures at enrolment**

After clear information about research project and after a consent form signed, the nurse who had accepted to participate to this study was given an anonymous questionnaire to fill.

### **3.6.3 Data management and analysis**

#### **3.6.3.1 Data management**

- For the management of data a Google form was designed into which data entry was done.
- The excel sheet was automatically formed as data entry was being performed.

#### **3.6.3.2 Data analysis**

- We have used SPSS version 20 for analysis.
- To change from Likert score to numeric knowledge's score, all correct answers (agree and strongly agree) were given score 1, and the incorrect answers (disagree, strongly disagree and unsure) were given score 0.
- Descriptive statistics were applied to generate frequency tables, and bivariate analysis performed to find out factors related to knowledge. Odds Ratios (OR) and p-values were calculated.
- The knowledge score was set at 65%, so that the respondents with knowledge score below 65% were considered as poorly knowledgeable or not having passing score. This cutoff of passing score corresponded with the general average of knowledge score obtained by respondents.

### **3.6.4 Ethical considerations**

- This study project was not funded from any external source.
- No potential conflict of interest was thought.

- The principles of confidentiality were respected, as neither the name of participant nor his/her place of work was mentioned on the questionnaire.
- Before carrying out this study, an ethical approval was obtained from the IRB (approval number 010/CMHS IRB/2020) of University of Rwanda.

## Chapter 4. RESULTS

Table 1 below shows the distribution of questionnaires by site. Seventy-two questionnaires were distributed out to nurses that corresponded to the total number of nurses working on the study sites. We received back forty-seven (47) responses which correspond to two-thirds (65%) of the expected number. Twenty-five questionnaires were not filled for unknown reasons. We didn't explore the reasons why these questionnaires have not been filled or why nurses have not consented to participate to the research, as the participation was voluntary. But, some non-official reasons have been advanced to explain why some nurses could not be joinable, such as maternity leave and annual leave for RMH and CHUB, and mission out of the country for RMH. All nurses from CHUK have accepted to participate to the study and have all filled the questionnaire.

**Table 1 Distribution of questionnaires by site**

<b>Site</b>	<b>Number of questionnaires distributed</b>	<b>Number of questionnaires received</b>	<b>Percentage (%)</b>
<b>CHUB</b>	<b>20</b>	<b>10</b>	<b>50</b>
<b>CHUK</b>	<b>15</b>	<b>15</b>	<b>100</b>
<b>RMH</b>	<b>37</b>	<b>22</b>	<b>59.4</b>
<b>TOTAL</b>	<b>72</b>	<b>47</b>	<b>65.2</b>

**Table2. Socio-demographic characteristics**

<b>Socio-demographic characteristics (n=47)</b>	<b>N0.</b>	<b>%</b>
<b>Age</b>		
20-30	4	8.5
31-40	29	61.7
≥41	14	29.7
<b>Gender</b>		
Male	8	17
Female	39	83
<b>Education level</b>		
A1	28	59.6
A0 & Postgraduate	19	40.4
<b>Nursing Experience (year)</b>		
5-9	17	36.2
10-14	15	31.9
≥15	15	31.9
<b>Nursing neonatal experience (Year)</b>		
1-4	12	25.5
5-9	26	55.3
≥10	9	19.1
<b>Training in neonatal care</b>		
Yes	36	76.6
No	11	23.4
<b>Sources of gaining neonatal feeding knowledge:</b>		
• Personal experience	14	29.8
• Recognized neonatal feeding course	9	19.1
• Conferences or workshops	4	8.5
• Undergraduate nursing course	17	36.2
• Others	3	6.4

The demographics of the individuals asked are shown in Table 2 above. Of all participants, 39 (83%) were females and 8 (17%) males. Most of them were aged between 31-40 years (62%, n=29) with the mean age of 43 years. Large majority of nurses (85%, n=40) were married. All participants reported having university level. More than half (60%, n=28) had under graduate level.

The two main sources of gaining knowledge were undergraduate nursing course (36%, n=17) and personal experience (30%, n=14) obtained from the fact to have been working in neonatal unit or neonatal intensive care unit.

**Table 3 Nurses knowledge on neonatal nutrition**

<b>Questions asked</b>	<b>Correct answers n(%)</b>	<b>Incorrect answers or unknown n(%)</b>
1. Breast milk is the appropriate food for the preterm baby	47(100%)	0
2. Trophic enteral feed means minimal enteral nutrition	43(91.5%)	4(8.5%)
3. The recommended trophic feed volume is 10-24ml/kg/d	27(57.4%)	20(42.6%)
4. The daily advancement feeding volume is 10-24ml/kg	29(61.7%)	18(38.3%)
5. The speed advancement feeding volume is >30ml/kg/d	27(57.4%)	20(42.6%)
6. The target enteral feed volume is 150-180ml/kg/d	38(80.9)	9(19.1%)
7. Optimal time to initiate enteral feed is day 1 to day 3 of life	41(87.2%)	6(12.8%)
8. There is no benefit to start feeding after day 4 of life	20(42.6%)	27(57.4%)
9. Colostrum is characterized by high protein	44(93.6)	3(6.4%)
10. Breast milk increases immunity of newborn babies	47(100%)	0
11. Breast milk production increases as sucking or expressing increases	47(100%)	0
12. Breast milk composition is the same for the preterm, term neonate or infant	29(61.7%)	18(38.3%)
13. Fortification of human starts when newborn has is receiving 100ml/kg/d	29(61.7%)	18(38.3%)
14. The average weight gain for severe preterm is 15g/kg/d	39 (83%)	8(17%)
15. The acceptable weight gain for term newborn is 25g/d	39 (83%)	8(17%)
16. For preterm babies the average daily energy requirement is 120kcal/kg/d	29(61.7%)	18(38.3)
17. Most of newborns pass their first urine within first 24h	45(95.7%)	2(4.3%)
18. Meconium passage occurs within 36h after birth.	25(53.2%)	22(46.8%)
19. Significant residual volume for feed intolerance is >2ml/kg/feed or >50% of previous feed	30(63.8%)	17(36.2%)
20. For Gastric residual volume (GRV) management, if GRV is greater than scheduled feeding volume, re-feed the GRV only.	18(38.3)	29(61.7%)
21. Gold standard way to verify NGT placement is by X-ray.	17(36.2%)	30(63.8%)
22. Iron supplementation starts at two weeks of age.	20(42.6%)	27(57.4%)
23. Risks of NGT	37(78.7%)	10(21.3%)
24. Assessment of risks of NGT	24(51.1%)	23(48.9%)
25. Different ways for preterm neonate feeding	4 (8.5%)	43(91.5%)

26. Calories required for neonate growth:25Cal/kg/d	10(21.3%)	37(78.7%)
27. Daily neonatal body weight measurement is important	34(72.3%)	13(27.7%)
28. Knows that breastfeeding should start in the first hour after birth in a normal full term neonate	20(42.6%)	27(57.4%)
29. Nurse is the responsible for hospitalized neonate feeding	43(89.6%)	4(8.5%)
30. Contraindications to enteral feed	27(57.4%)	20(42.6%)

#### 4.1 Nurses knowledge on infant nutrition

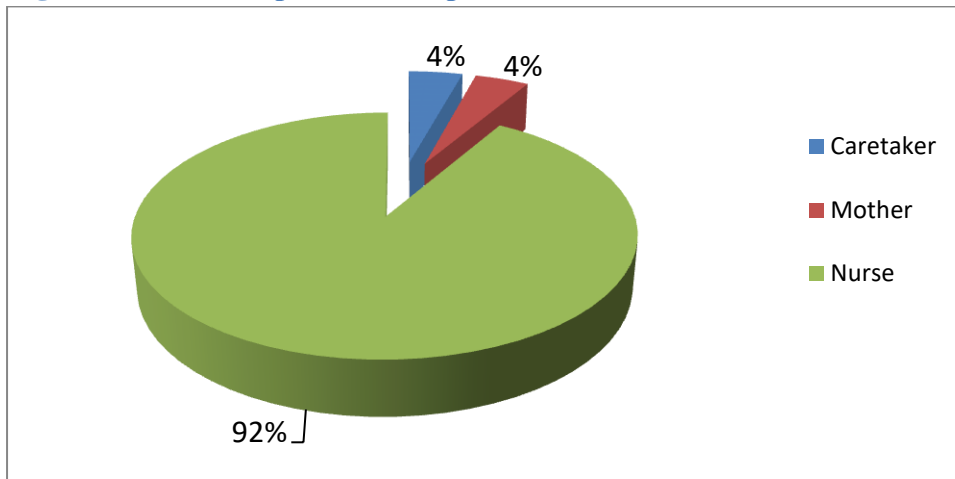
The table 3 above describes nurses' knowledge on neonatal nutrition. The nurses' answers to knowledge questions on neonatal nutrition have been summarized into correct and incorrect answers. The responses "unsure" were assimilated to incorrect answers. Three questions have been correctly answered by all participants. None was left without answer. Nurses aged between 31 to 40 years are the most knowledgeable. A threshold of adequate knowledge of 65% was fixed as the ability to respond to the question correctly. The answers were grouped in two groups (correct=1, incorrect=0) to calculate the overall knowledge. And the average knowledge was 65%. All participants were accorded that human breast milk is the most appropriate food for the preterm baby.

The definition of trophic enteral feed is known by a large majority of participants (92%, n=43). The optimal time for initiating feeding to preterm neonate is known by 87% (n=41) of respondents. 92% (n=43) of participants have agreed that nurses are responsible for preterm neonate nutrition (see Figure 1 below).

However, areas where nurses have shown inadequate knowledge are notably, recommended volume for TEF (57%, n=27), calories required for neonate growth (21%, n=10) and different ways for preterm neonate feeding (9%, n=4). We have also found that 43% (n=20) of nurses have agreed that there is no benefit to start feed after 4 days.



**Figure 1. Who's responsible for preterm neonate nutrition?**



The correlation between socio-demographic characteristics and knowledge showed that married nurses and those with experience between 10 and 14 years are more knowledgeable. But no significant difference was found. The findings are shown in Tables 4 & 5 below.

**Table 4 Relationship between socio-demographic characteristics and Knowledge**

Variable	Passing scores knowledge by 65/100				Chi-square	p-value
	Passed		Not passed			
	N=23	%	N=24	%		
<b>Age</b>						
20-30	3	13	1	4.2	1.2	0.5
≥41	7	34.4	7	29.2		
31-40	13	56.5	16	66.7		
<b>Marital status</b>						
Single-Divorced-Widow	7	30.4	0	0	8.5	0.0
Married	16	69.6	24	100		
<b>Education</b>						
A0 & postgraduate	9	39.1	10	41.7	0.0	0.8
A1	14	60.9	14	58.3		
<b>Nursing experience</b>						
5-9	7	30.4	10	41.7	0.6	0.7
10-14	8	34.8	7	29.2		
≥15	8	34.8	7	29.2		
<b>Experience in neonatology</b>						
1-4	8	34.8	4	16.7	2.8	0.2
≥10	5	21.7	4	16.7		
5-9	10	43.5	16	66.7		

**Table 5 Relationship between socio-demographic characteristics and Knowledge**

Variable	Passing scores knowledge by 65/100				OR	95%CI
	Passed		Not passed			
	N=23	%	N=24	%		
<b>Age</b>						
20-30	3	13	1	4.2	1.8	0.08 – 42.5
≥41	7	34.4	7	29.2	1.2	0.2 – 9.7
31-40	Reference					
<b>Marital status</b>						
Single- Divorced- Widow	7	30.4	0	0		
Married	Reference					
<b>Education</b>						
A0 & postgraduate	9	39.1	10	41.7	1.4	0.3 – 6.0
A1	Reference					
<b>Nursing experience</b>						
5-9	7	30.4	10	41.7	0.8	0.0 – 10.8
10-14	8	34.8	7	29.2	1.3	0.3 – 17.8
≥15	Reference					
<b>Experience in neonatology</b>						
1-4	8	34.8	4	16.7	1.8	0.2 – 13.3
≥10	5	21.7	4	16.7	5.0	0.7 – 33.6
5-9	Reference					

OR: Odds ratio; CI: confidence interval

#### 4.2 Nurses attitude on infant nutrition

The findings in Table 6 below have shown positive attitude among nurses in some areas. In particular 62% (n=29) of participants have agreed that feeding a preterm neonate should be on top of neonatal care, and more than half disagreed that another person could feed a neonate rather than a nurse (53%, n=25). About the timing, almost 43% (n=20) of respondents disagreed that early initiating enteral feed to a preterm infant could cause necrotizing enterocolitis versus those who agreed (38%, n=18). And 64% of respondents have disagreed that late initiating enteral feed to a neonate is better than earlier.

**Table 6 Nurses attitude (n=47)**

Statement	Agree N(%)	Disagree N(%)	Unsure N(%)
1. NGT feeding is a pleasure	11 (23.4%)	22 (46.8%)	14 (29.8%)
2. NGT feeding is an additional task	16 (34%)	25 (53.2%)	6 (12.8%)
3. NGT feeding is stressful	18 (38.3%)	23 (48.9%)	6 (12.8%)
4. NGT feeding requires extra time	23 (48.9%)	19 (40.4%)	5 (10.6%)
5. NGT feeding should be done by another person than a nurse	18 (38.3%)	21 (44.7%)	8 (17%)
6. Inserting NG feeding tube is difficult	5 (10.6%)	39 (83%)	3 (6.4%)
7. NGT insertion is easier than OGT	25 (53.2%)	18 (38.3%)	4 (8.5%)
8. Neonatal feeding should be on top of all neonatal management care	29 (61.7%)	14 (29.8%)	4 (8.5%)
9. If another person could feed neonate rather than you	12 (25.5%)	25 (53.2%)	10 (21.3%)
10. Early initiating enteral feeding to preterm neonate can cause necrotizing enterocolitis	18 (38.3%)	20 (42.6%)	9 (19.1%)
11. Late initiating enteral feeding to neonate is better than earlier	10 (21.3%)	30 (63.8%)	7(14.9%)

#### 4.1 Nurses practice

The table 7 below describes Self-reported nursing practice in nutrition of the neonates. Nutritional status assessment was reported as always and often done by nurses at the rate of 75% (n=35) and 11% (n=5), respectively, whereas frequency of measurement of gastric residual was reported as always and often done combined by almost 79% of participants.

However, orogastric tube insertion is reported as sometimes done by 30% (n=14) and as never done by 2.1% (n=1). 36% (n=17) of all participants have reported that being busy can delay them from feeding babies.

**Table 7 Self-reported nursing practice in nutrition of preterm babies**

<b>Statement</b>	<b>Never</b>	<b>Sometimes</b>	<b>Often</b>	<b>Always</b>
<b>Frequency of orogastric tube insertion</b>	<b>1 (2.1%)</b>	<b>14 (29.8%)</b>	<b>21 (44.7%)</b>	<b>11 (23.4%)</b>
<b>Frequency of nasogastric tube insertion</b>	<b>0</b>	<b>9 (19.1%)</b>	<b>14 (29.8%)</b>	<b>24 (51.1%)</b>
<b>Frequency of tube placement assessment before each feed</b>	<b>2 (4.3%)</b>	<b>3 (6.4%)</b>	<b>6 (12.8%)</b>	<b>36 (76.6%)</b>
<b>Frequency of nutritional status assessment</b>	<b>0</b>	<b>7 (14.9%)</b>	<b>5 (10.6%)</b>	<b>35 (74.5%)</b>
<b>Frequency of measurement of gastric residual</b>	<b>0</b>	<b>10 (21.3%)</b>	<b>16 (34%)</b>	<b>21 (44.7%)</b>
<b>Frequency at which being busy can delay patient feeding</b>	<b>7 (14.9%)</b>	<b>23 (48.9%)</b>	<b>14 (29.8%)</b>	<b>3 (6.4%)</b>

## **Chapter 5. DISCUSSION**

This study was a descriptive, prospective, cross-sectional study. The aim was assessing the knowledge, attitude and practice of nurses working in tertiary referral hospitals in Rwanda regarding neonatal infant feeding. The survey was conducted from January to February 2020. In total 47 nurses were surveyed. The majority were female (83%, n=39), their mean age was 43 years. Only almost 28% (n=13) of respondents reported to have received a course on neonatal nutrition apart from undergraduate nursing course, while the majority have not. Actually, nearly a quarter of the nurses asked were not trained on neonatal care before their enrollment in neonatal unit neither during their work. Moreover personal experience was considered as training by most of nurses.

### **5.1 Nurses' knowledge**

The nurses overall knowledge was 65% which is less than 73.5% found by Issa et al. (23). This low average knowledge can be explained by the absence of in-service training of the nurses.

We have also found that 43% of nurses have agreed that there is no benefit of initiating feed after 4 days, while the majority disagreed (57%, n=27). Those who disagreed were wrong due to lack of in-service training. This confirms not only the need of continuous training of nurses working in neonatal units on neonatal feed, but also the lack of knowledge of the content of Rwanda national guidelines. Many studies have proven that early initiating feed is more beneficial over late initiation (17,24–27). Manea et al. have shown that early initiating nutrition to preterm infant is beneficial as it improves not only digestive tolerance, intestine motility stimulation and GI hormone release, but also the weight gain (28).

43% (n=20) of nurses do not know the volume that is recommended in trophic feeding of preterm neonates. This also proves that nurses are not trained on neonatal feeding during their services.

The Statistical analysis showed no association between demographic characteristics of the nurses and their knowledge. Even if there was a difference among nurses according to their age, marital status and educational level upon knowledge, Chi-square test and  $p$  value  $> 0.05$  revealed no significant difference.

## **5.2 Nurses' attitude**

More than half of nurses (25 out of 47) have disagreed that another person could feed an infant rather than a nurse, which is ideally a positive attitude that goes into the same direction as the assertion that nurses are responsible for preterm neonate nutrition. This finding is similar to other findings (16,29). But this can really be a challenge in our low-staffed settings, where the nurses are overloaded, being caring many babies (the ratio of 1:10). This is probably the reason why a non-negligible number of other nurses (12 out of 47) did not agree with their colleagues. Actually, to improve the quality of neonatal nutrition in our low-resource settings, some tasks under nurses' responsibility should be delegated to other people, such as family members.

## **5.3 Nurses' practice**

The delay to feed a patient is common in our daily practice in different sites and for different reasons. Our study found that being busy in administering medications or in phlebotomy or in any other intervention could delay nurses from feeding babies. We did not explore in detail the specific reasons for this delay, nor the timing of feeding affected, whether in initiation or on-going feeding. Raban et al. has found that the two commonest causes for delaying initiation of feeds to a neonate were unavailability of human breast milk and perinatal asphyxia (3). Even for babies to whom feeding has already been initiated, missed feed opportunities are reported by many other studies (30,31).

Tubbs-Cooley et al. goes further by saying that missed feeding opportunities have a cost due to extended length of stay (31). Such a situation joins the policy of family-centered care which has an advantage to unload nurses, helping them to regain time to spend on clinical care per neonate, as it has been shown that nurses working in under-resourced areas spend 28% less time than the time spent on care in adequately staffed area (32). Moreover, this will also involve family members to neonate's care.

It was found that 45% (n=21) of nurses always measure gastric residual volume. Even if these results seem to be higher than findings by Mula in Malawi (n=16; 31.4%) (16), there is still need for nurses to improve their daily practice.

One out of 47 nurses reported as never inserted orogastric tube. Mula et al. found that it was not reported by any nurse. The findings show that nurses are more skilled in daily practice.

## **STRENGTHS AND LIMITATIONS**

This study is the first one conducted on three tertiary referral hospitals at once. It gives an overview on nurses about neonatal nutrition. It is also a contribution to the assessment of health care delivery.

However, the limitations that our study has faced to are its small sample size and that no significant difference has been found between demographic characteristics and knowledge of nurses.

## **Chapter 6. CONCLUSION AND RECOMMENDATIONS**

### **6.1 Conclusion**

Nurses working in tertiary referral hospitals have a positive attitude regarding infant nutrition and most of them have a relative high level of practice. However, their lack in-service training impacts on their level of knowledge.

### **6.2 Recommendations**

From the results of the study we can recommend the following:

- 1) To tertiary referral hospitals:
  - To organize a continuous in-service training on national guidelines and an evaluation of the pre-service curriculum to determine how feeding the LBW infant is achieved.
  - To conduct the same study to all nurses working in pediatrics.
- 2) To Rwanda Pediatric Association:
  - To elaborate a schedule for nurses training on neonatal feeding and provide certificate as proof.
- 3) To Ministry of Health:
  - To organize training for all nurses working in neonatal units on neonatal nutrition countrywide.
  - To extend the same study to other hospitals.
  - To increase the number of nurses in neonatal units
- 4) To researchers:
  - To conduct the same study with a larger sample size.
  - To explore the reasons of neonatal feeding delay.



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## APPENDICES

### APPENDIX 1: Questionnaire

Title: **Nurses' Knowledge, Attitudes and Practices regarding feeding of low and very low birth weight infants: a cross-sectional study at tertiary referral hospitals in Rwanda.**

**Thank you for agreeing to participate in this research study. Your contribution is valued.**

#### Instructions:

- Please complete this questionnaire honestly. Remember your identity is kept completely confidential.
- Answer all the questions below by circling the number that corresponds to your answer.
- Do not leave any questions unanswered.
- Please contact the researcher on the phone (call or SMS: **0788744053**) or by email: [frurumbi@gmail.com](mailto:frurumbi@gmail.com) if any questions or concerns.

<b>Section 1: socio-demographic information</b>	
<p><b>1. Age (years):</b> -----year-old</p> <p><b>2. Gender:</b> 1. Male 2. Female</p> <p><b>3. Marital status:</b> 1. Single 2. Married 3. Divorced 4. Widow 5. Other (<i>please specify</i>)_____</p> <p><b>4. What academic level do you have?</b> 1. &lt; A2 2. A2 3. A1 4. A0 5. Postgraduate degree</p> <p><b>5. What is your current employment status?</b> 1. Full-time 2. Part-time</p> <p><b>6. How long is your nursing experience?</b> ----- years</p>	<p><b>7. How long have you been in your current position (months or years)?</b> -----</p> <p><b>8. How long have been working in neonatal unit or NICU?</b> ----- years</p> <p><b>9. Have you ever been trained in neonatology or neonatal care?</b> Yes No</p> <p><b>10. Where did you get your neonatal knowledge from?</b> 1. Personal experience 2. Recognized neonatal feeding course 3. Conferences/Workshop 4. Undergraduate nursing course 5. Others (<i>please specify</i>) -----</p>

### Section 2: Nurses knowledge

Please indicate your response to the following statement by circling the number that best matches with what you believe.

SA= strongly agree; A= agree; U= unsure; D= disagree; SD= strongly disagree	SA	A	U	D	SD
1. Breast milk is the appropriate food for the preterm baby	1	2	3	4	5
2. Trophic enteral feed means minimal enteral nutrition	1	2	3	4	5
3. The recommended trophic feed volume is 10-24ml/kg/d	1	2	3	4	5
4. The daily advancement feeding volume is 10-24/kg	1	2	3	4	5
5. The speed advancement feeding volume is >30ml/kg/d	1	2	3	4	5
6. The target enteral feed volume is 150-180ml/kg/d	1	2	3	4	5
7. Optimal time to initiate enteral feed is day 1 to day3 of life	1	2	3	4	5
8. There is no benefit to start feeding after day 4 of life	1	2	3	4	5
9. Colostrum is characterized by high protein	1	2	3	4	5
10. Breast milk increases immune system of the neonate	1	2	3	4	5
11. Breast milk production increases as sucking or expressing increases	1	2	3	4	5
12. Breast milk composition is the same for the preterm, term neonate or infant	1	2	3	4	5
13. Fortification of human breast milk starts when the newborn is tolerating 100ml/kg/d	1	2	3	4	5
14. The average weight gain for severe preterm is 15g/kg/d	1	2	3	4	5
15. The average weight gain for term newborn is 25g/d	1	2	3	4	5
16. For preterm babies the average daily energy requirement is 120kcal/kg/d	1	2	3	4	5
17. Most of newborns pass their first urine within first 24h	1	2	3	4	5
18. Meconium passage occurs within 36h after birth	1	2	3	4	5
19. Gastric residual volume (GRV) of >50% of previous feed for 2 consecutive times indicates that the patient is tolerating feed well.	1	2	3	4	5
20. GRV of >20% of total daily feed volume indicates that the patient is tolerating feed well.	1	2	3	4	5
21. For Gastric residual volume (GRV) management, if GRV is greater than scheduled feeding volume, re-feed the GRV only.	1	2	3	4	5
22. The Gold standard way to verify NGT placement is by X-ray	1	2	3	4	5
23. Iron supplementation starts at two weeks of postnatal age	1	2	3	4	5
24. What are the risks of NGT? -----					

-----  
-----  
-----  
25. How do you assess it/them?

-----  
-----  
-----  
-----

26. What are different ways of feeding for preterm?

- a) Breast milk
- b) IVF
- c) Infant formula
- d) All above

27. What are contraindications of neonatal enteral feeding?

-----  
-----  
-----

28. Calories required for the newborn's growth is:

- a) 10 kcal/kg/d
- b) 25 kcal/kg/d
- c) 50 kcal/kg/d
- d) 100 kcal/kg/d

**Section 3: Nurses attitude**

<b>Statement</b>	<b>agree</b>	<b>disagree</b>	<b>unsure</b>
1. NGT feeding is a pleasure	1	2	3
2. NGT feeding is an additional task	1	2	3
3. NGT feeding is stressful	1	2	3
4. NGT feeding requires extra time	1	2	3
5. NGT feeding should be done by another person than a nurse	1	2	3
6. Inserting NG feeding tube is difficult	1	2	3
7. NGT insertion is easier than OGT	1	2	3
8. Neonatal feeding should be on top of all neonatal management care	1	2	3
9. If another person could feed neonate rather than you	1	2	3
10. Early initiating enteral feeding to preterm baby can cause necrotizing enterocolitis	1	2	3
11. Late initiating enteral feeding to preterm is better than earlier	1	2	3
12. Who is responsible for preterm neonate feeding?			
a) Nurse			
b) Mother			
c) Caretaker			
d) Pediatrician/Doctor			



**Section 4: Nurses practice**

Statement	Never	Sometimes	Often	Always
1. How often do you insert orogastric tube?	1	2	3	4
2. How often do you insert nasogastric tube?	1	2	3	4
3. How often do you check feed tube placement prior to the next feed?	1	2	3	4
4. How often do you assess neonatal nutritional status?	1	2	3	4
5. How often do you check & measure gastric residual volume?	1	2	3	4
6. How often is important daily neonatal body weight measurement?	1	2	3	4
7. How often being busy ( e.g. procedures, interventions, etc.) can delay feeding patients	1	2	3	4
8. When does breast milk feeding start?				
a) Theoretically:				
b) And in your unit:				
9. What do you give to preterm neonate in the first hours after birth?				
-----				
-----				
-----				
-----				

## **APPENDIX 2: Information form for the study participants – English Version**

Dear nurses, we are inviting you to participate in research on: **“Nurse’s Knowledge, Attitudes and Practices regarding feeding of the low and very low birth weight infant: a cross-sectional study at tertiary referral hospitals in Rwanda.”**

### **1. Purpose of the study:**

We are about to conduct a study at CHUK, CHUB and RMH with the aim of assessing the knowledge, attitude and practices of nurses working in tertiary referral hospitals in Rwanda.

This study will be a cross-sectional study that will be conducted on all nurses working in neonatal units and neonatal intensive care units of those hospitals.

### **2. Description of the Process**

After getting informed consent from nurses, a questionnaire will be given to all participants.

The questionnaire has 4 main parts: socio-demographic information, knowledge, attitude and practices. After filling the questionnaire, information obtained will be analyzed.

This study will be conducted with the approval of the Institutional Research Board of the CMHS and the national ethical committee. There is no any experimentation planned in this study.

### **3. Risk or discomfort:**

There is no risk or discomfort, either physical or emotional, thought on participants to this study.

### **4. Benefits:**

Identifying the areas of weaknesses among participants will help clinicians that we are in addressing these concerns; emphasize our teaching and enhance nurses’ skills.

## **5. Confidentiality:**

We can ensure you high level of confidentiality. This means that we won't share information of the participant to anyone else. The information that we will get from this research project will be kept secret. The nurses can be assured of anonymity and confidentiality, and they will be asked to avoid mentioning their specific names on the questionnaire.

## **6. Voluntary participation, Refusal or withdraw:**

The participation in this study is totally voluntary. However, it requires knowing well what the purpose of the study is. After being informed the potential participant will be free to accept or to refuse his participation. He also may stop participating at any time of his wish. Finally, participant is also free to withdraw after having signed the consent whenever this comes to pass.

**7. Who to contact if any question or concern?** In case of question or clarification, please call the Principal Investigator or the representatives of the CMHS IRB below:

1. Dr Frédéric BULOZE (Principal Investigator) : (+250) 0788744053). Email:

[frurumbi@gmail.com](mailto:frurumbi@gmail.com) / [frurumbi@yahoo.fr](mailto:frurumbi@yahoo.fr)

2. Dr Aimable MUSAFILI (Pediatrician, supervisor (0787584111). Email: [amusafili@yahoo.fr](mailto:amusafili@yahoo.fr)

3. Dr AGABA Faustine (Neonatologist, co-supervisor): (+250)788438837) Email:

[faustineagaba@yahoo.fr](mailto:faustineagaba@yahoo.fr)

### APPENDIX 3: CERTIFICATE OF CONSENT

I have read about research project. I have had the opportunity to ask questions about it and any questions I have been asked have been answered with satisfaction. Therefore, I consent to be a participate in this study.

Name of Participant: \_\_\_\_\_

Signature of Participant: \_\_\_\_\_

Date: \_\_\_\_\_

I, **BULOZE Frédéric**, have given or read out the information sheet to the potential participant, and at the best of my ability made sure that the participant understood the information given.

I confirm that opportunity was given to the participant to ask questions about the study, and each question asked by the participant got appropriate answer. The consent has also been given freely and signed voluntarily.

Name of Researcher: \_\_\_\_\_

Signature of Researcher: \_\_\_\_\_

Date: \_\_\_\_\_

## APPENDIX 4: IRB Approval



UNIVERSITY of  
RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES  
DIRECTORATE OF RESEARCH & INNOVATION

### CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 23<sup>rd</sup>/January/2020

**Dr Frederic RURUMBI BULOZE**  
School of Medicine and Pharmacy, CMHS, UR

#### Approval Notice: No 010/CMHS IRB/2020

Your Project Title *“Knowledge, Attitudes and Practices of Nurses regarding infant Feeding: A Cross-Sectional Study At Tertiary referral Hospitals In Rwanda”* has been evaluated by CMHS Institutional Review Board.

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

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 21<sup>st</sup> January 2020, **Approval has been granted to your study.**

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

Email: [researchcenter@ur.ac.rw](mailto:researchcenter@ur.ac.rw)

P.O Box 3286 Kigali, Rwanda

[www.ur.ac.rw](http://www.ur.ac.rw)


You are responsible for fulfilling the following requirements:


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

Sincerely,

Date of Approval: The 23<sup>rd</sup> January 2020

Expiration date: The 23<sup>rd</sup> January 2021

  
Professor GAHUTU Jean Bosco  
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

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Email: [researchcenter@ur.ac.rw](mailto:researchcenter@ur.ac.rw)

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