



UNIVERSITY *of*  
RWANDA

**INFLUENCE OF TRAINING ON KNOWLEDGE AND SKILLS ACQUISITION OF  
NURSES REGARDING CARDIOPULMONARY RESUSCITATION AT TWO  
SELECTED DISTRICT HOSPITALS IN RWANDA.**

**by**

**SADIKI NGAGI Delphin**

College of Medicine and Health Sciences  
School of Nursing and Midwifery  
Masters of Nursing Sciences

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by

**SADIKI NGAGI Delphin**

**Registration number: 218000404**

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Supervisor:

Mrs Liberatha RUMAGIHWANA

Co-Supervisor:

Professor Busisiwe Bhengu

Kigali

25<sup>th</sup> September, 2019

**UR/COLLEGE OF MEDECINE AND HEALTH SCIENCES**

**P.O.BOX:3286 KIGALI**

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I hereby declare that the work submitted in partial fulfilment of the requirement of a degree of a **MASTERS OF SCIENCES** in **NURSING** at National University of Rwanda/College of Medicine and Health Sciences, is my original work and it has never been submitted elsewhere.

I do declare that the complete list of reference provided indicate all sources of information quoted.

SADIKI NGAGI Delphin

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and authorize him/her to deposit the document to the Directorate of Postgraduate Studies.

**Supervisor name: Professor BUSISIWE ROSEMARY BHENGU**

**Supervisor's Signature: .....**

**Date: .....**

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**Member of the Panel**

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## **DEDICATION**

This research is dedicated to Almighty God in heaven,

I am grateful to my lovely family, my wife Keza M Germaine, my brothers and sisters for their encouragement and support

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## **LIST of ABBREVIATIONS/ACRONYMS**

**%:** Percentage

**A0:** Bachelor's degree

**A1:** Diploma

**A2:** Associated nurse

**AED:** Automated External Defibrillator

**AHA:** American Heart Association

**ANZCOR:** Australia and New Zealand Council on Resuscitation

**BLS:** Basic Life Support

**CPR:** Cardio Pulmonary Resuscitation

**CPR:** Cardio-Pulmonary Resuscitation

**DH:** District Hospital

**ECC:** Emergency Cardiovascular Care

**EMS:** Emergency Medical Service

**ICU:** Intensive Care Unit

## **LIST OF ABBREVIATIONS, ACRONYMS**

**LMIC:** Low and Middle Income Countries

**PVT:** Pulseless Ventricular Tachycardia

**ROSC:** Return of Spontaneous Circulation

**SCA:** Sudden Cardiac Arrest

**SCD:** Sudden Cardiac Death

**SPSS:** Statistical Package of Social Sciences

**UR/CMHS:** University of Rwanda College of Medicine and Health Science

**VF:** Ventricular Tachycardia

## **ABSTRACT**

**Introduction:** The effective provision of cardiopulmonary resuscitation (CPR) increases patient survival and reduces in-hospital mortality. As nurses are the front-line professionals in Hospital settings, it is very important for them to be equipped with tangible knowledge and skills regarding CPR to intervene promptly in a cardiac arrest. The well-trained nurses decrease mortality rate and increase the discharge of the patient who underwent cardiac arrest. The aim of this study was to explore the influence of the training on knowledge and skills of nurses at district hospital regarding cardiopulmonary resuscitation (CPR).

**Methodology:** This is prospective, quasi-experimental and interventional study design, which took place at two randomly selected district hospitals: Kacyiru and Masaka. **Sample** size of 87 registered nurses and associated nurses was used, the sample size was obtained using Taro Yamane formula and the participants were obtained using a simple random sampling .The study was made of a pretest followed by CPR training using PowerPoint presentation, videos in line with AHA, 2015 guideline, mannequin and defibrillator, followed by post-test with same questionnaire and skills checklist used for pretest.

**Results:** The results showed poor knowledge prior the teaching with a mean 30.4% which improved up to 73.5% for the post test. The same as for knowledge, the skills were poor with a mean of 22.8% prior the teaching and improved in the post teaching to 65.1%. The analysis was done using SPSS IBM version 23, for the descriptive statistics and Wilcoxon signed rank test was used for inferential statistics.

**Conclusion:** Respondents had inadequate CPR knowledge and skills at the pretest. The study revealed statistically significant improvement in both knowledge and skills of CPR for all nurses post training. The respondent showed to be better in terms of knowledge than skills.

# CHAPTER 1 INTRODUCTION AND BACKGROUND

## 1.1 General introduction

Cardiopulmonary resuscitation (CPR) is a lifesaving technique which is useful in many emergencies. Cardiopulmonary resuscitation is essential in cases of suffocation, near-drowning,

electrocution injuries, heart attacks, or any other situation in which a person's breathing or heartbeat has stopped (Al-janabi & Sc, 2014).

This involves a combination of rescue breathing, chest compressions and early defibrillation if AED is available, which keep oxygenated blood flowing to the brain and other vital organs until more definitive medical treatment can restore a normal heart rhythm. When the heart stops, the absence of oxygenated blood can cause irreparable brain damage within a few minutes. Death will occur within 6 minutes (Al-janabi & Sc, 2014).

The effective provision of cardiopulmonary resuscitation (CPR) increases patient survival and

Decreases in-hospital mortality. Nursing staff, as front-line healthcare professionals, are often the first present at cardiopulmonary arrests and respond by providing CPR. Their training has an impact on the efficiency of CPR and consequently on health outcomes. Thus, assessment of their status in that respect may provide useful information for decision making (Plagisou, Tsironi, Zyga, & Moisoglou, 2015).

The early intervention, the quality of cardiopulmonary resuscitation and time to defibrillation determine survival rate.

CPR is a key component of the chain of survival strategies. The CPR decreases the incidence of mortality and increases hospital discharge (Olajumoke, Afolayan, Raji, & Adekunle, 2012).

It is very crucial for nurses to know what to do and not to do in case of emergency situation like Sudden Cardiac Arrest (SCA), because CPR misapplied might lead to serious complications such as broken ribs, ineffective lung inflation and inadequate cardiac output, resulting in brain damage or death (Shahrakivahed et al., 2015).

## **1.2 BACKGROUND**

Cardiovascular disease is a leading cause of global mortality, accounting for almost 17 million deaths annually or 30% of all global mortality. In developing countries, it causes double as many deaths as HIV, malaria and TB combined. It is estimated that about 40-50% of all cardiovascular deaths are sudden cardiac deaths (SCDs) and about 80% of these are caused by ventricular tachydysrhythmias. Therefore, about 6 million sudden cardiac deaths occur annually due to ventricular tachydysrhythmias. The survival rate from sudden cardiac arrest is less than 1% worldwide and close to 5% in the US (Mehra, 2007).

Around 300,000 people suffer out-of-hospital cardiac arrest in the USA each year, either because of heart attack or a rhythm disturbance or witnessed with the symptoms of no pulse, no breath and no movement. Fewer than eight percent survive. According to the American Heart Association (AHA, 2017), SCA kills approximately 233,000 people each year in the United States. Over 750,000 citizens of the US and Europe suffer sudden cardiac arrest each year, and survival remains dismal. Over 75% of victims do not leave the hospital alive (Al-Janabi, MAM, & Al-Ani, 2014).

A new released article by American Association of Critical-Care Nurses, has shown the following findings: Approximately 209 000 in-hospital adult cardiopulmonary arrests occur each year in the United States. In children, it has been reported an incidence of 1.8 cardiopulmonary resuscitation (CPR) events per 100 admissions to the pediatric intensive care unit. Most cardiopulmonary arrests occur in a critical care unit, the operating room, or the emergency department. The Survival to discharge post CPR is estimated at 28% for neonates, 38% for children, and 26% for adults. These statistics suggest that 2 to 3 out of 10 cardiac arrest victims survive and, thus, the survival rates remain extremely low even in developed countries, despite the effort made. Therefore hospitals and institutions should emphasize on CPR training to cover the gap (Maheshwari et al., 2014).

Time is a critical component in a cardiopulmonary arrest. The earlier the CPR, the greater the chance of successful resuscitation. Cardiopulmonary resuscitation is one link in what the American Heart Association calls the “chain of survival”. The chain of survival is a series of

actions that, when performed in sequence, will double a cardiac arrest victims' chance of survival (Al-Janabi, MAM, & Al-Ani, 2014).

Despite this requirement for nurses to be equipped with knowledge and skills regarding CPR in order to respond timely, promptly and effectively, it is unfortunate that so many studies done on nurse's knowledge regarding CPR/BLS show that it is still tremendously low (Shahrakivahed et al., 2015).

In some developed countries the CPR Training programs are mandatory for all healthcare providers and even for non-medical workers. However, in developing countries the situation is not so as most health workers go for CPR Training programs if they want to, on their own not sponsored, except in some few centers where it is mandatory (Olajumoke et Al, 2012) .

Different studies conducted in different hospitals regarding knowledge of nurses on CPR either in developed or developing countries, found it to be inadequate (Shahrakivahed et al., 2015).

This study will be conducted at district hospital level in two randomly selected district hospitals (Kacyiru and Masaka). As a trainee and a provider of BLS and ACLS trained by AHA, the researcher realized the importance of this study after long time of observations in clinical placements, especially at district hospital level, whereby the majority of nurses don't know where to start and where to end in case of a cardiac arrest. The nurses could not identify the basic equipment to use in CPR, which is an evidence of lack of knowledge and the hospitals were lacking some equipment, like AED or resuscitation trolley (RT).



### **1.3 PROBLEM STATEMENT**

Cardiovascular disease is a leading cause of global mortality, accounting for almost 17 million deaths annually or 30% of all global mortality. In developing countries, it causes twice as many deaths as HIV, malaria and TB combined. It is estimated that about 40-50% of all cardiovascular deaths are sudden cardiac deaths (SCDs) and about 80% of these are caused by ventricular tachyarrhythmia. Therefore, about 6 million sudden cardiac deaths occur annually worldwide due to ventricular tachyarrhythmia which is easily treated once detected earlier. The survival rate from sudden cardiac arrest is less than 1% worldwide and close to 5% in the US (Mehra, 2007)

Sudden cardiac arrest kills approximately 233,000 people each year in the United States. Over 750,000 citizens of the US and Europe suffer sudden cardiac arrest each year, and survival remains dismal. Over 75% of victims do not leave the hospital alive (Al-Janabi, MAM, & Al-Ani, 2014).

In their study by Vedanthan et al, (2012) titled “Sudden Cardiac Death in Low- and Middle-Income Countries” revealed that in low and middle income countries (LMIC) SCA prevalence is higher than the high-income countries (HIC). The prevalence of SCA in LMIC was 3/100,000 while in the HIC like Ireland it was 51/100,000. The SCA prevalence for China was 41.8/100,000 (Cheng, Zhang, & Ruangwattanapaisarn, 2016).

Several studies highlight and emphasize on the lack of knowledge and skills of nurses to intervene in case of cardiac arrest. Considering the nature of their work, nurses as the backbone of the health system they should be equipped with tangible knowledge and skills to intervene promptly and accurately to the sudden cardiac arrest cases. Unfortunately most of the studies consulted gave an evidence of poor knowledge and skills of nurses regarding CPR.

A study conducted on “Knowledge of Nurses towards Cardio-pulmonary Resuscitation in a Tertiary Care Teaching Hospital in Nepal” revealed a mean of the overall knowledge scores of  $11.45 \pm 2.67$  (the maximum possible score was 21 (Parajulee & Selvaraj, 2011). Considering the neighboring country of Rwanda, located in a same region of East Africa, Uganda, in Mulago Hospital there was a cardiac arrest in 2.3 % (190) of 8,131 hospital admissions; 34.5 % occurred in the intensive care unit, 4.4 % in emergency operating

theaters, and 3.0 % in emergency wards. A majority (63.2 %) was unwitnessed, and only 35 patients (18.4 %) received CPR. There was return of spontaneous circulation (ROSC) in 14 (7.4 %) cardiac arrest patients. Survival to 24 hours occurred in three patients, which was only 1.6 % of all cardiac arrest patients during the study period. Trauma was the most common primary diagnosis and HIV infection was the most common co-morbidity (Ocen et al., 2015).

Very little is known about CPR in Rwanda. No prevalence for Rwanda regarding sudden cardiac arrest and sudden cardiac death literature is found. None of the literature has been found about knowledge and skills of nurses in Rwanda.

In Rwanda and most of low and middle-income countries there are very few articles and literature talking about CPR or BLS. An article from Rwanda Journal by Norgan et al (2015) highlighted that there is lack of trained staff to respond to critically ill patients and cardiopulmonary arrests in health facilities in Rwanda. This gap in human resources can lead to poor patient outcomes. Therefore, innovative strategies to provide the best and most appropriate patient care, are highly recommended (Norgan et al, 2015).

The togetherness of these mentioned reasons gave a burning idea of conducting such a study to find out if the nurses at district hospital level are really equipped to conduct accurate and organized CPR. The nurse group were chosen in this study because research has shown that 80% of medical care are provided by nurses in Rwanda and most of the care is given at district level

### **1.5 PURPOSE OF THE STUDY**

The purpose of this study is to assess the influence of training on knowledge and skills acquisition of nurses regarding CPR and AED at two selected district hospitals in Rwanda in order to equip nurses with adequate knowledge and skills regarding CPR.

### **1.6. SPECIFIC OBJECTIVES**

The objective of this study were to:

1 Assess the preexisting knowledge and skills of nurses on CPR and AED use (Pre-test) at two selected district hospitals in Rwanda.

2. Re-assess the nurses 'level of knowledge and skills of on CPR and AED use in the post-test at the selected Hospitals.

3. Determine the change in knowledge and skills of nurses on CPR and AED use between pre-and post-test at the selected hospitals

#### **1.4 RESEARCH QUESTIONS**

1. What is the level of knowledge and skills of nurses on CPR and AED use before face to face teaching (Pre-test) at the selected district hospitals?

2. What is the level of knowledge and skills of nurses on CPR and AED use at the selected Hospitals after face to face teaching (Posttest)?

3. What is the difference or change in knowledge and skills on CPR and AED use among nurses between the pre-test and posttest at the selected district hospitals?

#### **1.6 SIGNIFICANCE OF THE STUDY**

This study will impact positively on all four pillars of nursing: Practice, education, administration and research. For administration this study may serve to raise the need of training on CPR at district level for nurses.

In domain of practice this study could highlight the gap of knowledge by nurses at DH level and the need to provide CPR. Therefore it will realize the importance of continuous training in CPR and improve lifesaving in general if the results show poor knowledge.

This study will provide relevant information to the leaders of DH and other health authorities by revealing the extent of the problem and challenges that nurses are facing during resuscitation.

As very few studies have been conducted in this domain, the educators and researchers will use this study in their journey of research. The information provided in this study will give curiosity to explore more about other topics related to this study. It will serve as reference to the researchers.

This study will provide tangible knowledge and skills on CPR and AED use, as a training in line with American Heart Association guideline (2015) which was provided after the pre-test. Once the study shows the training to be effective, a recommendation of training on CPR/BLS

at district hospital level will be made at different levels of Rwanda Health System. Therefore the Ministry of Health may elaborate continuous program of training at district hospital level.

## **2.7 OPERATIONAL DEFINITION OF KEY TERMS PERTINENT TO THE STUDY**

**Cardiopulmonary resuscitation:** It is a manual application of chest compressions and ventilations to patients in a cardiac arrest at a ratio of 30:2 done in an effort to maintain viability of vital organs, such as the brain, heart, etc. until the advanced life support help arrives (AHA, 2015). The chest compression is done on the chest, the compression consist of pushing hard and fast, two rescue breaths are given after 30 compressions, a reassessment of pulse and spontaneous breathing is done every two minutes or 5 cycles.

**Sudden cardiac arrest:** According to the Utstein definition, Sudden cardiac arrest is a Sudden cessation of cardiac mechanical function as evidenced by absence of detectable pulse, absent or gasping breath, and loss of consciousness (Ocen et al., 2015). SCA occurs when the heart malfunctions and stops beating unexpectedly. If not treated within minutes, it quickly leads to death. In this case sudden cardiac arrest (SCA) is a condition in which the **heart suddenly** and unexpectedly stops beating. If this happens, blood stops flowing to the brain and other vital organs. SCA usually causes death if it's not treated within minutes and the treatment basically begins with chest compression and rescue breaths. Sudden cardiac arrest are mostly caused by ventricular fibrillation (VF). The treatment of VF is defibrillation with shock.

The shockable rhythm are pulseless ventricular tachycardia (PVT) and ventricular fibrillation (AHA, 2017).

**Sudden cardiac death (SCD):** is unexpected death caused by a change in heart rhythm.

**Automated external defibrillator (AED):** An automated external defibrillator (AED) is a Lightweight, portable device that delivers an electric shock through the chest to the heart. The shock can potentially stop an irregular heartbeat (arrhythmia) and allow a normal rhythm to resume following sudden cardiac arrest (AHA,2015). In this case the sudden cardiac death is an unexpected cession of breathing and heartbeat, the importance of CPR in this regard is to keep the noble organs including brain and the heart, itself, perfusion.

## **1.8 CONCLUSION**

Chapter one included an introduction, background of the study, problem statement, research purpose, objectives and questions inclusion definition of terms pertinent to the study and conclusion of the chapter. The consulted articles and theoretical literature evidenced that there is lack of knowledge among nurses. Most of literature concluded recommending continuous training on CPR for nurses for accurate and updated knowledge and proper intervention for prevention or intervention for someone in cardio-respiratory arrest.

## **CHAPTER 2 LITERATURE REVIEW**

### **2.1 INTRODUCTION**

Chapter two covers the global overview of cardiopulmonary arrest, causes of cardio-respiratory arrest a summarized management of cardio-respiratory arrest including the relevant algorithms. The chapter will further present an overview of knowledge of nurses regarding cardiopulmonary resuscitation including the burden of life that SCA and SCD are causing globally by providing statistics of prevalence and mortality rates in developed and developing countries as well as the consequences related to post successful and unsuccessful CPR. Inadequate knowledge of nurses' impact is also discussed. This chapter will also highlight the global perspective in management of a SCA by nurses.

### **2.2 SEARCH STRATEGY**

Literature of a quantitative nature, dating from ten years old was chosen for this literature review. Data bases such as CINAHL, PubMed, Medline, EBCO Host, Google Scholar, sci-hub were utilized to access the literature.

### **2.3 THEORETICAL REVIEW REGARDING CARDIAC ARREST.**

#### **2.3.1 What is sudden cardiac arrest?**

Sudden cardiac arrest is the sudden, unexpected loss of heart function, breathing and consciousness. Sudden cardiac arrest usually results from an electrical disturbance in the heart that disrupts its pumping action, stopping blood flow to the rest of the body (Mayo Clinic, 2017). About 6 million sudden cardiac deaths occur annually due to ventricular tachyarrhythmias. (Mehra, 2007). Sudden cardiac arrest prevalence is estimated to be 15-20% of all deaths worldwide. SCA occurs mostly among older adults than younger people (Hayashi et al, 2016).

#### **2.3.2. Prevalence of sudden cardiac arrest and sudden cardiac deaths**

Cardiac arrest is a public health threat. It accounts for 30% of all deaths globally (Mendhe, Burra, Singh, & Narni, 2017). The literature demonstrates that the WHO estimate that 17 million people died in 2008 from cardiovascular diseases which is classified as the leading killer among non-communicable and communicable diseases. Cardiopulmonary resuscitation (CPR) reduces in-hospital cardiac arrests and related deaths, when a patient receives CPR

promptly from adequately trained and specialized healthcare professionals (Plagisou, Tsironi, Zyga, Moisoglou, et al., 2015)

Despite being first responders to any emergency critical care including sudden cardiac arrest, most of the literature emphasize that the knowledge of nurses regarding CPR/BLS remains inadequate.

A randomized trial by Halm and Crespo(2018) has revealed completely different figures of survival rate post CPR compared to the previous literature consulted for the recent years. The Authors stated that approximately 209 000 in-hospital adult cardiopulmonary arrests occur each year in the United States. In children, the reported incidence is 1.8 cardiopulmonary resuscitation (CPR) events per 100 admissions to the pediatric intensive care unit.

The survival to discharge is estimated at 28% for neonates, 38% for children, and 26% for adults. The study suggested that 2 to 3 out 10 survive (Halm & Crespo, 2018).

#### **2.3.4. CAUSES OF CARDIAC ARREST 5HS AND 5TS**

Many different traumatic and medical conditions can lead to cardiac arrest in both adults and children. For example, electrical abnormalities, inherited disorders and structural changes in the heart can lead to cardiac arrest. Determining and treating the cause of cardiac arrest is critical to improving patient outcomes. Fortunately, many causes of cardiac arrest are reversible, including the conditions listed below. These conditions are often referred to by the mnemonic “H’s and T’s”:

**Hypoxia:** Hypoxia is a deficiency in the level of oxygen that reaches the tissues. This problem can occur due to a variety of conditions, such as lung disorders i.e. COPD and asthma. The condition can be reversed by administering oxygen either through BiPAP, a mechanical ventilator, or oxygen mask if the patient has spontaneous respirations.

**Hypovolemia:** One common cause of cardiac arrest is hypovolemia, which can develop due to excessive fluid or blood loss. It can occur as a result of extreme sweating, severe diarrhea and/or vomiting, or traumatic blood loss. Severe burns can also lead to hypovolemia. After initiating CPR, an intravenous line should be established if possible. The condition is reversed by administering fluids and blood products.

**Hypothermia:** Although not as common as other causes, hypothermia can also lead to cardiac arrest. When the body's core temperature drops below 30 degrees Celsius, cardiac output is decreased, which can lead to cardiac arrest. The body may not respond to CPR and defibrillation during the hypothermic state, thus rewarming should be implemented as soon as possible. Depending on how low the body temperature is, passive external rewarming or active internal rewarming may be indicated.

**Hypokalemia/Hyperkalemia:** Potassium is an electrolyte which plays a role in maintaining normal contraction of the myocardium. If levels become too high or too low, cardiac arrest may ensue. Causes of hypokalemia include excessive vomiting/diarrhea or use of diuretics. Chronic kidney disease can also lead to potassium loss. Treatment may include a controlled but rapid infusion of potassium. Hyperkalemia may be caused by kidney disease, diabetes and as a side effect of certain drugs. Hyperkalemia can be treated by administering sodium bicarbonate or calcium chloride shifting with insulin and glucose ,lastly performing dialysis, either hemodialysis or peritoneal dialysis.

**Hydrogen Ion (Acidosis)** Acidosis can be either metabolic or respiratory. Either cause can lead to cardiac arrest. An arterial blood gas is a quick and accurate method to determine if a patient is acidotic. If a patient has respiratory acidosis, he can be treated by providing adequate ventilation. Metabolic acidosis may be treated by administering sodium bicarbonate depending on the level of bicarbonate.

**Tension Pneumothorax:** A tension pneumothorax develops when there is a buildup of air in the pleural space. The buildup causes a shift in the mediastinum and venous return to the heart is obstructed, which can lead to cardiac arrest. Signs of a tension pneumothorax may include unequal breath sounds, tracheal deviation, difficult ventilation and JVD. The condition can be treated with a needle decompression and/or insertion of a chest tube.

**Tamponade (Cardiac):** Another reversible cause of cardiac arrest is cardiac tamponade. The condition occurs when fluid or blood fills the pericardium. The fluid puts pressure on the heart and prevents the ventricles from filling properly. It may be caused by trauma to the chest such as a gunshot wound or by inflammation of the pericardium. A pericardiocentesis or a thoracotomy is needed to remove the fluid.



**Toxins:** One of the most common causes of cardiac arrest is ingestion of toxins, or an overdose of some type of medication or street drug. One sign of cardiac arrest due to a drug overdose is a prolonged QT interval. In addition to supportive care, a reversing agent may be administered. For example, Narcan may be administered to reverse the effects of narcotic overdose.

**Thrombosis Pulmonary:** A pulmonary embolism can lead to cardiac arrest in some instances. A pulmonary embolism usually develops after a blood clot in another area of the body, such as the leg, travels to the pulmonary artery in the lung, leading to cardiac arrest. Prior to the arrest, the patient may exhibit symptoms such as shortness of breath, chest pain, decreased oxygen levels and a cough. Treatment usually includes embolectomy, fibrinolytic therapy or anticoagulant therapy.

**Thrombosis, Coronary:** A coronary thrombosis is a blockage within the coronary artery. It occurs due to blood which has clotted in the vessel. The occlusion in the vessel prevents blood flow to the heart. Cardiac arrest can occur depending on the location and extent of the blockage. Treatment includes angioplasty and stent placement or coronary artery bypass surgery.

Sometimes other signs and symptoms precede sudden cardiac arrest. These may include fatigue, fainting, blackouts, dizziness, chest pain, shortness of breath, weakness, palpitations or vomiting. But sudden cardiac arrest often occurs with no warning (Durila, 2018).

### **2.3.3 Cardiac arrest management**

The cardiac arrest management includes CPR which is a manual application of chest compressions and ventilations to patients in a cardiac arrest at a ratio of 30:2 (AHA, 2015), done in an effort to maintain viability until advanced life support help arrives. The management of cardiac arrest includes also the use of the AED, which is used to deliver defibrillation in case of shockable rhythm. The shockable rhythm is pulseless ventricular tachycardia (PVT) and ventricular fibrillation (VF) also cardioversion can be considered in some cases of tachyarrhythmias (AHA, 2015).

Defibrillation is the use of a high-energy electric shock that stops the chaotic arrhythmias such as pulseless ventricular tachycardia PVT and ventricular fibrillation (VF).

Using automated external defibrillators (AEDs) is the key to survival rate improvement. Hospital and companies should make sure all employees are trained to use them, this can make a big difference between life and death. Places such as offices, airports, schools, shopping malls, grocery stores, manufacturing plants and golf courses should be equipped with AEDs (AHA, 2017). The automated external defibrillator (AED) has been described by British Heart Foundation as the single most important development in the treatment of SCA (British Heart Foundation AEDs guidelines, 2013). The victim's chance of survival falls by around 7 - 10% with every minute that defibrillation is delayed (British Heart Foundation AEDS guidelines, 2013).

#### **2.3.4 Chain of survival**

The American Heart Association's Chain of Survival depicts the critical actions required to treat life-threatening emergencies, like cardiac arrest and associated conditions: This chain is made of a continuous series of links to adopt in order to rescue a patient with cardiac arrest. These links include:

- Early recognition of SCA and Early Access to the emergency response system).
- High quality CPR
- Early Defibrillation
- Basic and Advanced Emergency medical services Care team arrival and post arrest care (AHA, 2015).
- Advanced life support and post arrest care.

**See figure 2.1 below.**



**Figure 1: Survival chain**

If the sequences of chain of survival are well followed the survival rate will be improved post cardiac arrest.

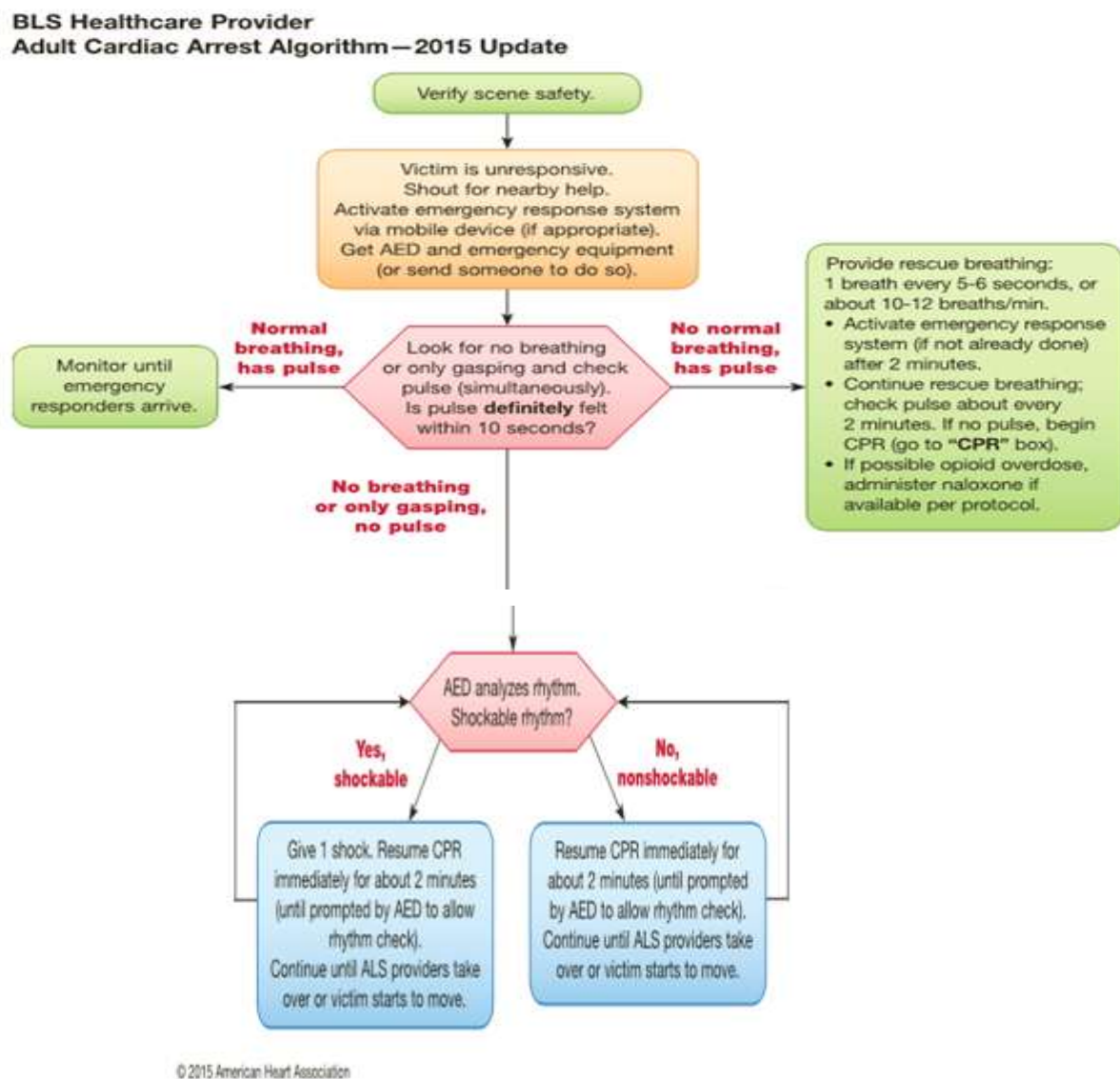
### **2.3.5. CPR ALGORITHM WITH TWO OR MORE RESCUERS**

For a good understanding and good performance of CPR the American Heart Association has made summarised algorithm which makes CPR much easier once memorised. The algorithms are made based on the age. We have neonate algorithm, paediatric and adult. AHA made also the algorithm based on the number of rescuers. Different steps need to be taken in consideration

- The first step is summarised into 3S (safety, stimulation and shout for help), once the victim is encountered the rescuer needs to check for the safety of herself and for the patient, stimulate the victim by tapping the shoulder if no response shout for help and request for AED.
- Check of pulse and breathing for less than ten second
- Activate emergency response according to the local police
- If no pulse start CPR with 30:2 ratio, 30 stands for compressions and 2 stand for rescue breathing if possible.
- Give a shock if advised by AED. Resume CPR after each shock.

- Check for pulse every 2 minutes or 5 cycles.
- Continue the same procedure until the ROSC (return of spontaneous circulation) or ACLS team arrives (AHA, 2015). See figure 2.2 below

**Figure 2: CPR/BLS ALGORITHM FOR ADULT**



**Figure 2. BLS Healthcare Provider Pediatric Cardiac Arrest Algorithm for 2 or More Rescuers—2015 Update.**

## **2.4. EMPIRICAL REVIEW**

### **2.4.1. Empirical review on nurses' knowledge and skills acquisition regarding CPR and AED use by training.**

During the in-hospital cardiac emergencies the registered nurses (RN) are most of the time the first persons to respond with basic and advanced lifesaving measures. It should be mandatory for them to have a full package to respond timely and adequately to any emergencies including sudden cardiac arrest and provide effective CPR/basic life support (BLS).

In developed countries the course of CPR/BLS is becoming mandatory for all health care providers, extended even to non-health care professionals. In the United States, BLS training has been recommended for all health care professionals since 1966 especially for those who are involved in resuscitation. In developing countries like Nepal there is no standard and BLS is not routine (Roshana, 2012). No studies found worldwide talking about nurses' knowledge and skills regarding CPR but it has been reported that the knowledge of nurses on CPR differs even in developed countries as in developing countries. Studies conducted in USA and United Kingdom on knowledge of nurses revealed how the nurses lack of knowledge regarding CPR is across the world regardless of the country income (Rajeswaran & Ehlers, 2014).

CPR is a developing procedure in most of African countries including Rwanda. In hospitals nurses usually discover cardiac arrests and initiate CPR procedures. Inadequate initial assessment, inappropriate treatment and inadequate monitoring contribute to poor CPR outcomes. However, there is no established cost-effective BLS training program (Rajeswaran & Ehlers, 2014). In Botswana nurses provide up to 80% of healthcare services in primary and secondary healthcare facilities. Nurses in Botswana should thus be competent and skilled in CPR provision to enhance the survival rates of cardiac arrest patients. In Botswana there is no established CPR training for hospital-based healthcare providers, and this situation is similar to that in other countries like Nepal (Rajeswaran & Ehlers, 2014)

In a study conducted on “Evaluation of knowledge on CPR/Basic Life Support Training Program provided to nurses in a teaching University Hospital in Istanbul in Turkey”, the pre- and post-test a statistically significant difference was found between the mean pre- and post-test scores .The pre- test mean was 47,88% with a posttest mean of 81.74% (Terzi, Polat, & Düzkaya, 2017). This shows that even in a developed country the knowledge of nurses regarding CPR remains low but it can be improved with training.

Rajeswran and Ehlers (2014) in their study on cardiopulmonary resuscitation knowledge and skills of registered nurses in Botswana, mentioned that in Botswana nurses provide most of health care in the primary, secondary and tertiary level clinics and hospitals. Trauma and medical emergencies are on the increase, and nurses should have cardiopulmonary resuscitation (CPR) knowledge and skills in order to be able to implement effective interventions in cardiopulmonary arrest situations. Their objective was to assess the knowledge and skills of registered nurse regarding CPR (Rajeswaran & Ehlers, 2014). A pre-test, intervention and re-test time-series research design was adopted, and data were collected from 102 nurses from the two referral hospitals in Botswana. A multiple-choice questionnaire and a checklist were used to collect data.

The result showed that all nurses failed the pre-test. The knowledge increased after training but it deteriorated over the three months after the post-test.

A similar study was conducted by Aziz Shahrakivahed in 2015 on “The Effect of CPR Workshop on the Nurses’ Level of Knowledge and Skills” using three tests, before training, immediately after training and three months later on 140 nurses of Zabol University of Medical Science. The results revealed that the minimum score in pre-test was 12% and a mean of 21%, while the mean post workshop training improved up to 41% and 45% in a three months later test with a  $P=0.001$ . In the Pretest the lowest score was 12% with the highest score of 35%. The immediate test post training has shown the lowest score of 35% and the highest of 47% while a delayed test after three months revealed 42% as the lowest and 48% as the highest. This study shows that the knowledge has improved after training and it has improved more after three months but still no one among them could achieved a score of 50%. This shows that even after a workshop the knowledge can remain low which can be the reason for continuous teaching program of CPR/BLS for nurses (Aziz, 2015).

The current study's result goes hand in hand with A study which aimed at assessing nurses' knowledge and skills following cardiopulmonary resuscitation with training conducted at Mbarara Regional Referral Hospital in Uganda which is a neighboring country to Rwanda in the North. The prospective interventional design was adopted with a sample size of 32 nurses. The results have showed the following: The average score prior to instruction was 53.8% for knowledge and posttest 82.5%, and for skills was 46% pre-instruction and 81.5% post instruction. There was a statistically significant improvement in the CPR knowledge and ( $p = 0.02$ ) for CPR skills. The pretest scores knowledge and skills ranged from 33.3% to 72.2% and 3.2% and 77, 4% respectively. The average pre-test score on the knowledge was 53.8% and 46.0% for skills. Following the instructional intervention, the post test score ranged from 72.0 to 95.2% for knowledge and 70.9% and 95% for skills. The post-test mean score improved to 82.5% knowledge and 81.5% skills. (Munezero A et Al, 2018).

Abraham and Caroline (2016) conducted a study of assessing the level of knowledge on cardiopulmonary resuscitation among nurses. This study aimed to assess the knowledge on revised cardio-pulmonary resuscitation guidelines among nurses. A descriptive cross-sectional study design was adopted for that study. The data were collected from 100 nurses using a self-developed questionnaire made of different questions.

The following were the results: 54% of nurses had moderately adequate knowledge and 46% of them had inadequate knowledge on cardio-pulmonary resuscitation. Generally, the study has shown a lack of adequate knowledge on CPR among nurses. None of them showed an evidence of having adequate knowledge on CPR (Abraham and Mary, 2016). This study reveals a need of continuous training program and evaluation of knowledge on CPR for nurses.

## **2.5. CONCLUSION**

Knowledge of nurses on CPR is very crucial in every setting or health facilities, either in the hospital or outside of the hospital when it comes to a sudden cardiac arrest. In the review of literature consulted, they all highlighted the importance of knowledge and interventions of nurses towards cardiopulmonary arrest victims, because of the nature of their job being 24/7 bedside care providers. The almost common point highlighted is that the knowledge and skills of nurses were very poor in the pre-test but a significant improvement was observed in the post teaching reassessment.

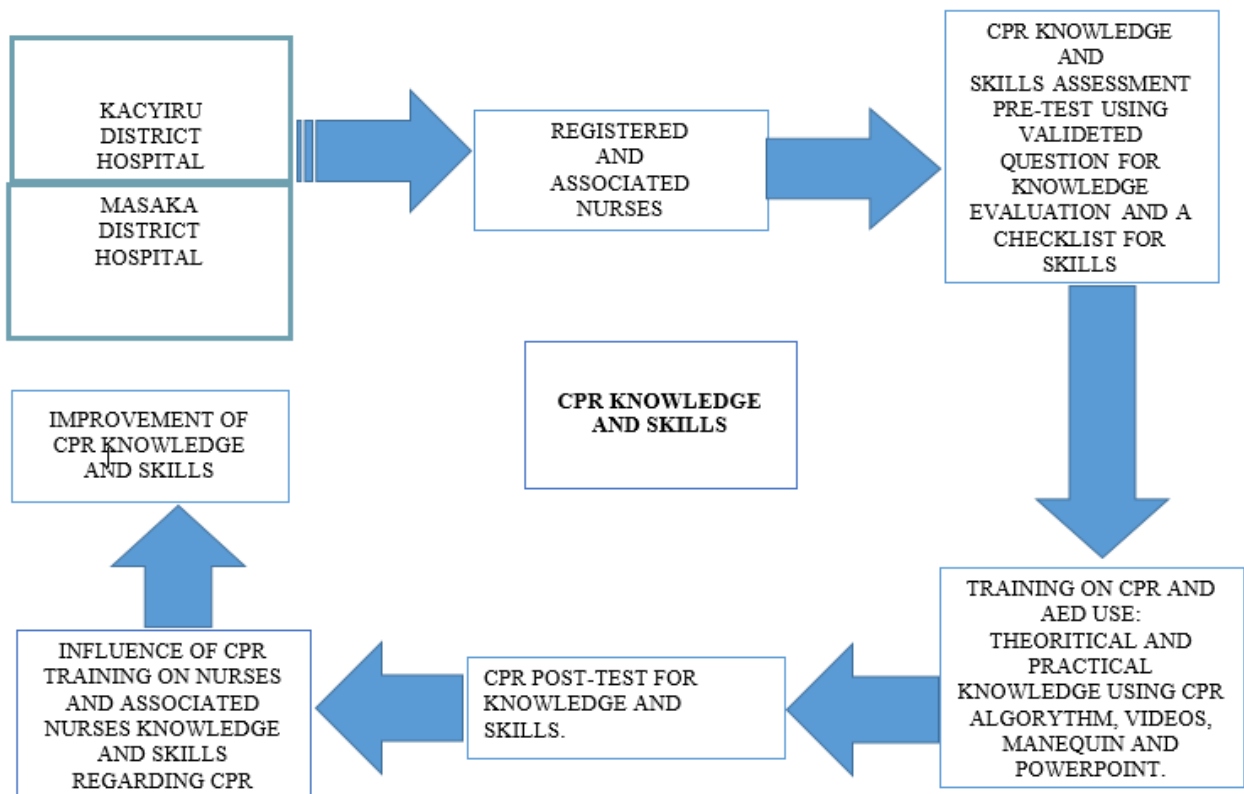
The CPR in Western countries is far better compared to India, China and African countries including Rwanda. It is obvious that CPR is done in Rwandese health facilities especially in teaching and referral hospitals but no document was found talking either about, training, prevalence or incidences about cardiac arrest or about nurses training on CPR. Most of the articles consulted suggest training and frequent refresher courses for nurses to keep their knowledge and skills on CPR accurate and up to date.



## 2.5 CONCEPTUAL FREAMWORK

This study consisted of two main components, the first aim was to assess the pre-teaching knowledge and skills of nurses at two selected district hospitals in Rwanda. The second aim was to train those nurses and associated nurses on Basic life support. The training consisted of Power point, CPR based videos according to AHA (2015) guideline. A portable mannequin from AHA was used for skills acquisition and skills evaluation thereafter a post test was given to reevaluate the knowledge and skills using the same questionnaire and checklist used in the pre-test. See figure 2.3 below.

**Figure 3: Conceptual frame work**



**Figure.2.3 CONCEPTUAL FREAMWORK**

## **CHAPTER 3. RESEARCH METHODOLOGY**

### **3.1 INTRODUCTION**

This chapter describes the methodology that will be used in this study. It comprises a description of the study approach, study design, the study area, the sampling strategy and the sample size, the data collection tools and procedures, the data analysis and management, the ethical Consideration and the study limitations.

### **3.2 STUDY APPROACH**

A quantitative approach was adopted. This is an approach that gathers information, focusing on describing a phenomenon across a larger number of participants by providing the possibility of summarizing characteristics across groups or relationships. This approach surveys a large number of individuals and applies statistical techniques to recognize overall patterns in the relations of processes (Creswell, 2014).

The results of quantitative analysis are most commonly reported in the form of statistical tables or graphs. The presentation of results usually begins with descriptive statistics describing who is in the sample. This can take the form of univariate statistics (such as frequency distributions, means, and standard deviations) or simple graphs (such as pie charts, bar graphs, or histograms).

### **3.3 THE STUDY DESIGN**

The design of this study is a quantitative, quasi-experimental interventional, pretest-posttest design. The pretest-posttest study design is appropriate to evaluate the effectiveness of an intervention by comparing the baseline results before the intervention (pretest) with the results after the intervention (posttest). It shows that the outcomes resulted from the intervention and not the previous knowledge of the participants. The population was nurses in general.

### **3.5 THE STUDY SETTING**

This study was conducted at two district hospitals among 37 district Hospitals. These hospitals are Kacyiru hospital located in Kigali City, Gasabo district, Kacyiru sector. The Second is Masaka District Hospital located in Kigali City, Kicukiro District in Sector of Masaka.

### **3.6 STUDY DESCRIPTION**

This study took place in two randomly selected hospitals by picking up in a basket by someone else among 37 district hospitals, whereby a pre-test was given to the participants, followed by a teaching session with power point presentation, videos with a mannequin demonstration. Thereafter a post test was given for both knowledge and skill, the same test as the pre-test. The checklist was used to test the skills of the participants for the posttest.

### **3.6 STUDY POPULATION**

The research was interested in registered nurses (A1 and A0) and associated nurses (A2) working at district hospital level. Specifically at accident and emergency (A&E), medical-surgical ward and outpatient department (OPD). District hospitals were chosen considering health care system in Rwanda. Most of care such as primary, secondary and some tertiary care are rendered at district hospital level. The study was again interested in nurses because of the nature of their job of being the first persons to diagnose and respond to cardiac arrest. The total number of the nurses at the selected hospitals was 180 nurses including registered nurses and associated nurses.

### **3.7 INCLUSION AND EXCLUSION CRITERIA**

Only registered nurses (advanced diploma and bachelor's Degree holder) and associated nurses were included in the study. The participation was voluntary and the data collection was done after signing a consent. Nurses and associated not licensed did not participate in the research. Pediatric and neonatology departments' nurses were also excluded because the focus of the study were adults. Inability to obtain the consent was also one of the criteria for exclusion.

### 3.8 SAMPLE AND SAMPLING STRATEGY.

Sampling strategy is the way that a researcher uses to obtain the desired sample. In this case the researcher considered, random sampling strategy by picking randomly the two involved district hospitals among 37 district hospitals in Rwanda.

The sample size of nurses was obtained using simple random sampling, whereby the names of nurses were put into a basket thereafter, another person was asked to pick the name randomly until the desired sample size was reached.

This method was applied to each of the two hospitals. The researcher considered Emergency department, Outpatient department, and medical-surgical wards.

The sample size was determined using Taro Yamane's Formula. Only the pediatric and neonatology departments' nurses were excluded because the study is mostly about adult population. The duration for this exercise was one day at each hospital.

#### **Taro Yamane's Formula**

$$n = \frac{N}{1 + N e^2}$$

n stands for sample size, N = population size, and e = Margin of error (MoE) or acceptable sampling error, e = 0.5 based on the research condition.

The following are the sample obtained after mathematical calculation using Taro Yamane formula

Masaka district hospital has 108 nurses

Kacyiru Police district hospital has 72 Nurses in respective department

by using Taro Yamane's formula, the following was the results.

The sample size or n

$$n = \frac{N}{1 + N \cdot e^2}$$

e is the margin of error and it is equal to 0,05

$$n = \frac{180}{1 + 180 \cdot 0.05^2}$$

$$n = 124$$

The sample size was 124

**Table 1: Sample size for each hospital**

<b>Masaka DH</b>	<b>Kacyiru Police DH</b>	<b>Sample size</b>
<b>n= 108x124/180</b>	<b>n= 72x124/180</b>	<b>N=124</b>
<b>n=74</b>	<b>=49.6</b>	

One hundred and twenty four (124) nurses were supposed to be the sample size unfortunately due to some inconvenience only 87(70%) nurses were available for the study. The response rate was therefore 70%. Only 40 nurses from Kacyiru were available at the time of training and both tests while 47 nurses from Masaka were available at the time of training and tests

### **3.9 DATA COLLECTION PROCESS**

Data collection is a way of collecting information either in the form of words or numbers, records, videos etc. Data collection procedures uses different study instruments or study tool (Creswell, 2014). For this study a validated questionnaire of 20 multiple choice questions and a checklist of twelve questions were used to collect the necessary information to carry out the study. The researcher himself went to each of the selected district hospitals, explained about the procedure, and obtained the consent from the participants. The researcher gave enough time for participants to respond to the pretest, and explained any difficulties.

The researcher tested the knowledge and skills of the nurses using the questionnaire and checklist followed by a training on CPR then gave the same test as the post-test right after the training for post-test knowledge and skills evaluation. Due to the need of CPR training both hospitals availed their conference rooms and personnel not only nurses and associated nurses but also Medical doctors, midwives, human resources, drivers and other different kind of personnel. Projectors and IT technicians were available to facilitate a smooth training. The researcher started by introducing himself. He proceeded by explaining about the research's main purpose and objectives, thereafter the researcher explained about the consent which was signed by the supposed study participants. The training started around 8:30 am after the pre-test. The researcher started by theoretical part composed of PowerPoint incorporated with CPR videos in line with American Heart Association followed by practice on a mannequin from AHA, whereby most of the participants had time for practice (chest compression, rescue breath and AED use).

### **3.10 DATA COLLECTION INSTRUMENTATION**

The instrument to this study was a questionnaire of 20 multiple choice questions adopted from the **National Health Care Provider Solutions**, which is an association accredited by the same company as American Heart Association. The permission granted via email. The instrument is composed also with a checklist for skills assessment composed of twelve questions adopted from a study “Assessment of nurses’ cardiopulmonary resuscitation knowledge and skills within three district hospitals in Botswana” the permission was granted by Dr Lakshmi Rajeswaran from University of Rwanda, the Author of the study. Therefore they were both questionnaire and checklist adapted to my study.

### **3.11 VALIDITY AND RELIABILITY OF THE INSTRUMENT**

Validity is about the trustworthiness of the research instrument to measure what it is supposed to measure, while the reliability is the reproducibility of the instrument to measure the same variable at different point in time (Polit and Beck, 2008).

The questionnaire used for this study is a validated tool from national health care provider solutions in United States which has attributions of providing online training and certificate on basic life support, advanced cardiovascular life support, advanced trauma life support and pediatric life support. This questionnaire is composed of 20 multiple choice questions. Its cronbatch Alpha is 0.7. The instrument is composed also of a checklist composed of twelve questions adopted from a study” Assessment of nurses’ cardiopulmonary resuscitation knowledge and skills within three district hospitals in Botswana” the use permission was granted by Dr Lakshmi Rajeswaran, the Author of the study. Therefore they were adapted to my study. A pilot study with 10 nurses with the same characteristics was conducted to determine contextual or cultural differences. Before consideration of these, instruments they were submitted to be evaluated by senior and high profiled persons for its validation.

### **3.12 DATA ANALYSIS**

Data were collected using a questionnaire and a checklist for skills then analysis was done using SPSS version 23. Wilcoxon signed rank test was used to analyze inferential statistics. The variables were coded to enable the statistical analysis. The level of confidence interval was 95% and P value < 0,05 to determine association between variables. Afterward data were presented in tables as frequencies, percentages and Pie chat. The results were analyzed using categories based on a study by Maheshwari et al (2014). Study to “Assess Knowledge and

Attitude Regarding Hand Hygiene amongst Residents and Nursing Staff in a Tertiary Health Care Setting of Bhopal City” (Maheshwari et al., 2014) where by >75 had good knowledge, 50-74 as moderate knowledge and below 50 as poor knowledge.

### **3.13 ETHICAL CONSIDERATIONS**

A letter of ethics clearance was granted by the UR/CMHS Ethics committee, thereafter it was presented to the Ethics Committees of each of the two participant district hospitals. Data collection was commenced after the approval of the hospitals management and their Institutional Review Boards (IRB). This research was in respect to the ethical principles for the protection of participants from any harm or integrity violence. Participants were allowed to give informed consent after explaining the research purpose, objectives and process including risks and benefits.

Anonymity was observed by assigning codes to the completed questionnaires so that the names of the participants could not be revealed. Confidentiality was observed through keeping the research documents in a password-controlled computer. The ethical principles of beneficence and maleficence was observed through minimal potential risks.

### **3.14 LIMITATION OF THE STUDY**

The limitation to this study was to meet the targeted sample. The challenge was that only 47 participants at Masaka hospital were available for the study in place of 74 while at Kacyiru 40 participants were available instead of 50 which was the targeted sample. This was due to many factors such as staff shortage, attendance to other training and hospital meetings. Data collection was done in April which is a month in which Rwanda commemorate the Genocide against Tutsi therefore some who were supposed to be participants were not available. This was reported by the management of both Hospitals. In addition to this, another partial limitation was limited literature regarding nurses’ knowledge and skills regarding CPD in Africa especially in Rwanda.

### **3.15 DATA MANAGEMENT**

Soft data are stored in a locked computer with a password known by the researcher only, and hard data are kept in a very safe and secured place out of the reach of any body, except the researcher. In addition, those data will continue to be kept up to five years thereafter they will be shredded and incinerated as the university policy recommends. The confidentiality of data

will be ensured by making the participation anonymous even during dissemination of findings.

### **3.16 DISSEMINATION OF FINDINGS**

The thesis will be submitted to UR/CMHS library, as the rules recommend. At the completion of this work, the researcher will be due to publish the study in a scientific journal. At any opportunity the researcher will not miss a chance to publish the findings in different conferences and symposiums. Each of the two hospitals will be given a summarized report regarding the findings.

### **3.17 CONCLUSION**

This chapter describes the study approach as a quasi-experimental, quantitative, cross-sectional and interventional study design. The study setting was held at two district hospitals. The simple random sampling was used to select the district hospitals and the sample size was calculated using Taro Yamane formula, data collection methods used a questionnaire and a checklist for knowledge and skills assessment of nurses in the pre and post teaching test. The instruments were validated and accredited. Data collection procedure was in respect to the academic and ethical regulations, data analysis was done using SPSS version 23 with descriptive data, inferential statistics analysis was done using Wilcoxon signed rank test as the data were not normally distributed. The participation was voluntary with informed consent secured before the pre-test. At the end of the study the dissertation will be compiled and later the study will be published in a scientific journal. Conferences and symposium will be used for dissemination of the study findings.



## **CHAPTER4: PRESENTATION OF THE RESULTS**

### **4.1 INTRODUCTION**

This chapter aims to present the results and give meaning to different variables used during data collection and this task was facilitated by use of SPSS version 23. Demographic data, knowledge score in pretest and post-test, skills scores in pretest and post-test are presented in different sections. Due to the mentioned reason the targeted sample was not met only 87 participant were available instead of 124.

Demographic data, knowledge score in pretest and post-test, skills scores in pretest and post-test are presented in different Sections.

### **4.2. DESCRIPTION OF SOCIAL DEMOGRAPHIC DATA**

Demographic data include, gender, study level, assigned hospital, marital status, age of participants, work experience. Results are summarized in table 4.1

Participants male and female were 40(46.0%) and 47(54.0%) respectively. Most of participants

64(73.6%) had diploma in nursing (A1) and 12(13.8%) Associated Nurse or A2 while 11(12.6%) were Bachelor's degree holders. Most of participants 37(42.5%) were grouped between 20-30 years old.

Most of the participants had work experience ranging between 1-3 years. Over half (54%) are deployed at Masaka hospital. Participants who were single (50.6%) are nearly equal to participants who are married (49, 4%).See table4.1 below.

**Table 2: DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS (N=87)**

<b>Variables</b>	<b>Frequency (n)</b>	<b>Percent (%)</b>
<b>Gender</b>		
Male	40	46.0
Female	47	54.0
<b>Study level</b>		
Associated nurse A2	12	13.8
Diploma A1	64	73.6
Bachelors degree	11	12.6
<b>Hospital</b>		
Kacyiru	40	46.0
Masaka	47	54.0
<b>Marital status</b>		
Single	44	50.6
Married	43	49.4
<b>Age of participants</b>		
20-30	37	42.5
30-40	30	34.5
40-50	20	23.0
<b>Experience</b>		
<1	8	9.2
1-3	38	43.7
3-5	26	29.9
5-10	15	17.2

### 4.3 CATEGORIZATION OF KNOWLEDGE

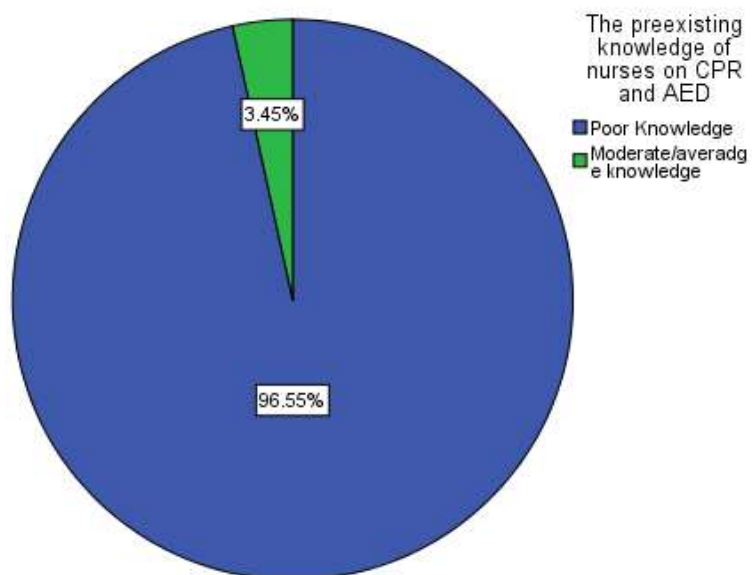
The level of knowledge was categorized in three group

>75% good knowledge

50-74 moderate knowledge

<50 poor knowledge.

The statistics show that 96.55% of participants had poor knowledge in pretest and only 3.45% had moderate knowledge. None of participant had good knowledge in pretest. The preexisting knowledge seem to be inexistent before teaching. **See figure below.**



**Figure 4: PREEXISTING KNOWLEDGE OF NURSES ON CPR AND AED**

#### **4.4 DISTRIBUTION OF SCORES AMONG PARTICIPANTS ABOUT PREEXISTING KNOWLEDGE ON CPR AND AED.**

The analysis shows that 59(67.8%) of participant responded wrongly on the question which was asking 2015 AHA guidelines for CPR which recommend the sequence for BLS, 65(74.7%) failed to respond critical characteristics of high quality CPR. 30(34.5%) knew that 8 years of age age indicated to use AED pads. The majority 61(70.1%) of participants did not know the ratio of compression to ventilation when one rescuer is giving CPR to victims that is 30:2.

Results also show that only 27(31.0%) knew where they should attempt to perform pulse check in an adult during CPR.

Among participants, only 27(31.0%) knew one of the 5 links which is included in adult chain of survival, 24(27.6%) knew the first step to take during CPR when encounter a patient who appears to be cardiac or respiratory arrest.

The majority 63(72.4%) participants failed to know that when there is one rescuer, the compression to ventilation ratio is 30:2. only 17(19.5%) knew the steps for operating an AED. Participants were also given a scenario of a 21 years old who turned blue and collapse while eating a hot dog at a bar, only 23(26.4%) knew that this client was choked. Only 29(33.3%) knew why ventilations should be delivered to a pediatric arrest patient before seeking assistance in single rescuer scenarios.

Participants were given also a scenario of 3-year-old child unresponsive. She had laid down for a nap because she was not feeling well and when you checked on her, she was not breathing and appeared blue. You are by yourself.

The participants were asked to list the first step in managing the case and only 28(32.2%) responded well.

57(65.5%) did not know when a child is breathing spontaneously at a rate of 18 and the pulse is 50 beats per minute, have to begin CPR. Same results were found for the scenario which was about caring a 49 years female suffers a witnessed cardiac arrest and notice a e4bulge in the upper left child under the skin. There was a healed incision overlying the bulge.

Only 28(32.2%) knew what AED stands for.

Few 26(29.9%) participants knew that the next step after delivering a shock you have to resume CPR. When assessing the knowledge of nurses on CPR and AED, the results showed

that a large number gave incorrect answers to all knowledge assessment items. A big number of people who got the right answer was observed at compression/ventilation ratio 30:2 for any age once there is one rescuer. **See table below**

**Table 3: THE PERCENTAGES OF RIGHT AND WRONG ANSWERS BEFORE TEACHING**

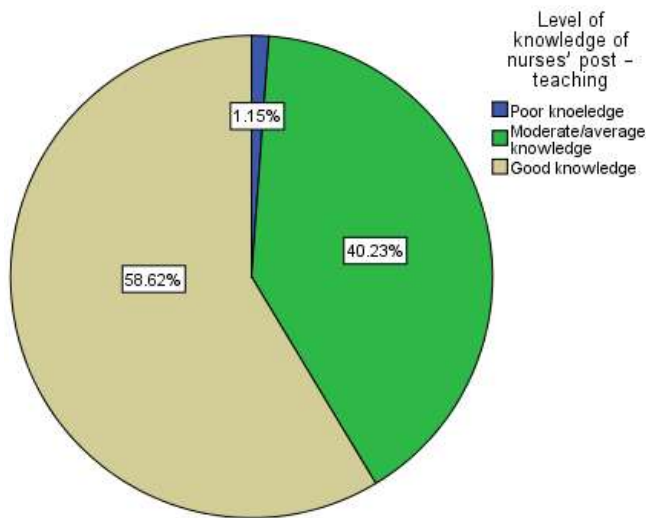
KNOWLEDGE ASSESSMENT ITEMS (87)	PRETEST	
	Correct answer (%)	Incorrect(%)
The 2015 AHA Guidelines for CPR recommended BLS sequence of steps(compression, airway, breathing)	28(32.2)	59(67.8)
Critical characteristics of high-quality CPR include(All of the above)	22(25.3)	65(74.7)
Necessary age to use the child AED pads (8 years of age or younger)	30(34.5)	57(65.5)
compression to ventilation ratio for the one-rescuer giving CPR to victims of any age (30:2)	26(29.9)	61(70.1)
Where you should attempt to perform a pulse check in an adult (Carotid)	27(31.0)	60(69.0)
Situations an AED can be used safely (Victim lying in the snow)	36(41.1)	51(58.6)
The 5 links in the adult Chain of Survival	27(31.0)	60(69.0)

include (Usage of Cardiovascular Medications)	24(27.6)	63(72.4)
You are alone the first step you should take to stabilize the patient when you encounter a patient in what appears to be cardiac or respiratory arrest (chest compression for 2 minutes )	31(35.6)	56(64.4)
Both infants and children, the compression to ventilation ratio for one-rescuer CPR is:(30:2)	17(19.5)	70(80.5)
The proper steps for operating an AED (Power on the AED, attach electrode pads, , analyze the rhythm, shock the patient)		
Most likely cause to a 21year old intoxicated college student who turns blue and collapses while eating a hot dog at a bar. (chocking)	23(26.4)	64(73.6)
You assess that the patient still has a pulse, the next step in managing (Begin CPR)	23(26.4)	64(73.6)
Age considered as an infant for BLS purposes(under1)	19(21.8)	68(78.2)
Why are ventilations delivered to a pediatric arrest patient before seeking assistance in single rescuer scenarios (Most pediatric cardiac arrests are due to respiratory arrest)	29(33.3)	58(66.7)

<p>You are a daycare provider and find a 3-year-old child unresponsive. She had laid down for a nap because she was not feeling well and when you checked on her, she was not breathing and appeared blue. You are by yourself. What is the first step in managing this case?( Deliver 2 minutes of CPR)</p>	<p>28(32.2)</p>	<p>59(67.8)</p>
<p>The child begins to breath spontaneously at a rate of 18. Her pulse is 50. What is the next step? (Begin CPR)</p>	<p>30(34.5)</p>	<p>57(65.5)</p>
<p>AED stand for (Automated External Defibrillator)</p>	<p>28(32.2)</p>	<p>59(67.8)</p>
<p>A 49-year-old female suffers a witnessed cardiac arrest. She has a known cardiac history per her family. You notice a bulge in the upper left chest under the skin. There is a healed incision overlying that bulge. Which is true of AED use (Avoid placing pads over bulge)</p>	<p>30(34.5)</p>	<p>57(65.5)</p>
<p>The AED indicates shock advised. The next step is (Clear the patient)</p>	<p>25(28.7)</p>	<p>62(71.3)</p>
<p>The next step in caring for this patient After delivering a shock (Resume CPR)</p>	<p>26(29.9)</p>	<p>61(70.1)</p>

#### 4.5. LEVEL OF KNOWLEDGE OF PARTICIPANTS IN POST TEST

Participants were assessed after teaching and results showed that there was an increase in score in terms of knowledge comparing to the pretest. After training the results showed that 58.62% had good knowledge, 40.23% had moderate knowledge and only 1.15% had poor knowledge. See figure below



**Figure 5: LEVEL OF KNOWLEDGE IN POST-TEST FOR THE PARTICIPANTS.**

#### 4.6. DISTRIBUTION OF KNOWLEDGE SCORES AMONG PARTICIPANTS IN POSTTEST

The table 4.3 shows that 24(27.7%) of participant responded wrongly on the question which was asking 2015 AHA guidelines for CPR recommending the sequence for BLS, 9(10.3%) failed to respond critical characteristics of high quality CPR in posttest .66(75.9%) knew that 8 years of age indicated to use AED pads. 17(19.5%) of participants did not know the ratio of compression to ventilation when one rescuer is giving CPR to a victims.

Results also show that 58 (66.7%) knew where they should attempt to perform pulse check in an adult during CPR.



Among participants, 60(69.0%) knew one of the 5links which is included in adult chain of survival. 75(86.2 %) knew the first step to take during CPR when encounter a patient who appears to be cardiac or respiratory arrest.

30(34.5%) participants failed to know that when there is one rescuer, the compression to ventilation ratio is 30:2 for both infants and children. Only 17(19.5%) knew the steps for operating an AED.

Participants were also given a scenario of a 21 years old who turned blue and collapse while eating a hot dog in bar, 65(74.7%) knew that this client was choked.

56(64.4%) participants knew why ventilations should be delivered to a pediatric arrest patient before seeking assistance in single rescuer scenarios.

Participants were given also a scenario of 3-year-old child unresponsive. She had laid down for a nap because she was not

Feeling well and when you checked on her, she was not breathing and appeared blue. You are by yourself. The participants were asked to list the first step in managing the case and 59(67.8%) responded well. 28(32.2%) did not know when a child is breathing spontaneously at a rate of 18 and the pulse is 50 beats per minute, have to begin CPR.

57(65.5%) of participants knew what AED stands for.

61(70.1%) participants knew that the next step after delivering a shock you have to resume CPR. **See table 4.3 below**

**Table 4: LEVEL OF KNOWLEDGE OF PARTICIPANTS IN POST TEST**

KNOWLEDGE ASSESSMENT ITEMS (87)	POSTTEST	
	Correct answer	Incorrect answer
<b>a</b> .The 2015 AHA Guidelines for CPR recommended BLS sequence of steps(compression, airway, breathing)	63(72.4)	24 (27.7)
<b>b</b> .Critical characteristics of high-quality CPR include(All of the above)	78(89.7)	9(10.3)
<b>c</b> . Necessary age to use the child AED pads (8 years of age or younger)	66(75.9)	21(24.1)
<b>d</b> . Age of the compression to ventilation ratio for the one-rescuer giving CPR to victims (30:2)	70(80.5)	17(19.5)
<b>e</b> . Where you should attempt to perform a pulse check in an adult (Carotid artery)	58(66.7)	27(33.3)
<b>f</b> . Situations an AED can be used safely (Victim lying in the snow)	73(86.9)	11(13.9)
<b>g</b> . The 5 links in the adult Chain of Survival include (Usage of Cardiovascular Medications)	60(69.0)	27(31.0)
<b>h</b> .You are alone the first step you should take to stabilize the patient when you encounter a patient in what appears to be cardiac or respiratory arrest (check for danger)	75(86.2)	12(13.8)
<b>i</b> .Both infants and children, the compression to ventilation ratio for one-rescuer CPR is:(30:2)	57(65.5)	30(34.5)

<b>j.</b> The proper steps for operating an AED (Power on the AED, attach electrode pads, analyze the rhythm, shock the patient)	63(72.4)	24(27.6)
<b>k.</b> Most likely cause to a 21year old student who turns blue and collapses while eating a hot dog at a bar. (Choking)	65(74.7)	22(25.5)
<b>l.</b> You assess that the patient still has a pulse, the next step in managing (Open airway)	63(72.4)	24(27.6)
<b>m.</b> Age considered as an infant for BLS purposes(under1)	65(74.7)	22(25.5)
<b>n.</b> Why are ventilations delivered to a pediatric arrest patient before seeking assistance in single rescuer scenarios (Most pediatric cardiac arrests are due to respiratory arrest)	56(64.4)	31(35.6)
<b>o.</b> You are a daycare provider and find a 3-year-old child unresponsive. She had laid down for a nap because she was not Feeling well and when you checked on her, she was not breathing and appeared blue. You are by yourself. What is the first step in managing this case?(Deliver 2 minutes of CPR)	59(67.8)	28(32.2)
<b>p.</b> The child begins to breathe spontaneously at a rate of 18. Her pulse is 50. What is the next step? (Begin CPR)	59(67.8)	28(32.2)
<b>q.</b> AED stand for (Automated External Defibrillator)	57(65.5)	30(34.5)
	60(69.0)	27(31.0)

<p><b>r.</b>A 49-year-old female suffers a witnessed cardiac arrest. She has a known cardiac history per her family. You notice a bulge in the upper left chest under the skin. There is a healed incision over lying that bulge. Which is true of AED use (Avoid placing pads over bulge).</p>	66(75.9)	21(24.1)
<p><b>S</b> .The AED indicates shock advised. The next step is (Clear the patient)</p>	1(70.1)	26(29.9)
<p><b>t.</b>The next step in caring for this patient After delivering a shock (Resume CPR)</p>		

#### **4.7 LEVEL OF SKILLS OF THE PARTICIPANT PRE AND POSTTEST**

When assessing the skills of nurses on CPR and AED, the results showed that a large number did not perform to all knowledge assessment items. After training a change was observed. A large number perform to all knowledge assessment items (**Table 4.4**)

**Table 5: LEVEL OF SKILLS OF PARTICIPANTS IN PRETEST AND POST TES**

SKILLS COMPONENT	PRESKILLS n (%)			POST SKILLS (%)	
	Not done	incorrect	correct	Not incorrect	done
Checking for safety	56(64.4)		19(21.8)	19(21.8)	25(28.7)
Check for responsiveness	12(13.8)			43(49.4)	29(33.3)
Call for help	57(65.5)	25(28.7)	5(5.7)	48(55.2)	21(24.1)
Initial pulse check	55(63.3)		21(24.1)	52(59.8)	33(37.9)
Check for breathing	11(12.6)			11(12.6)	43(49.4)
Chest compression	55(63.3)		20(23.0)	11(12.6)	50(57.5)
Depth 2 inches or 5cm	12(13.8)			18(20.7)	13(14.9)
Hands positioning during CPR	63(72.4)	17(19.5)	7(8.0)	56(64.4)	12(13.8)
Chest compression to rescue breath ratio	53(60.9)		19(21.8)	66(75.9)	11(12.6)
Complete 5 cycles or 2min then reassess	15(17.2)			69(79.3)	
Placement of AED pads	47(54.0)	26(29.9)	14(16.1)	14(16.1)	5(5.7)
	60(69.0)		15(17.2)	68(78.2)	
	12(13.8)				
	55(63.2)		20(23.0)	16(18.4)	10(11.5)
	12(13.8)			61(70.1)	
AED Power on	54(62.1)		18(20.7)		
Charge, clear, deliver shock, resume compression	15(17.2)			13(14.9)	15(17.2)
				59(67.8)	
	54(62.1)		16(18.4)		
	17(19.5)			8(9.2)	10(11.5)
				69(79.3)	
	59(67.8)	19(21.9)	9(10.3)		

#### 4.8. DESCRIPTION OF KNOWLEDGE AND SKILLS SCORE CHANGE PRE AND POST TEST

Changes of score in knowledge before and after training was assessed using paired T test and the results showed a significant change by comparing two mean, median, minimum and maximum score. The mean in pretest was 30.4% and after teaching the mean was 73.5% with a P(0.000).The minimum score in pretest was 10%, with a maximum of 60, while the minimum in post teaching was 45% with a maximum of 95%.**See table 4.5**

**Table 6: DESCRIPTIVE STATISTICS SHOWING CHANGES IN KNOWLEDGE SCORE PRE AND POST TEACHING.**

N	Valid	87	87
Mean		30.40	73.51
Std. Error of Mean		1.076	1.097
Median		30.00	75.00
Std. Deviation		10.035	10.233
Minimum score		10	45
Maximum score		60	95

**INFERENCEAL STATISTICS OF PARTICIPANTS KNOWLEDGE PRE AND POSTTEST**

KNOWLEDGE ASSESSMENT ITEMS (87)	PRETEST		POSTTEST		
	Mean(0-1)	± SD		Mean(0-1)	± SD
	P.Value				
The 2015 AHA Guidelines for CPR recommended BLS sequence of steps(compression, airway, breathing)	0.32	0.46	0.72	0.44	0.000
Critical characteristics of high-quality CPR include(All of the above)	0.25	0.43	0.89	0.30	0.000
Necessary age to use the child AED pads (8 years of age or younger)	0.34	0.47	0.80	0.39	0.000
Age of the compression to ventilation ratio for the one-rescuer giving CPR to victims (30:2)	0.29	0.46	0.66	0.47	0.000
Where you should attempt to perform a pulse check in an adult (Carotid artery)	0.31	0.46	0.83	0.36	0.000
Situations an AED can be used safely (Victim lying in the snow)	0.41	0.49	0.70	0.46	0.000
The 5 links in the adult Chain of Survival include (Usage of Cardiovascular Medications)	0.31	0.46	0.68	0.46	0.000
You are alone the first step you should take to stabilize the patient when you encounter a patient in what appears to be cardiac or respiratory arrest (check for danger)	0.27	0.44	0.82	0.37	0.000

Both infants and children, the compression to ventilation ratio for one-rescuer CPR is:(30:2)	0.35	0.48	0.86	0.34	0.000
The proper steps for operating an AED (Power on the AED, attach electrode pads, shock the patient, analyze the rhythm)	0.19	0.39	0.77	0.40	0.000
Most likely cause to a 21year old college student who turns blue and collapses while eating a hot dog at a bar. (choking)	0.26	0.44	0.72	0.44	0.000
You assess that the patient still has a pulse, the next step in managing (Open airway)	0.26	0.44	0.74	0.43	0.000
Age considered as an infant for BLS purposes(under1)	0.21	0.41	0.84	0.32	0.000
Why are ventilations delivered to a pediatric arrest patient before seeking assistance in single rescuer scenarios (Most pediatric cardiac arrests are due to respiratory arrest)	0.33	0.47	0.64	0.48	0.000
You are a daycare provider and find a 3-year-old child unresponsive. She had laid down for a nap because she was not feeling well and when you checked on her, she was not breathing and appeared blue. You are by yourself. What is the first step in managing this case? (Deliver 2 minutes of CPR).	0.32	0.46	0.67	0.46	0.000
The child begins to breath spontaneously at a					



rate of 18. Her pulse is 50. What is the next step? (Begin CPR)	0.34	0.47	0.67	0.46	0.000
AED stand for (Automatic external Defibrillator)	0.32	0.46	0.65	0.47	0.000
A 49-year-old female suffers a witnessed cardiac arrest. She has a known cardiac history per her family. You notice a bulge in the upper left chest under the skin. There is a healed incision over lying that bulge. Which is true of AED use(Avoid placing pads over bulge).	0.34	0.47	0.68	0.46	0.000
The AED indicates shock advised. The next step is (Clear the patient)					
The next step in caring for this patient After delivering a shock (Resume CPR)	0.32	0.46	0.75	0.43	0.000
<b>Overall</b>	<b>0.34</b>		<b>0.73</b>		<b>0.000</b>

#### **4.9. INFERENCE STATISTICS SHOWING CHANGES IN KNOWLEDGE SCORE PRE AND POST TEACHING.**

Changes of score in knowledge before and after training was assessed using Wilcoxon signed rank test and the results showed a significant change to the mean score. The mean before teaching was 30% while the post teaching mean was and after was 73% with P (0.000)

#### **TABLE 4.6. INFERENCE STATISTICS HIGHLIGHTING THE OVERALL CHANGE IN KNOWLEDGE OF NURSES' POST TEACHING**

The table below highlight the changes in skills between the pretest and post-test where by the mean pretest 22.8% and 65.1% in post-test was. A minimum score of 4% and a maximum 63% for the pretest, while a minimum of 38% and a maximum of 88% for the post test were observed.

#### 4.7.CHANGES IN SKILLS SCORE PRE AND POST TEACHING

A remarkable change was observed for the skills whereby the mean score improved from 22.89 to 65.13% ,while the minimum skills score was 4% for the pretest with a maximum score of 38% ,a significant change was observed in the post teaching as the minimum skills score was 63% with a maximum score of 88%.

#### DESCRIPTIVE STATISTICS HIGHLIGHTING THE CHANGES IN SKILLS BETWEEN THE PRE AND POSTTEST.

	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>		<i>Std.</i>
		<i>(%)</i>	<i>(%)</i>	Statistic	Std.	<i>Deviation</i>
	Statistic	Statistic	Statistic	(%)	Error	Statistic
PretestSkills	87	4	63	22.89	1.090	10.164
Post-test Skill	87	38	88	65.13	1.221	11.386
Valid N (listwise)	87					

#### 4.8.INFERENTIAL STATISTICS IN SKILLS HIGHLITING THE CHANGE BETWEEN THE PRE AND POSTTEST

The inferential statistics has revealed a big change between the pretest and the posttest and improvement has been identified at every question of the checklist.Bassed on the overall mean,the mean have improved from 0.45/2(22.89%) to 1.43(65,13%) with a P(0.000).

**Table 7: INFERENTIAL STATISTICS HIGHLIGHTING THE CHANGES IN SKILLS BETWEEN THE PRETEST AND POSTTEST**

SKILLS COMPONENTS (87participant)	PRETEST				POSTTEST
	Mean(0-2)	± SD	Mean(0-2)	± SD	<u>P.Value</u>
Checking for safety	0.49	0.72	1.27	0.80	0.000
Check for responsiveness	0.40	0.59	1.21	0.92	0.000
Call for help	0.49	0.71	1.35	0.84	0.000
Initial pulse check	0.50	0.72	1.11	0.93	0.000
Check for breathing	0.35	0.62	1.27	0.89	0.000
Chest compression Depth 2 inches or 5cm	0.56	0.77	1.43	0.81	0.000
Hands positioning during CPR	0.62	0.75	1.62	0.71	0.000
Chest compression to rescue breath ratio	0.44	0.72	1.66	0.69	0.000
Complete 5 cycles or 2min then reassess	0.50	0.72	1.62	0.75	0.000
Placement of AED pads	0.55	0.77	1.51	0.79	0.000
AED Power on	0.57	0.80	1.52	0.74	0.000
Charge, clear, deliver shock, resume compression	0.42	0.67	1.70	0.63	0.000
<b>Overall mean score 0.5</b>	<b>0.45</b>			<b>1.43</b>	

## **CHAP.5 DISCUSSION OF RESULTS**

### **5.1. INTRODUCTION**

Good theoretical knowledge is a prerequisite for nursing staff to provide high quality and effective CPR. The present study revealed that the nursing staff surveyed had unsatisfactory knowledge, since their mean score in the written test in the pretest was 30.4% and a mean of 73.5% post-test.

### **5.2. PRETEST KNOWLEDGE ON CARDIOPULMONARY RESUSCITATION**

This study showed a remarkable deficit on CPR knowledge among registered nurses and associated nurses in the two selected district hospitals, for most of the questions in the pretest result. The majority of participants had poor knowledge with a mean of 30.4% with a minimum score of 10% and a maximum of 60% for knowledge. Only 3.45% of the participants had moderate knowledge, the majority 96.55% had poor knowledge, none of the participants had good knowledge prior to the teaching. (See figure 4.2)

A similar study conducted in Botswana, on Cardiopulmonary resuscitation knowledge and skills of registered nurses in Botswana has shown a totally different image to this study, the only similarity is that most of the participants 51.3% scored less than 50 and 48.7% scored more than 50% contrary to the present study whereby only 2(2.2%) scored more than 50%, this comparison shows that the score was much higher in Botswana than the present study as 4% of participants in Botswana could score more than 85% while for the current study no one scored good or more than 75%.

### **5.3. POSTTEST KNOWLEDGE**

There was a very significant improvement between the pretest and post-test, with a P value (0.001) and a mean of 73.5%. The minimum score for the post-test was 45%, while the maximum was 95% which is significantly higher than the score in the pretest whereby the minimum score was 10% with a maximum of 60%. For the post-test, contrary to the pretest only 1.15% got poor knowledge, 40.23% got moderate and 58.62% got good score.

This study is in one hand consistent to a study conducted at Zabol University of Medical Science .on the Effect of CPR Workshop on the Nurses' Level of Knowledge and Skills using three test, before training, immediately after training and three months later on 140 nurses.

Whereby the score of the pretest was poor for all participant with a minimum score of 12% .The mean score was 21%,this underwent a slight improvement in the post-test as 35% was the minimum score and the highest of 47% with a mean of 41% with P(0.001) in another hand the current study has shown a different image in terms of post test results, whereby the mean improved greatly from 30% to 73.5% for the present study contrary to the other study whereby none of participants got 50%. While also the mean differ in the post teaching 73.5 against 41%

#### **5.4. SKILLS OF NURSES REGARDING CPR AND AED USE.**

Generally the skills of nurses has increased remarkably with the lowest score of 4,17% with the highest score of 62,5% with a mean of 22.8% while an important improvement was seen in the post-test whereby the lowest score was 37.5%,a maximum score of 87.5% with a mean of 56%.The correlation between skills was positive at low side 0.360.This study is consistent with A study which aimed to assessment nurses knowledge and skills following cardiopulmonary resuscitation training at Mbarara Regional and Referral Hospital in Uganda. The pretest skills score ranged between 3.2% to 77.4%, with an average of 46%, the same as the current study the posttest had showed a remarkable improvement as the skills score ranged from 70.9 to 95%.

##### **5.4.1. AED PADS PLACEMENT**

The two questions asked about AED skills were poorly answered in the pretest and well answered in the posttest.16 (18.4) placed the AED pads wrongly, 17(19.5%) placed pads correctly, while 54(62.1%) did not give it a trial. The score has improved tremendously in the post-test: only 13(14.9) did not try to fix the pads, 15(17.2%) fixed the pads in a wrong place, while 59(67.8%) fixed the AED pads correctly.

##### **5.4.2. OPERATION OF AED**

(AED Power on, Charge, clear, deliver shock, resume compression).Normally pads are two, one is placed at the sternum while the second is placed at the apex of the heart. While assessing the operation of AED, the pretest score showed a poor knowledge whereby

59(67.8%) did not attempt, 19(21.9%) attempted wrongly 9(10.3%) did it correctly, for the post-test there was a significant improvement in knowledge and skills (**See table 4.6**).

The present research gives almost similar findings as a study conducted at Assuit University Hospital on Effect of Teaching Program on Knowledge and Skills Regarding Automated External Defibrillation among Nurses Working in Emergency Unit. The sample size was 50. The Author had categorized the score into 3 groups: Poor, Fair and Good.

The results showed that the majority of participants 49(98%) has got poor knowledge, only 1(2%) got fair knowledge and none of the participants had good knowledge in the pretest. A significant change with  $P(0.001)$  was observed as it happened for the present study, 7(14) got poor knowledge, 9(18%) got moderate and 34(68%) got good knowledge.

The findings of the above mentioned study are almost similar to the present study regarding skills of nurses on AED use. The results in the pretest have remarkably improved in the post test. 39(78%) had poor skill, 8(16%) had poor skill and 3(6%) had good skills. In the post-test The majority of the participants 34(68%) got good skills, 12(24%) got fair knowledge and only 4(8%) got poor knowledge (Mohammed Abd El naeem, Taha Mohamed, Aly Mohammed, & Anwar Abd El-Aziz, 2016). For the present study results please (**check table 4.8**).

## **5.5. CHANGES BETWEEN THE RESULTS PRE AND POST TEACHING REGARDING KNOWLEDGE AND SKILLS**

A remarkable change was observed regarding knowledge and skills between the pre-teaching and post-teaching assessment. If we compare means for both knowledge and skills we will find that the mean improved from 30.40% to 73.51% for knowledge while the mean for skills improved from 22.89 to 65.13%. The minimum score for knowledge in the pretest was 10% while the maximum was 60% , an improvement was seen in the post teaching where by the minimum knowledge was 45% with a maximum score of 95%. The same observation was seen for the skills the minimum score for the skills was 4% with maximum score of 38% ,an improvement was seen in the pre-teaching assessment where by a minimum score of 63% was observed with a maximum of 88% was seen.

## **CHAPTER 6. RECOMMENDATION AND CONCLUSION.**

### **6.1 RECOMMENDATION**

Based on the findings of this study and considering the pre and post-test, nurses can learn and intervene correctly in case of cardio-respiratory arrest, once well trained in CPR an increase in survival rate and home discharge can be observed. It has been found that none of both hospital had provided training to its staff.

#### **Education**

I would like to recommend to the University of Rwanda and other schools of nursing to incorporate CPR educational program in all nursing schools and curricula all graduate can be able to provide CPR if this is needed.

#### **Practice**

Structured CPR training program is needed to train and educate all nurses in order to respond effectively and promptly in case of a sudden cardiac arrest.

Repetitive periodic CPR training courses to ensure that nurses are competent, up to date and confident responders in the event of a cardiac arrest.

Annual assessment and certification of CPR according to the latest guidelines by hospitals.

#### **Administration**

I would like to recommend to the Rwandan council of nurses and midwifery to include BLS certification as one of criteria to renew the licensing.

An association like American heart Association (AHA) or British Heart Association is needed to regulate program like Basic life support, Cardiopulmonary Resuscitation, Advanced cardiovascular resuscitation country wide.

#### **Research**

The present research has been conducted at two hospital only. This research revealed poor knowledge and poor skills of nurses which improved after training, this has revealed a need to carry out a country wide research to assess the knowledge and skills across the country so that a program of CPR training can be established for all nurses if recommended.



## **6.2. CONCLUSION**

Nurses at Kacyiru and Masaka Hospital had inadequate CPR knowledge and skills at pretest assessment, which could have negatively impacted on effective CPR performance. The study revealed a statistically significant improvement in both knowledge and skills of CPR for all nurses post training for both hospital. Regular training needs to be instituted at both hospitals to ensure adequate knowledge and practice in order to be competent and confident to intervene accurately in case of cardiopulmonary arrest.

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**APPENDIX 1 INSTRUMENT**

**SECTION A: CPR/BLS PRACTICE TEST QUESTION**

**DEMOGRAPHIC DATA**

Answer every question by ticking the right answer

**Name initials:**

**D1 Gender**

Male

1

Female

2

**D2 Study Level**

Associated Nurse(A2)

1

Diploma

2

Bachelor's Degree

3

Masters Degree

4

**D3 Hospital**

kacyiru

1

Masaka

2

Nyanza

3

**D4 Marital status**

Single

1

Married

2

Devorced

3

**D5 Age:** 20-30

1

3

2

40-50

3

≥

4

**D6 Experience**

≤ 1 year

1

1-3

2

3-5

3

5-10

4

≥ 10

5

This questionnaire is made of 20 multiple choice questions, you shall answer all question by choosing the right answer.

**A.** The 2015 AHA Guidelines for CPR recommended BLS sequence of steps are:

1. Airway, Breathing, Check Pulse
2. Chest compressions, Airway, Breathing
3. Airway, Breathing, Chest Compressions
4. Airway, Check Pulse, Breathing

**B.** Critical characteristics of high-quality CPR include which of the following?

1. Starting chest compressions within 10 seconds of recognition of cardiac arrest
2. Allowing complete chest recoil after each compression
3. Minimize interruptions of CPR
4. All of the above

**C.** At what age is it necessary to use the child AED pads?

1. 8 years of age or older
2. 8 years of age or younger
3. 12 years of age or younger
4. 18 years of age or younger

**D.** The compression to ventilation ratio for the one-rescuer giving CPR to victims of Any age is:

1. 30:1
2. 30:2
3. 15:1
4. 15:2

**E.** Where should you attempt to perform a pulse check in an adult?

1. Brachial artery
2. Carotid artery
3. Popliteal artery
4. Temporal artery

**F.** An AED can be used safely in which of the following situations

EXCEPT:

1. Victim lying in the snow
2. Victim with an implanted pacemaker
3. Victim with a transdermal medication patch on
4. Victim lying partially in water

**G.** The 5 links in the adult Chain of Survival include all of the following

EXCEPT:

1. Early CPR
2. Rapid Defibrillation
3. Usage of Cardiovascular Medications
4. Integrated Post-Cardiac Arrest Care

**H)** You are alone when you encounter a patient in what appears to be cardiac or respiratory arrest. What is the first step you should take to stabilize the patient?

1. Call for help
2. Check for danger
3. Check for response
4. Start CPR

**I.**In both infants and children, the compression to ventilation ratio for one-rescuer CPR is:

1. 15:1
2. 15:2
3. 30:1
4. 30:2

**J.**The proper steps for operating an AED are:

1. Power on the AED, attach electrode pads, shock the patient, analyze the rhythm
2. Power on the AED, attach electrode pads, analyze the rhythm, shock the patient.
3. Power on the AED, analyze the rhythm, attach electrode pads, shock the patient
4. Power on the AED, shock the patient, attach electrode pads, analyze the Rhythm

**K.** A 21-year-old student turns blue and collapses while eating a hot dog at a bar. What is the most likely cause?

1. Cardiac arrest
2. Alcohol poisoning
3. Choking
4. Drug ingestion

**L.** You assess that the patient still has a pulse, what is the next step in managing this case?

1. Begin CPR
2. Open airway
3. Apply AED
4. Look for a medical alert bracelet

**M.** What age is considered as an infant for BLS purposes?

1. Under 1
2. 2
3. 3
4. 4

**N.** Why are ventilations delivered to a pediatric arrest patient before seeking assistance in single rescuer scenarios?

1. 9-1-1 response times are generally slow
2. The parents are often nearby
3. Most pediatric cardiac arrests are due to respiratory arrest
4. The use of an AED is contraindicated in pediatric patients

**O.** You are a daycare provider and find a 3-year-old child unresponsive. She had laid down for a nap because she was not feeling well and when you checked on her, she was not breathing and appeared blue. You are by yourself. What is the first step in Managing this case?

1. Back blows
2. Blind finger sweep



3. Activate 912(for Rwanda)

4. Deliver 2 minutes of CPR

**P.** The child begins to breathe spontaneously at a rate of 18. Her pulse is 50. What is the next step?

1. Faster rescue breaths

2. Carotid massage

3. Begin CPR

4. Monitor

**Q.**What does AED stand for?

1. Automatic Energy Delivery

2. Automated External Device

3. Automated External Defibrillator

4. Autonomous Energy Defibrillator

**R.** A 49-year-old female suffers a witnessed cardiac arrest. She has a known cardiac history per her family. You notice a bulge in the Upper left chest under the skin. There is a healed incision overlying that bulge. Which is true of AED use?

1. Cannot be used in this patient

2. Put a magnet over the bulge before using the AED

3. Place pads over bulge

4. Avoid placing pads over bulge

**S.** The AED indicates shock advised. What is the next step?

1. Clear the patient

2. Deliver 2 additional minutes of CPR before delivering shock

3. Ventilate while shock is delivered

4. Assume error and do not deliver shock

**T.** After delivering a shock, what is the next step in caring for this patient?

1. Reassess for a pulse

2. Chest compressions only

3. Resume CPR

4. Ventilation only

#### Review Question Answers

1) Chest compressions, Airway, Breathing

2) All of the above

3) 8 years of age or younger

4) 30:2

5) Carotid artery

6) Victim lying in the snow

7) Usage of Cardiovascular Medications

8) check for danger

9) 30:2

10) Power on the AED, attach electrode pads, analyze the rhythm, and shock the patient

11) Choking

12) Open airway

13) Under 1

14) Most pediatric cardiac arrests are due to respiratory arrest

15) Deliver 2 minutes of CPR

16) Begin CPR

17) Automated External Defibrillator

18) Avoid placing pads over bulge

19) Clear the patient

20) Resume CPR

## APPENDIX 2

### SECTION C: CHECKLIST FOR SKILLS EVALUATION

The checklist is made of 15 question. It will be completed by the researcher by observing the participant practicing the CPR on a mannequin. Its aim is to evaluate the skill of nurses towards nurses.

Variable	Skills components	Value	Marks
A	Checking for safety	Correct	2
		Incorrect	1
		Not done	0
B	Check for responsiveness	Correct	2
		Not correct	1
		Not done	0
C	Call for help	Correct	2
		Incorrect	1
		Not done	0
D	Initial pulse check	Correct	2
		Incorrect	1
		Note done	0
E	Check for breathing	Correct	2
		Incorrect	1
		Not done	0
F	Chest compression Depth2 inches or 5cm	Correct	2

		Incorrect	1
		Not done	0
G	Hands positioning during CPR	Correct	2
		Incorrect	1
		Not done	0
H	Chest compression to rescue breath ratio 30:2	Correct	2
		Incorrect	1
		Not done	0
I	Complete 5 cycles or 2min then reassess	correct	2
		Incorrect	1
		Note done	0
J	Placement of AED pads	Correct	2
		Incorrect	1
		Not done	0
K	AED Power on	Correct	2
		Incorrect	1
		Not done	0
L	Charge, clear, deliver shock, resume compression	Correct	2
		Incorrect	1
		Not done	0

## **PERMISSION FOR QUESTIONNAIRE USE**

Hello Delphin,

Thank you for contacting us.

Yes, we have sought approval for your request and this is to confirm that your request has been granted.

You may use our practice test questions on your thesis.

If there is anything else we can help you with, please let us know.

Thanks,

**BRYAN PARK**

*Empowerment Team*



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Online ACLS, PALS, BLS and  
CPR, AED and First Aid Certification

## CONSENT

**SADIKI NGAGI Delphin**

**STUDENT AT UR/ COLLEGE OF MEDICINE AND HEALTH SCIENCES**

**DEPARTMENT: NURSING SCIENCES**

**TRACK: CRITICAL CARE AND TRAUMA**

**PROGRAM: MASTERS PROGRAM**

**Email: [85sadikidelphin@gmail.com](mailto:85sadikidelphin@gmail.com)**

**Tel: +250788469796**

You are being asked to take part in a research study **influence of training on knowledge and skills acquisition of nurses regarding CPR at district hospital in Rwanda.**

We are asking you to take part because you have accepted to participate voluntarily. Please read this form carefully and ask any questions you may have before agreeing to take part in the study.

**What the study is about:** The purpose of this study is to assess the influence of training on knowledge and skills acquisition of nurses regarding CPR at district hospital in Rwanda.

**What we will ask you to do:** If you agree to be in this study, you will be asked to fill a questionnaire with 20 multiple choice questions which will include question about cardiopulmonary resuscitation. the questionnaire will take you about 20 minutes, you will also be requested to perform a practical test on a mannequin for skills evaluation by a checklist

### **Risks and benefits:**

Normally there is no risk that you may face. I do not anticipate any risks to your participation in this study other than those encountered in day-to-day life.

The benefits in this assignment is that you will benefit a free of charge training of cardiopulmonary (CPR) resuscitation. **Your answers will be confidential.** The records of this study will be kept privately. In any sort of report, we make public we will not include any information that will make it possible to identify you. Research records will be kept in a locked file; only the researchers will have access to the records. The hard copy will be destroyed after being entered into the computer.

**Taking part is voluntary:** Taking part in this study is completely voluntary. If you decide not to take part, it will not affect you in any way. If you decide to take part, you are free to withdraw at any time.

**If you have questions:** The researcher conducting this study is **SADIKI NGAGI Delphin** student at national University of Rwanda at master's level in nursing, track of critical care and trauma. Please ask any questions you have now. If you have questions later, you may contact him: phone number: **+250788469796**, email address: [85sadikidelphin@gmail.com](mailto:85sadikidelphin@gmail.com). My supervisor is RUMAGIHWANA Liberatha her phone number is: **+250788756885**, my co-supervisor is Professor Busisiwe Bhengu. If you have any question or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board (IRB) the telephone numbers of Chairperson of the CMHS IRB is **+250788 490 522** and the Deputy Chairperson **+250783 340 040**. Ethics committee is an independent organization that serves as a liaison between the University and the person bringing the complaint so that anonymity can be ensured.

**Initials and Signature of the participant:**



**Name and signature of the Research: NGAGI SADIKI Delphin**

## **APPENDIX4**

### **AMASEZERANO HAGATI Y'UMUSHAKASHATSI N'UKORERWAHO UBUSHKASHATSI**

**UMUSHAKASHATSI: SADIKI NGAGI Delphin**

**UMUNYESHURI MURI KAMINUZA Y'URWANDA ISHAMI RY'UBUZIMA**

**DEPARITEMA Y'UBUFOROMO N'UBUBYAZA**

**AGASHAMI K'INDEMBE N'INKOMERE**

**ICYICIRO CYA GATATU CYA KAMINUZA.**

**IMERI:** 85sadikidelphin@gmail.com

**Telefoni:** +250788469796

Uri umwe mubasabwe gukorerwaho ubushakashatsi bujyanye n'impinduka ziterwa n'amahugurwa kubwenge n'ubumenyi by'abaforomo mukugerageza kugarura umutima wahagaze, kurwego rw'ibitaro by'akarere mu Rwanda

Uri ahangaha kubera ko wemeye kubushake gukorerwaho ubu bushakashatsi. Urasabwa gusoma aya masezerano witonze, ukabaza ikibazo aho utumva neza mbere yo kwinjira mubushakashatsi nyirizina.

#### **Ubushakashatsi bugamije iki?**

Ubu bushakashatsi bugamije kumenya impinduka zibaho kubwenge n'ubumenyi bw'abaforomo kubijyanye no kugerageza kugarura umutima wahagaze, nyuma yo guhabwa amahugurwa kurwego rw'ibitaro by'akarere mu Rwanda.

#### **Ni iki usabwa ?**

Niba wemeye kuba umwe mubakorerwaho ubu bushakashatsi urasabwa gukora ikizameni kizatangwa n'umushakashatsi mbere y'amahugurwa na nyuma yayo kugira ngo habeho igereranywa ry'amanota.



## **Ingaruka n'inyungu**

Muri rusange nta ngaruka umushakashatsi ateganya cyereza ibyo ushobora gura nabyo mubuzima bwa buri muni

Inyungu ziri muri ubu bushakashatsi ni amahugurwa azatangirwa ubuntu no kumenya aho uhagaze mubutabazibw'ibanze mubijyanye no kugarura umutima wahagaze.

Ibisubizo byawe n'amanota bizagirwa ibinga, muri raporo zizakorwa zose ntaho amazina yanyu azagaragazwa. Impapuro zizabikwa muburyo bw'ibanga. mudasobwa bizabikwamo izaba ifite pasuwadi izwi n'umushakashatsi wenyine.

## **Gukorerwaho ubushakashatsi ni uburenganzira bwawe**

Kujya muri ubu bushakashatsi ni ubushake bwawe. Ni ubushake bwawe guhagarika bibaye ngombwa igihe ubishakiye.

## **Uburenganzira bwo kubaza**

Umushakashatsi yitwa **SADIKI NGAGI Delphin**, umunyeshuri muri kaminuza y'uRwanda icyiciro cyagatatu, ishami ry'ubuzima agashami k'ubuforomo n'ububyaza. Ufite uburenganzira bwo kumubaza ikibazo cyose kijyanye n'ubu bushakashatsi nonaha cyangwa ikindi gihe .Numero ye ya Telefoni ni 0788469796, imeri ye ni [85sadikidelphin@gmail.com](mailto:85sadikidelphin@gmail.com). Umwarimu uyoboye ubu bushakashatsi yitwa **RUMAGIHLWA Liberatha** numero ye ya Telefone ni: **0788756885**, umwarimu wa kabiri ni **Profeseri BUSISIWE Bhengu** terefone ye ni: **0782333732**. Niba ufite ikibazo cyangwa icyifuzo kijyanye n'uburenganzira muri ubu bushakashatsi ushobora kubimenyesha ikigo cya kaminuza y'uRwanda gishinzwe ubushakashatsi IRB ,numero ya telephone y'umuyobozi mukuru ni: **0788490522** , numero y'uwungirije umuyobozi mukuru ni : **0783340040** iyi comite ni ikigo cyigenga

Gishinzwe gucyemura amakimbarane yavuka hagati ya kaminuza cyangwa umushakashatsi nukorerwaho ubushakashatsi.

**Impine z'amazina n'Umukono w'ukorerwaho ubushakashatsi:**

**Amazina n'umukono by'umushakashatsi**



**SADIKI NGAGI Delphin:**



**COLLEGE OF MEDICINE AND HEALTH SCIENCES**

**CMHS INSTITUTIONAL REVIEW BOARD (IRB)**

Kigali, 14/01/2019  
Ref: CMHS/IRB/003/2019

**Delphin NGAGI SADIKI**  
School of Nursing and Midwifery, CMHS, UR



Dear Delphin NGAGI SADIKI

**RE: ETHICAL CLEARANCE**

Reference is made to your application for ethical clearance for the study entitled *“Influence of Training on Knowledge and Skills Acquisition of Nurses Regarding CPR at District Hospital in Rwanda.”*

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

REPUBLIC OF RWANDA

04/04/2019

REF 265/MSK/DH/2018



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

To: **SADIKI NGAGI Delphin**

Re: **PERMISSION TO CONDUCT DATA COLLECTION**

Dear Sir,

Reference made by decision of Director General of Masaka district hospital on your research proposal entitled "*Influence of training on knowledge and skills acquisition of nurses regarding cardiopulmonary resuscitation*" The management of Masaka District Hospital is pleased to inform you that, you have authorization to conduct a study in our hospital.

Sincerely

A handwritten signature in blue ink is written over a circular official seal. The seal contains the text 'DISTRICT DE KICUKIRO - HOPITAL MASAKA' around the perimeter and a central emblem.

**Dr. Marcel UWIZEYE**  
**Director General Masaka Hospital**

KACYIRU HOSPITAL  
FCR RECEPTION  
Date: 13/03/2019  
Signature: [Handwritten Signature]

SADIKI NNGAGI Delphin

Kigali City

District: Gasabo District

Sector: Kacyiru

SADIKI

Go ahead

Clinical Director & N.D. Kigali 13<sup>th</sup> March, 2019

General Director of Kacyiru Hospital Facilitate Please

Kigali City

Gasabo District

DG/KH/Kacyiru  
25/03/2019

Where is the proposal?

Dear Doctor,

**RE: Request to conduct my master's thesis at Kacyiru Hospital.**

I am pleased to write to you requesting for a permission to conduct my master's thesis at Kacyiru hospital which is under your leadership. I am a student at university of Rwanda pursuing a master's a master's in nursing sciences track of Critical care and trauma.

In fact, my thesis topic is about "influence of training on knowledge and skills acquisition of nurses regarding cardiopulmonary resuscitation at district hospital level in Rwanda" Kacyiru district hospital was chosen together with other two district hospitals by random sampling strategy. This is a quasi experimental study whereby a pretest will be given to the randomized sample of registered nurses(A1&A0) and Associated nurses(A2) followed by theoretical and practical teaching then after a post test will follow. In addition, this study will be conducted at accident and Emergency, internal medicine, surgical ward and Outpatient departments nursing staff. The tool to be used will be a questionnaire and checklist. I will be thankful once my application will be put your consideration.

Please find here attached with University of Rwanda IRB Ethical committee clearance

Yours sincerely

[Handwritten Signature]

SADIKI NNGAGI Delphi