KAMUZU COLLEGE OF NURSING

ASSESSING CARDIOPULMONARY RESUSCITATION KNOWLEDGE AND ATTITUDES AMONG NURSES WORKING IN ADULT GENERAL WARDS AT KAMUZU CENTRAL HOSPITAL, MALAWI

By

MADALO KALUKUSHA MACIAS

A Thesis Submitted to the Faculty of Nursing, University of Malawi,

In Partial Fulfilment of Requirements for the Award of

Master of Science Degree in Adult Health Nursing

JUNE 2019

Declaration

I, Madalo Kalukusha Macias, hereby declare that this thesis is my original work and that I have not submitted it or any part of it for any degree at any university within or outside of Malawi. Work of other people used in this thesis has been appropriately acknowledged.

Madalo Kalukusha Macias

Legal Name

_____

Signature

_____

Date

Certificate of Approval

The undersigned certify that this thesis represents the students own work and effort and has been submitted with my approval.

Signature _____Date_____

Belinda Gombachika, PhD

Supervisor

Dedication

To Anna, my daughter, for kicking me to the finish line

Acknowledgement

- To Lord God Almighty, for showing me the way, granting me peace and wisdom to prevail. I praise you Lord for letting me be still.
- To my husband, Jeremy, you are amazing. My stronghold, my anchor. Thank you for keeping us standing while carrying 90 % of the load as I was busy pursuing my dream. For never failing me nor the kids. For pushing me and supporting me all the way. I love you to the moon and back.
- To my kids Paul and Anna, for brining me joy and loving me even in times when I was not fully available
- To my father in law, Joe Jr, thank you, your support was overwhelming
- To my parents and relatives for cheering me on and giving me confidence.
- To my supervisor, Dr Belinda Gombachika, this is your work as much as mine. Thank you for being the wind that made my ship sail.
- My classmates, for counsel, friendship and having each other's backs.

Abstract

This study looked at knowledge of nurses in diagnosing patients who need cardiopulmonary resuscitation; examined nurse's knowledge on how to conduct cardiopulmonary resuscitation; and nurse's attitude towards cardiopulmonary resuscitation in in adult general ward at Kamuzu Central Hospital

Methodology: A descriptive quantitative survey approach was used for the study. Data was collected using a self-administered questionnaire which also included 10 questions adopted from American Heart Association written Basic Life Support exam version 11 of year 2010. Analysis of the data was done using Statistical Package for Social Science version 23 and Excel packages to draw out mean, frequencies and percentages. A sample of 61 nurses in adult general wards was recruited using consecutive sampling.

Results: The results of the study showed that 65% (n=40) could be able to diagnose a patient needing cardiopulmonary resuscitation. Nurse's attitude towards cardiopulmonary resuscitation was positive in 73% (n=44) of the nurses. However, knowledge on cardiopulmonary resuscitation graded using American Heart Association pass rate of 84% was very poor as only 7 % (n=4) of the nurses passed. A chi square test using fishers exact test at 5% significance level showed that nurses with experience of less than ten years had significantly higher knowledge of cardiopulmonary resuscitation at 63.4 % compared to those between ten and fifteen years of experience at 23 % with *p* value of 0.042.

Recommendations: Periodic CPR trainings for the nurses and consider CPR certification for all bedside nurses.

Conclusion: CPR knowledge among nurses is very low but needed. CPR trainings can help to rectify the problem.

Table of Contents

List of Abbreviations

AHA	American Heart Association
BLS	Basic life Support
COMREC	College of Medicine Research and Ethics Committee
CPR	Cardiopulmonary Resuscitation
EWS	Early Warning Signs
ICU	Intensive Care Unit
KCH	Kamuzu Central Hospital
KCN	Kamuzu College of Nursing
NCDs	Non-Communicable Diseases
IHCA	In Hospital Cardiac Arrest
NMT	Nurse Midwife Technician
RN	Registered Nurse
TOTAL	Tachypnoea, Oxygen saturation, Temperature, Alert and Loss of independence
WHO	World Health Organization

List of tables

List of figures

Definition of terms

Nurse Midwife Technician (NMT)	A nurse that has been trained at college diploma level, the training in Malawi combines both nursing and midwifery
Registered Nurse/Registered Nurse Midwife (RN/RNM)	A registered nurse that has been trained at degree or diploma level at university level. The programs in Malawi can either combine nursing and midwifery or trained separate. In this study both groups took part.

Chapter One

Introduction

Timely provision of emergency care is vital for patient survival (Brodsky, Berg, Tijen & Kester, 2010). Cardiopulmonary Resuscitation (CPR) is one of the important emergency care skills which American Heart Association (2016) state that it can reduce mortality by 24.8%. Cardiopulmonary resuscitation involves chest compressions and compressions create blood flow primarily by increasing intrathoracic pressure and directly compressing the heart, which in turn results in critical blood flow and oxygen delivery to the heart and brain (American Heart Association, 2015). Cardiac arrest occurs when the heart's electrical system abruptly malfunctions and the heart suddenly stops beating normally and treatment of cardiac arrest is a race against the clock (American Heart Association, 2014). Delays to either the start of CPR or the start of defibrillation reduce survival from cardiac arrest, for every minute without cardiopulmonary resuscitation and defibrillation reduces the chances of survival by 7 % to 10 % (Link et al., 2010). Hasselqvist-Ax et al. (2015) confirms that overall there is a significant association between the time to the start of CPR and the survival rate: the survival rate decrease with an increase in the time to the start of CPR.

American Heart Association (2015) guidelines state that a cardiac arrest can present anywhere, anytime: on the street or at home, but also in the hospital's emergency department, inpatient bed, Intensive Care Unit, operating suite, catheterization suite, or imaging department thus the system of care must be able to manage cardiac emergencies wherever they occur. However, most in-hospital CPR is provided in Intensive Care Units (ICU) emergency department, operating rooms, and other procedural units where teams and systems can be optimized to provide the highest level of care.

At least half of in hospital cardiac arrests occur in medical- surgical wards (McHugh et al., 2016). The first link in the 5 links for chain of survival for cardiac arrest is early recognition of cardiac arrest (American Heart Association, 2015). Nurses are crucial for initiation of chain of survival in the hospital and mobilizing lifesaving interventions. In the wards, nurses are at the bedside 24 hours a day, every day; they are responsible for early warning system monitoring, they have direct knowledge of patient condition and changes in condition, and they are often the first on the scene of a cardiac arrest (McHugh et al., 2016). In hospitals worldwide, it is usually the nurse who discovers a cardiac arrest (loss of consciousness, absence of pulse and breathing) and initiates the procedure of CPR (Marzooq & Lyneham, 2009). It is therefore important that nurses need to know the skills and theories behind CPR as performing quality CPR might improve the patient's chance of survival and increase the opportunity of recovery (Marzooq & Lyneham, 2009).

Nori, Saghafinia, Motamedi and Hosseini (2012) assert that the ability to respond quickly and effectively to a cardiac arrest situation rests on nurses being competent, prepared and up-to-date in the emergency life-saving procedure of CPR. It was therefore imperative to assess nurses' knowledge on CPR in-order to improve patient survival, especially at Kamuzu Central hospital (KCH) which is one of the referral hospitals in Malawi.

Background

Nori et al. (2012) defines CPR competence as possessing cognitive knowledge and psychomotor skills to perform CPR skill in a cardiac arrest situation. Core CPR skills are performing of proper chest compressions and ventilation. Development of CPR dates as back as the 1700s by which different individuals have been discovering different resuscitation techniques for airway, breathing and circulation (Cooper, Cooper & Cooper, 2006). In America the first documented CPR guidelines were produced in 1966 by the American Heart Association (AHA) (Cooper et al., 2006). Indication for CPR is mainly cardiac arrest which

studies have shown that can be up to 60 % predisposed by cardiac diseases of which counts for 31 % of global deaths (World Health Organization, 2014). One of the leading risk factors for cardiac disease is raised blood pressure/hypertension (World Health Organization, 2013). Timermanthiago, Timerman, Quilici, Gonzalez and Ramires (2010) state that specifically, hypertension counts for 46.6 % of ailments present before a cardiac arrest event.

In Malawi, a survey (Msyamboza et al., 2011) for burden of disease indicated that 32.9 % of Malawi population is hypertensive and the diagnosis is unknown to them leaving a probability that at least 30 % of all adult admissions in Malawi hospital setting may be hypertensive and some with a probable risk of cardiac arrest event there by requiring the implementation of CPR skill.

According to the American Heart Association (2015) cardiac arrest in the hospital often represents the progression of physiologic instability and a failure to identify and stabilize the patient in a timely manner. They continue to state that this scenario is more common on the general wards, outside of critical care and procedural areas, where patient-to-nurse ratios are higher and monitoring of patients is less intense. McHugh et al. (2016) found that the odds of survival for cardiac arrest patients were 5 % lower for each additional patient per nurse on medical-surgical units. Higher patient-to-nurse ratios on these units are associated with lower odds of survival after an in-hospital cardiac arrest (IHCA). In the hospital, cardiac arrest chain of survival rests on early recognition, notifying emergency team, initiating CPR, defibrillation then, transfer to intensive care unit (American Heart Association, 2015). Agyeman-Duah, Theurer, Munthali, Alide and Neuhann (2014) observe that in Malawi health care set up, nurses are the ones that are the direct care givers to the patients in the wards, while on the other hand, clinicians and doctors are not full time in the ward. It is therefore anticipated that the nurses would be key to recognizing the need and initiating CPR in the general wards.

As a lifesaving skill, it would be anticipated that nurses as first responders would be more competent in CPR (Meaney et al., 2012). Evidence in other settings however, is showing contrary to expectations. Nori et al. (2012) assert that despite the fact that nurses' ability to perform CPR may be a critical determinant of patient survival from a cardiac arrest, there is compelling evidence to suggest that registered nurses across continents lack competence in the performance of a proper CPR. In Malawi, however, no such written evidence could be found regarding nurse's knowledge in CPR on an adult. According to Hwang (2013) most underdeveloped or developing countries have no CPR guidelines and that special concern should be paid to underdeveloped or developing countries that have low public awareness about sudden death.

Problem Statement

Indication for CPR is mainly cardiac arrest which studies have shown that can be up to 60 % predisposed by cardiac diseases and counts for 31 % of global deaths (World Health Organization, 2014). One of the leading risk factors for cardiac disease is raised blood pressure/hypertension (World Health Organization, 2013). In Malawi, a survey for burden of disease indicated that 32.9 % of Malawi population is hypertensive and the diagnosis is unknown to them (Msyamboza et al., 2011). Hypertension counts for 46.6 % of ailments present before a cardiac arrest event (Timermanthiago, Timerman, Quilici, Gonzalez & Ramires, 2010). As chain of survival for CPR includes admission into the ICU (American Heart Association, 2015), the efforts of resuscitation can therefore be seen in the number of admissions for respiratory or cardiac support from the wards to the ICU at KCH. At KCH in Malawi evidence of implementation of CPR is usually seen in paediatric ward but very minimal and almost none existent in adult general wards. Paediatric ward sends up to 8.3 % of all KCH ICU admissions but the adult general wards, both medical and surgical wards combined, send less than 3 % of the admissions (Gundo et al., 2014). Competence in

Paediatric resuscitation can be contributed by evidence (Bream, Gennaro, Kafulafula, Mbweza & Hehir, 2005; Cognata, 2013; Lang et al., 2014; Molyneux & Robertson, 2002; Schnittger, Downie & Pollach, 2011) that shows investment in paediatric nursing and medical staff to improve paediatric resuscitation in Malawi while no documented evidence has been found focusing on adult resuscitation. Review of literature has produced no documented evidence that studies have been conducted in Malawi focusing on knowledge of adult CPR skill among nurses or any other medical profession group. This study, therefore, sought to assess knowledge and attitudes on CPR on an adult among nurses working in the adult general wards at Kamuzu Central Hospital as it is a life-saving skill that needs to be nurtured in this era where there is an increase in cardiac diseases predisposing more people to cardiac arrests.

Significance of the Study

This study is important because it will provide baseline evidence for action towards promoting acquisition and implementation of CPR skill in adult general wards in Malawi, thereby preventing premature death in patients who go into cardiac arrest while in hospital. The data will also help in mapping of emergency service provision in general wards. The result of the study will guide teaching, provide managers a basis for advocacy for in service training for nurses and provide baseline data for further research.

Study Objectives

Broad objective

The broad objective of this study is to investigate nurses' knowledge and attitudes on cardiopulmonary resuscitation at Kamuzu Central Hospital general adult ward.

Specific objectives

1. To assess knowledge of nurses in diagnosing patients who need cardiopulmonary resuscitation.
2. To examine nurse's knowledge on how to conduct cardiopulmonary resuscitation
3. To find out nurse's attitude towards cardiopulmonary resuscitation in general wards

Chapter Two

Literature Review

Polit, Beck and Hunger (2012) describe literature review as a critical summary of research on the topic of interest often prepared to put research problem in context. This chapter is therefore exploring literature on CPR among nurses with specifications on knowledge diagnosing need for CPR, how to conduct CPR in adults, and attitudes towards CPR.

Literature search was conducted through access to different data bases, then it was downloaded and saved and Zotero referencing was used to manage literature sources. Literature was accessed on Google Scholar, Research Gate, HINARI, and Pubmed Journals. The search was achieved using the search terms: In hospital cardiac arrest; CPR competence OR chest compression competence; CPR AND nurse's competence; in-hospital cardiac arrest AND nurses; Cardiopulmonary Resuscitation AND nurses; Cardiac arrest OR CPR OR resuscitation AND general wards; cardiac arrest OR CPR survival; Resuscitation AND Malawi OR CPR in Malawi. After searching, literature was then assessed for relevance by topic, if relevant by topic then assessed for relevance by abstract. All articles that had relevant abstracts were downloaded to be thoroughly read later, relevant articles were then kept for use in one folder, slightly relevant articles were also kept separately and irrelevant ones were discarded.

Knowledge on Diagnosing Patient Needing CPR

It is not unusual to recognize patients pending cardiac arrest in monitored wards such as intensive care units and high dependence units. The patients are machine monitored and

anything out of the ordinary can be set to set off the alarm and nurse patient ratio is usually one to one and one to two in worst case scenario. In general wards however, it is critical to know and be able to recognize signs of impending arrest so that effectiveness of CPR intervention should be optimal (Tirkkonen, Hellevuo, Olkkola & Hoppu, 2016). According to Abidin, Aruming Sila, Revai and Liputo (2017) the recognition, response, and treatment of deteriorating patients are an important element to improve patient outcomes and reduce an unexpected death in the general wards of hospitals.

Abidin et al. (2017) conducted a systematic review of 15 journals for indicators of changes in patient condition in general wards using modified early warning signs. From the reviewed journals, the number of sample varied between 204-3054 respondents and everything was done in adult patients at the general wards. The review looked at changes in patient condition into critical condition characterized by hemodynamic changes in several indicators. Early identification of changes in patient's condition such as cardiac arrest, shock, hypoxia among others through hemodynamic indicator is the key to success in the process of continued treatment (Abidin et al., 2017). Abidin et al. (2017) states that early recognition to such changes becomes responsibility of the nurses and the recognition of clinical changes along with appropriate early intervention can prevent adverse outcomes including death.

Tirkkonen et al. (2016) conducted a study in a Finnish hospital with the aim of shedding light on the etiology and antecedents to IHCAs occurring on hospitals' general wards and investigate, whether the etiology and antecedents are associated with outcome. The study investigated the etiology of IHCAs on general wards where continuous monitoring and staff resources are limited as compared to ICUs and emergency departments. The results of the study found that half of the IHCAs on hospital general wards were of cardiac origin and these IHCAs were more commonly preceded by subjective antecedents, especially chest pain. Two thirds of the IHCAs in general wards in the study were witnessed or observed. IHCAs

are often preceded by vital dysfunctions and subjective antecedents. Tirkkonen et al. (2016) found that the cardiac arrests that were witnessed or observed had better outcome.

The American Heart Association guidelines (2010) states that when encountering a victim of sudden adult cardiac arrest, the lone rescuer must first recognize that the victim has experienced a cardiac arrest, based on unresponsiveness and lack of normal breathing (Travers et al., 2010). The lack of normal breathing includes agonal breathing (occasional gasps, slow, laboured, or noisy breathing) which is common immediately after cardiac arrest and is not normal breathing – it is a sign of cardiac arrest and should not be mistaken for a sign of life (Neumar et al., 2010). The definition of cardiac arrest by Utstein-style is the cessation of cardiac mechanical activity, confirmed by absence of detectable pulse, unresponsiveness and apnoea or agonal respirations (Sandroni, Nolan, Cavallaro & Antonelli, 2007).

In one study, Vural et al. (2017) found that nursing students scored average in knowing the indications and effectiveness of CPR in the study of 61 students in Istanbul, Turkey. In another study, Tsegaye, Tesfaye, and Alemu (2015) studied knowledge, attitude and practices of CPR and associated factors in 238 medical students in Ethiopia. The results showed about 79.8 % of respondents had identified that cardiac and respiratory arrests were the major indication of CPR. 15.2 % of them identified apparent sudden death as an indication of CPR.

In Malawi, a study was conducted in Blantyre to assess Early warning scores (EWS) to identify patients at risk of mortality. The study generated a model with five parameters coined TOTAL (Tachypnoea, Oxygen saturation, Temperature, Alert and Loss of independence). The results of the study showed that the factors most associated with in-patient mortality within three days were tachypnea, hypoxia, low temperature, deterioration in conscious level and inability to stand unaided (Wheeler et al., 2013). In Korea, Kim et al.

(2015) found that 46.8 % of 501 consecutive adults in hospital cardiac arrest patients who were monitored and resuscitated by a medical emergency team showed an increased Modified Early Warning Signs during the 24 hours prior to cardiac arrest.

Literature is showing that there is need to monitor patients and observe changes early enough to plan for interventions for saving their lives. CPR can only be initiated if a patient is identified to have had cardiac arrest as such monitoring and being able to identify patient symptoms for impending cardiac arrest is of importance.

Knowledge on How to Conduct CPR

For CPR to be effective there is need for good chest compressions and appropriate ventilation (Link et al., 2010; Travers et al., 2010). The ability to respond quickly and effectively to a cardiac arrest situation rests on nurses being competent, prepared and up to date in the emergency life-saving procedure of CPR (Nori et al., 2012). A cross sectional study (Plagisou et al., 2015) conducted in Greece among nurses working at NHS hospital to assess theoretical knowledge of CPR. The study population surveyed consisted nurses and assistant nurses of a specific public hospital. The study revealed that nursing staff had poor theoretical CPR knowledge, with a mean score for correct answers in the written test of 50.6 ± 25.9 % and a mean 4.1 ± 2 correct answers. The study also found a significant correlation between education level and written test for CPR, where registered nurses with higher education achieved higher scores than assistant nurses. Registered nurses who possessed a university (p=0.016) or a technological institution (p<0.001) diploma, achieved 36.1 % and 20.9 % higher mean scores, respectively, in the written test in comparison to assistant nurses.

In a study to assess the quality of CPR in relation to clinical outcome in Egypt, Taha, Bakhoum, Kasem, and Fahim (2015) discovered refrainment of nurses to start CPR in most of the cases and the non-adherence to some aspects of the international guidelines. The study showed that in 119 attempted resuscitations, a first responder CPR occurred in 90 cases

(75.6%). Irrespective of who witnessed cardiac arrest, the on-call resident physician started CPR in 114 cases (95.8%) while a nurse started CPR in the remaining 5 cases (4.2%) representing only 16.7 % of the 30 cardiac arrests first witnessed by the on duty nurse. Taha et al. (2015) observed that the nurse preferred to call the on duty physician who started CPR in 95.8 % of cases, possibly due to lack of self-confidence or the result of defective education of guidelines and CPR training.

Nori et al. (2012) confirms poor nurse competence in their study that aimed to determine the extent to which nurses acquire and retain CPR cognitive knowledge and psychomotor skills following CPR training courses in several time frames where pre-test results showed 54.75 % pass in knowledge and 18.70 % in skills. Similarly, Parajulee and Selvaraj (2011) did a study at a tertiary teaching hospital in Nepal and the results showed that knowledge among nurses on CPR was generally low where a mean score was 11.45 in a scenario where the maximum possible score was 21.

In addition, a study in Bahrain by Marzooq and Lyneham (2009) where nurses were assessed for knowledge for CPR, the results indicated that cognitive knowledge was not adequately retained. CPR information was perceived easy or extremely easy by 58% of the respondents. Only 7 % of respondents passed the knowledge test. In general, those who had less education and experience did not recall essential CPR knowledge. Similar observations can be applied in Malawi setting where CPR training is usually done during nursing school training and not emphasized as an in-service training in hospitals where majority of the nurses are Diploma nurses trained as Nurse Midwife Technician (HRH Malawi, 2018).

Similar results were also seen in Botswana where (Rajeswaran & Ehlers, 2014) studied 102 nurses from two referral hospitals participated in the study where a pre-test and post-test questionnaire was administered following a CPR training. The results of the study showed that all nurses failed the pre-test. Their knowledge and skills improved after training,

but deteriorated over the three months until the post-test was conducted. Even though the participants' scores increased after the training session, the post-training mean score of 80.63 % was still below the expected international pass standard of 85 %. The mean score achieved by the participants three months after their CPR training had decreased to 70.75 %, demonstrating that the nurses' CPR knowledge had declined significantly.

In addition, Rajeswaran, Cox, Moeng, and Tsima (2018) assessed CPR knowledge and skill in registered nurses from three different districts in Botswana where 154 nurses participated in *quansi*-experimental study. Pretesting, intervention and post testing were done and were tested using the American Heart Association Basic Life Support 2010 guidelines. The study revealed that the nurses did not know the majority of the basic life support steps as only 48 % passed the pre-test. While a 26.4 % increase was observed in the immediate post-test score compared with the pre-test, the performance of the available participants dropped by 14.5 % in the re-test 6 months after the post-test. Refresher of CPR knowledge and skill was recommended as it is important in managing cardiac arrests patients.

On the other hand, in an effort to assess the impact of CPR and defibrillation program on nursing students performance and practice Mahmoud and Ahmed (2017) conducted a *quansi*-experimental study on 20 students at Najran University. The participants were divided into two groups; the previously trained in CPR group and no previous training group. After training, the results showed that there was significant difference in performance between the previously trained groups to the no previous training group; however, there was no significant difference in knowledge. The result shows that skill can be retained longer than knowledge and recommend frequent CPR trainings to enhance the skill.

Likewise, a correlation was found in a Nigeria study between performance of CPR and scores in CPR knowledge where those who had performed CPR before, scored higher in knowledge assessment than those who had not (Okonta & Okoh, 2015). Another study

conducted by Saramma, Raj, Dash and Sarma (2016) in a tertiary hospital in India with the aim to assess the long term impact of formal certified training among nurses. The study included 206 nurses of which 93 were certified and 113 were not certified for CPR. Written and practical tests were done for Basic Life Support and Advanced Cardiac Life Support. The results showed that there was significant increase in mean knowledge level and performance after the trainings with a *p* value 0.000. The following result was also found in the study regarding CPR and work experience in a pre-test for CPR knowledge; 46 % of nurses with ten years and less experience passed compared to 22 % of those with ten to fifteen years' experience. The study recommended regular CPR trainings.

Gebreegziabher, Aregawi, and Getinet (2014) in Ethiopia assessed the knowledge and skills of neonatal resuscitation of health professionals. The study recruited 150 participants which included midwives, nurses and residents. The results showed that the mean knowledge score of nurses was poor (43.9%) and so was of the other health professionals. This was attributed to limited exposure to real CPR cases during the undergraduate course and updating training.

In another study by Mendhe, Burra, Singh and Narni (2017) looked at knowledge, attitude and practice of CPR among 100 medical interns and nursing interns in India which showed that CPR knowledge and practice was poor. The study revealed that 69 % of the study participants had not performed CPR at any time while only 29 % of the participants (30% medical interns and 28% nursing interns) have performed CPR. The result also showed that 46 % nursing interns and 36 % of medical interns had poor knowledge score of basic life support guidelines of 2010.

On the contrary, a study done by Zientarska et al. (2015) in Poland in order to attempt to assess the knowledge of selected aspects of CPR among nurses in the intensive therapy unit showed that nurses had sufficient knowledge when it came to CPR but would still benefit

with training in current CPR guidelines update. The study included 100 female and male nurses from the Military Medical Institute in Warsaw, medical personnel with up to 5-year work experience, people with higher education (Bachelor's degree in nursing) and respondents having a frequent contact with cardiac arrest patients.

Literature review has revealed that most studies on CPR especially those done in Africa lack the assessment of the skill in real life situations as CPR is not adequately performed and the same can be applied in Malawi setting. However, with frequent exposure to the procedure nurses can be deemed competent in CPR.

Attitude toward CPR

Attitude is defined as the affective domain that includes "learner's" values, beliefs, and role expectations that may influence the management of patients (Gebremedhn, Gebregergs, Anderson, & Nagaratnam, 2017).

Verplancke et al. (2008) in Belgium studied determinants of the quality of basic life support by hospital nurses by recruiting 296 nurses from non-critical care wards of Ghent University Hospital in a manikin and simulation study. The objective of the study was to determine the relationship between the quality of Basic Life Support skill and some potential determinants. Data were collected to determine self-confidence score then the participants would subsequently perform CPR on a manikin. The result of the study showed that greater self-confidence was associated with good compressions and good ventilation. In the study, 43 % of the nurses rated their confidence as good or very good. On the contrary, in another study (Marzooq & Lyneham, 2009) where 82 nurses were recruited as participants in Bahrain, 58 % of the participants had positive attitude as they perceived CPR knowledge as easy or very easy to recall, but still their test result came out poor at 7 %. Similarly, in a study by Mendhe et al., 2017), the result showed that the attitude score for 100 nursing and medical interns on CPR in India was very good and positive but the knowledge and practice score was poor. In

the study 42 % of the medical interns had poor practice score and 52 % of nursing interns had poor practice score but almost all the participants 99 % are of the view that basic life support is necessary and it should be part of the teaching curriculum.

A hospital-based cross-sectional study was conducted by Gebremedhn et al. (2017) at the University of Gondar Teaching Hospital in Ethiopia 461 graduates we included in the study to assess attitude and skill levels to perform CPR. The participants of the study included medical officers, psychiatry nurses, anaesthesiologist, midwives and nurses. Eighty-two of the participants were nurses. In the study, attitude was assessed using structured questionnaire which was addressing sociodemographic variables, field of study of students, and attitude and skills of participants about basic life support and Advanced Cardiac Life Support based on the 2010 UK Resuscitation Council Guidelines. The results of the study revealed substandard attitude and skill across the different health professionals and in more particular the mean attitude score for nurses was poor at 11.5 %. The result was attributed to lack` of awareness about the advantages of CPR in the management of critically ill patients and limited involvement in the management of critically ill patients during their undergraduate course. In Ethiopia Tsegaye et al. (2015) a study on knowledge, attitude and practices of CPR and associated factors in 238 medical students found that 93.8 % of the respondents had positive attitude as compared to 7.4 % of respondents noticed with negative attitude. Tsegaye et al. (2015) recommend that with theoretical knowledge, a healthcare professional may be able to perform CPR sufficiently. The reasons for not practicing CPR included lack of training followed by poor exposure time.

Conclusion

The reviewed literature shows that survival of a person who has gone into cardiac arrest and need for CPR may mainly depend on the competence of the nurses to initiate the chain of survival since they are the first responders; otherwise death of the patient is

inevitable. Literature has reviewed the need for refresher courses on CPR as many may not be motivated because of lack of confidence and competence in diagnosing the need for and conducting CPR itself. Literature around CPR in general wards seem to be scanty in other setting and almost non-existent in Malawi setting.

Chapter Three

Methodology

Introduction

This chapter discusses how the study was conducted from the study design, setting, population, sampling technique and data collection tool. The steps, procedures and strategies for gathering data and analysis of the data are also discussed.

Study Design

This study used a descriptive survey approach. A descriptive study is designed to gain more information about characteristics within a field of study (Burns & Grove, 2011). Quantitative description involves the prevalence, incidence, size and measurable attributes of a phenomena (Polit, Beck & Hungler, 2012). It may be used to identify problems with current practice, make judgments or determine what other nurses in similar situation are doing (Burns & Grove, 2011). The study intended to investigate knowledge and attitude of nurses as well as measure proficiency on CPR among nurses working at Kamuzu Central Hospital general wards.

Study Setting

The place of the study was KCH adult general wards. KCH is one of the tertiary referral hospitals in Malawi situated in the central region. The hospital offers specialized care inclusive of emergency care services, for instance CPR. The hospital offers specialized care to patients referred from 9 district hospitals and other private health facilities within the region. It serves as a teaching hospital for various cadres such as medical doctors, nurses, clinical officers and anaesthetic clinical officers (Gundo et al., 2014). The hospital has at least 46,544 in-patient admissions per year and includes medicine, paediatric, general surgery,

obstetrical services and Intensive Care Unit (Hoffman et al., 2012). The facility currently has a seven bed ICU fully equipped to carter for patients needing respiratory and cardiac support and advanced medical care following cardiac arrest among other ailments.

Currently KCH has the following adult general wards that are included in the study setting; male medical ward 4B and male surgical wards 1A and 1B, female medical 4A and female surgical ward 3B, medical short stay ward and a paying general adult ward at the Ethel Muntharika Wing.

Study Population

The population of the study was all nurses working at KCH in adult general wards.

Sample Size

According to survey using the intended ward duty rosters the number of nurses working in adult general wards as of February 2017, were 72. Sample size was calculated using Slovin's statistical formula $n = \frac{N}{1+Ne^2}$ at 95 % confidence level. Where *n* is sample size, *N* is population and *e* is margin of error (Tejada & Punzalan, 2012).

Therefore;$n = \frac{72}{1+72(0.05)^2}$

Therefore;$n = \frac{72}{1.18}$

Therefore;$n = 61$

In a similar study looking at nurses' knowledge, attitude, and practice when facing cardiac arrest and cardiopulmonary resuscitation conducted in Brazil, a sample of 56 nurses working in surgical wards was used (Silva, Steremberg, & Valença, 2012).

Sampling

Sampling is defined as the process of which individuals or units are selected from a target population (Martínez-Mesa, González-Chica, Duquia, Bonamigo & Bastos, 2016). Consecutive sampling was applied to select the desired number of participants in this study. Consecutive sampling is a convenient sampling that is non probabilistic in nurture, the participants are selected as they appear out of convenience (Martínez-Mesa et al., 2016). The reason for the choice of the sampling technique is that the sample population is small therefore; every available individual that met the inclusion criteria was eligible to participate in the study. In this study everyone meeting the criteria was eligible until the calculated target number of participants of 61 was achieved.

Inclusion Criteria

Nurses working in general adult medical and surgical wards were included in the study. All nurse levels were included whether trained as a nurse midwife technician/enrolled nurse or as a registered nurse or nurse midwife. This inclusion criterion was derived from the focus area of the study which was adult admission wards whose patients are not on continuous monitoring devices otherwise called non-monitoring wards or general wards.

Exclusion Criteria

Nurses working in Intensive Care Units, High Dependence Unit and emergency department were excluded from the study because the patients in these department are monitored constantly; and the probability of the nurses in these areas to have more knowledge in CPR is high therefore would have given a false projection to the rest of the nurses knowledge. All those working in wards other than adult general wards for instance children wards and maternity wards were also excluded as these did not meet the characteristics of the targeted population for the study.

Access and recruitment of participants

The nurses were accessed in their work environment. The researcher was going every alternate afternoon within the week for 8 weeks to KCH adult general wards. The researcher would first meet the ward in charge on the first day of data collection of the particular ward to explain the intention to access nurses for the study as well as show letters of permission. Then the researcher would go ahead and seek consent of every nurse that was found to be free during that shift after verifying that they work in that particular ward.

Data Collection tool

A four-part self-administered questionnaire which encompassed demographic data; knowledge on diagnosing need for CPR; nurse's attitude towards CPR; nurse's knowledge on how to conduct CPR was used. The questionnaire was formulated after review of other research articles (Ganz, Israel, Hersch, Varon & Einav, 2010; Kause et al., 2004; Meaney et al., 2012; Myrianthefs et al., 2003; Sandroni et al., 2003). After the review then areas needs to be asses were identified and compiled together to assess attitude and knowledge on indications for CPR. Ten questions on knowledge of how to conduct CPR were adopted from American Heart Association written CPR exam version 11 of year 2010. The exam on the tool was then graded and a pass mark was 84% and above as recommended by American Heart Association.

Data Collection

Data was collected from August to September of 2017. Collection of data was done in the specified general adult wards at KCH. Information about the study was given to those nurses that were on duty. Those that had consented to participate in the study were given the questionnaire to fill in. If the nurse was on break or had some time they would immediately

fill the questionnaire and the researcher would collect but those that were still busy preferred to keep the questionnaire and have the researcher collect the filled questionnaire the next day they came.

Pretesting

According to Polit, Beck and Hungler (2011) pretesting is a trial administration of a newly developed instrument to identify flaws and assess time requirements. Pretesting is a very important step in survey research and it is an absolutely necessary step to ensure all kinds of errors that are associated with survey research are reduced (Grimm, 2010). Pretesting of the data collection tool was conducted at the African Bible College (ABC) community clinic in Lilongwe. Pretesting helped with validating the data collecting tool and making sure that the data is measuring what the study is supposed to measure. Pretesting questionnaire helps to improve the quality of data significantly (Grimm, 2010).

Five questionnaires were circulated during pretesting and minor errors were identified and rectified. The errors identified were; researchers contact phone number missing a digit and having question 9 pointing back to question 6 and 7 instead of question 7 and 8. The pretesting participants expressed that they understood the questionnaire clearly.

In addition, during the pretesting period, it was discovered that the study was focussing more on knowledge rather than competencies/skills. Therefore, upon discussion with the research team, it was recommended that the study topic be changed to *'Assessing Cardiopulmonary resuscitation knowledge and attitudes among nurses working in adult general wards at Kamuzu Central Hospital, Malawi'* from the approved topic by the Ethics Committee *'Cardiopulmonary resuscitation competence among nurses at Kamuzu Central Hospital adult general wards'*.

Data Management

Data were managed in such a way to ensure that it is kept safe and access was restricted. Completed questionnaires were filed and kept in a locked cupboard. Access to the computer used for data analysis was only limited to the researcher. The computer was secured with a password that is known only to the researcher. The filled-in questionnaires will be kept for a period of three years to allow time for queries that may demand retrieval of raw data before being destroyed by burning.

Dissemination of Results

The results of the study will be disseminated in various forms, including in written form as a thesis at the Kamuzu College of Nursing library, in form of presentation to the managers and health workers, especially nurses and doctors at KCH where the study was conducted, through participation in research dissemination conferences and submission for publication in peer reviewed journals.

Data Analysis

Data was analysed using descriptive and inferential statistics. Frequencies and percentages were run to determine sample demographic characteristics; determine: participants' knowledge on diagnosing need for CPR; participant's attitude towards the need for CPR; and participant's knowledge on how to conduct CPR on adult. A new variable "*percent correct*" was then computed and copied to excel where percentage of participants providing a specific percentage of correct responses was calculated. The pass mark for knowledge on how to conduct CPR exam was 84% as recommended by American Heart Association. Data were then displayed on statistical charts. Finally, to determine the association between nursing cadre and knowledge of how to conduct CPR on adult and association between experience and the ability to initiate CPR, Fisher exact test was used at 5

% significance level, based on the assumption that the sample size was not adequate for the Chi square test of independence, as in all cases more than 20 % of the observations had expected value of less than 5.

Ethical Consideration

To be ethical, research must be based on the following ethical considerations and principles; respect for autonomy, voluntary and free from coercion, fully informed, private and confidential and justice/fairness in selection process, distribution of risks and benefits (Hendrick, 2004). The research proposal passed through a review the College of Medicine Research and Ethics Committee (COMREC) a review body, before any data was collected for analysis. Certification to carry on with the study was given by COMREC certificate number P/04/17/2144. Permission was also sought from the data collecting sites; ABC Community clinic for the pretesting and KCH for the study participants and approval letters were provided.

All participants in the study were fully informed of the importance and the risks associated with their participation in this study, and they were granted freedom to withdraw from the study at any point in time without any coercion. Only those who consented to take part in the study were given the chance to participate and had to sign an informed consent form. Confidentiality for the participants was achieved by use of codes instead of names on the questionnaire to ensure that their identity is kept confidential. The data collected was solely handled by the researcher to ensure no risk of manipulation and breach of privacy.

Chapter Four

Results

Introduction

The chapter is organized in four sections; demographic characteristics of the participants, participant's knowledge of diagnosing need for CPR; participants' attitude towards CPR in general wards and participant's knowledge on how to conduct CPR on adult.

Sociodemographic characteristics of participants

A total of 61 nurse midwives were interviewed. Out of the sixty-one participants, 28 (46%) indicated to have never done CPR before and only 4 (6.6%) had done CPR in less than a week before. Table 1 presents the participants demographic characteristics including statistical test of association using Fishers test run at 95 % confidence interval between nursing carder and CPR knowledge, work experience and CPR knowledge, and a *p* value of less than 0.05 was considered significant.

Table 1: *Sample demographic characteristics*

Characteristic		*Number of participants' n (%)*	*Initiated CPR n (%)*	*Participated CPR n (%)*	*knowledge of CPR and 95% CI*	*P-value*
Gender	Male	9(14.8)	6 (67)	5(56)		
	Female	52(85.2)	22(42)	24(46)		
Age	20-29years	29(47.5)	15(53)	14(49)		
	30-39 years	20(32.8)	9(45)	10(50)		
	40 years and above	12(19.7)	3(23)	2(15)		
Cadre	Nurse Midwife Technician	38(62.3)	12(32)	11(29)	44.4% (95% CI 29.9,59.0)	0.03
	Registered Nurse/Midwife	23(37.7)	16 (72)	17(76)	81.3% (95% CI 62.1, 100.4)	
Work Experience	Less than 10 years	41(67.2)	24(58)	24(58)	63.4% (95% CI 48.7, 78.2)	0.42
	10 years and above	20(32.8)	7(34)	5(26)	23.1% (95% CI 0.2, 46.0)	

Knowledge of participants in diagnosing patient who need CPR

The study also explored participants' knowledge in diagnosing patients' need for CPR. Figure 1 below present results of the analysis of participants' knowledge on diagnosing patient who needs CPR.

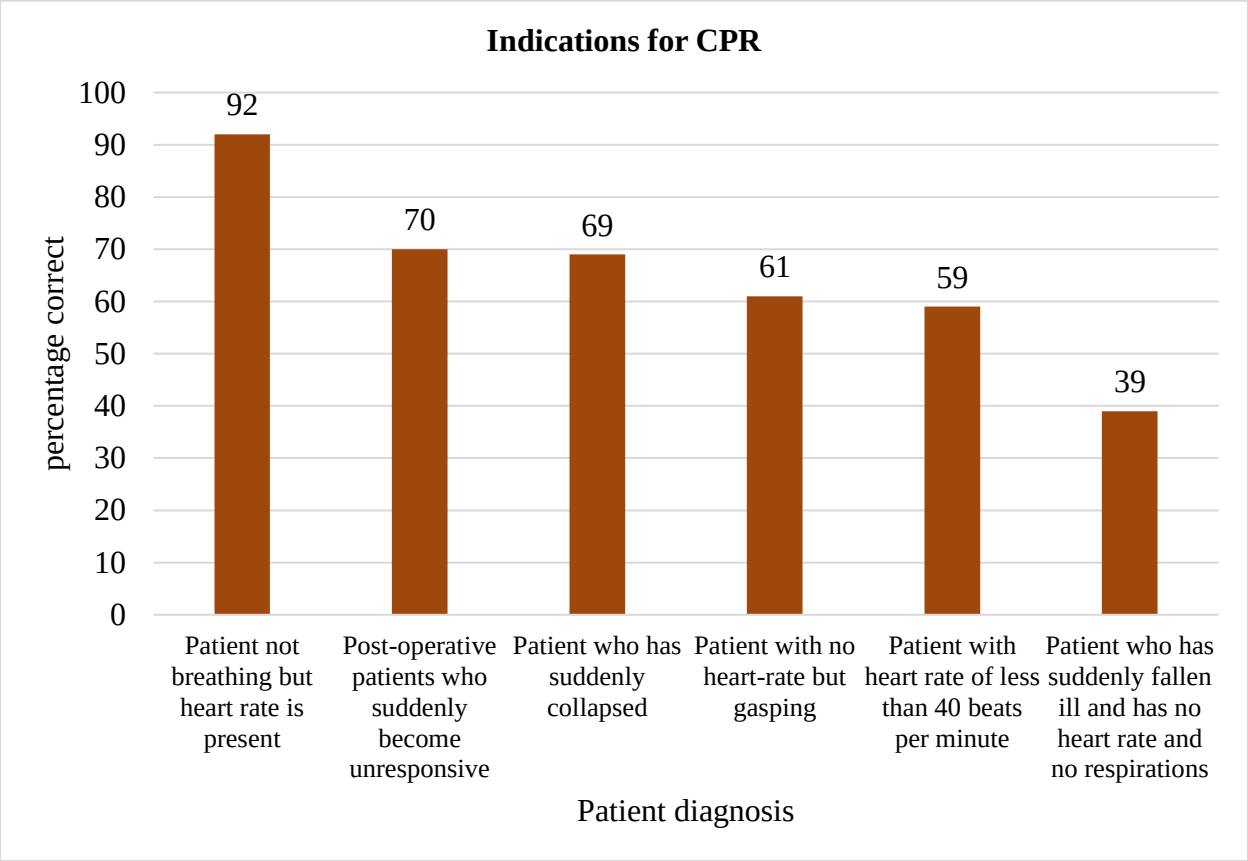


Figure 1. Knowledge of participants in diagnosing patients who need CPR

Participant's Knowledge of How to Conduct CPR on Adult

The participants of the study were asked multiple-choice questions extracted from the American Heart Association Basic Life Support exam of 2010 version 1. Out of 61 participants only 4 (7%) passed the CPR test requirement of 84 % and above. The majority, 57 (93%) failed the exam. Table 2 presents the percentage of participants who passed each question.

Table 2. *Knowledge of how to conduct CPR on an adult (BLS test)*

Basic Life Support knowledge assessed	***Number of correct answers (n)***	***Percentage of participants (%)***
The correct compression and ventilation rates for 2-rescuer CPR in the presence of an advanced airway	8	(13)
The recommended rate for performing chest compressions for victims of all ages	14	(23)
Importance of compressing to the appropriate depth during CPR	21	(34)
The compression-to-ventilation ratio for 1-rescuer adult CPR	26	(43)
Depth of compressions for an adult victim should be at least	28	(46)
Where to place the hands when performing chest compressions	29	(48)
What is recommended to minimize the risk of gastric inflation during bag-mask ventilation	38	(62)
What the second rescuer should do in 2-rescuer CPR, while the first rescuer begins chest compressions	41	(67)
Within how long to treat unresponsive victim - no breathing, no pulse, with chest compressions	42	(69)
Victim(s) that need CPR	49	(80)

Participant's Attitude towards CPR

Participants were asked to respond to these statements whether they agree, disagree or were not sure.

Participants who demonstrated positive attitude towards CPR were 44 (73%). However, the rest of the participants either demonstrated negative attitude or were neutral in their responses. *Figure 2* below presents results of the analysis of participants' attitude on the need for CPR.

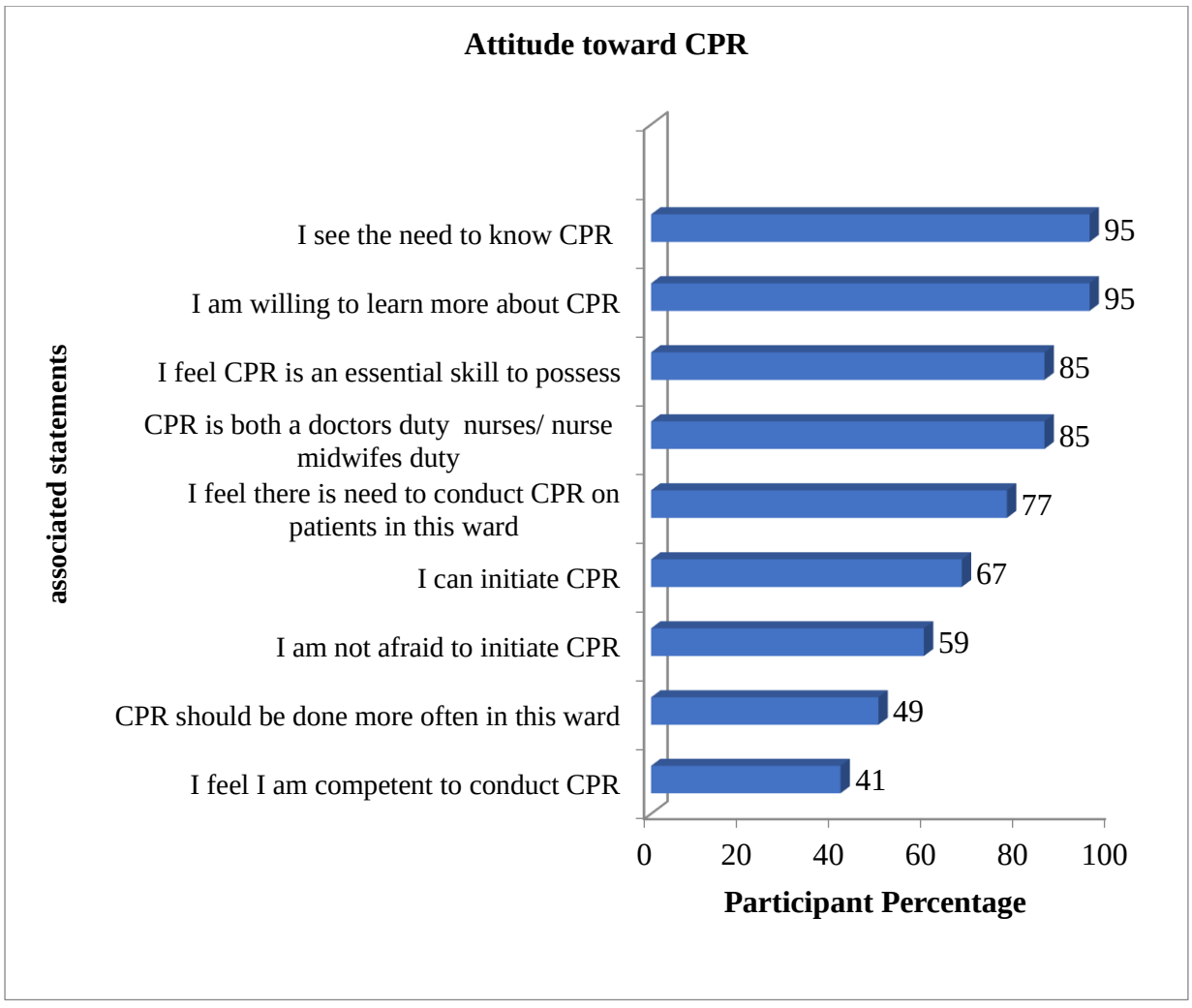


Figure 2: percentage of participants displaying a positive attitude towards CPR

Chapter 5

Discussion

Introduction

This chapter presents a discussion on nurses' knowledge and attitudes on CPR at KCH general adult wards. The discussion is based on results on nurses' knowledge in diagnosing patient who needs CPR; nurses' knowledge on how to perform CPR and nurses' attitude towards CPR in adult general wards.

Participant's knowledge of diagnosing need for CPR

The chain of survival for someone who has had cardiac arrest follows these crucial steps: immediate recognition of cardiac arrest and activation of emergency response system; early CPR with emphasis on chest compression; rapid defibrillation; effective advance life support and integrated post cardiac care (American Heart Association, 2015a). Being able to diagnose the need for CPR is essential because it is the very first step towards initiating CPR. This study revealed that the nurses on average 40(65%) could establish indication for CPR; 57(92%) indicated patient not breathing but heartrate is present, 42(69%) indicated patient who has suddenly collapsed and 37(61%) indicated patient with no heart rate but gasping. Complementary to this result, the CPR competence test in the study based on the American Heart Association Basic Life Support guidelines of 2010 revealed that 49(80 %) of the nurses in this study demonstrated correct knowledge of victims that need CPR as a victim who is unresponsive, no normal breathing and absent/inadequate pulse. Similar results were also found in a study done in Ethiopia where (79.8%) of the respondents were able to indicate cardiac arrest and respiratory arrest as major indications for CPR (Tsegaye et al., 2015).

Though the nurses in this study seem to have good knowledge in the indication for CPR the result can be limiting because this was theoretical knowledge and not practical on

the patient. In another study, the same limitation was noted where standard questionnaire was used to measure knowledge attitude and practice of CPR where only cognitive domain without psychomotor skills were tested (Mendhe et al., 2017) . However, another study recommended that with theoretical knowledge a healthcare worker can perform CPR sufficiently (Tsegaye et al., 2015).

Being able to diagnose the need for CPR is the most important part of the survival chain of a person experiencing cardiac arrest (American Heart Association, 2015). Evidence has shown that initiation of CPR immediately following a cardiac event improves chances of survival tremendously (Marzooq & Lyneham, 2009; McHugh et al., 2016). Initiation of CPR depends on the witness being able to recognize the need to conduct one (McHugh et al., 2016). This result, therefore, can be used as a starting point to encourage more nurses in initiation of and participation in CPR.

Participant's knowledge of how to conduct CPR on adult

In this study, though 25(41%) of the nurses had indicated that they felt competent in their CPR skills, only 4(7%) passed CPR competence test at 84 % pass rate as per prescription from the American Heart Association. The same outcome was also seen in a study in Bahrain where only 7 % of the participants passed the knowledge test on CPR but 58 % of the participants had previously responded recalling CPR knowledge as being easy or very easy (Marzooq & Lyneham, 2009). Nori, Saghafinia, Motamedi and Hosseini (2012) also found poor nurse competence in their study that aimed at determining the extent to which nurses acquire and retain CPR cognitive knowledge and psychomotor skills following CPR training courses in several time frames. The pre-test results showed 54.75 % pass in knowledge and 18.70 % in skills.

In Africa, Ethiopia, the results of a similar study showed that the mean knowledge score of nurses in resuscitation was poor (43.9%). The present study compliments the

worldwide picture from other studies where knowledge for CPR in nurses is not adequate. One of the contributing factors for nurses at KCH would be having nurses that are trained in CPR pre service but lack in-service training. This is supported by Plagisou et al., (2015) that found low levels of theoretical knowledge of CPR among nurses and only 13.2 % of the participants had participated in CPR training within 6 months prior to study. These findings concurs with studies in (Mahmoud & Ahmed, 2017; Marzooq & Lyneham, 2009; Plagisou et al., 2015; Rajeswaran, Cox, Moeng, & Tsima, 2018; Rajeswaran & Ehlers, 2014) which concluded that CPR skill diminishes with time and that frequent refresher trainings are ideal to enhance and maintain the skill. A correlation was found in a study in Nigeria between performance of CPR and scores in CPR knowledge, those who had performed CPR before scored higher in knowledge assessment than those who had not (Okonta & Okoh, 2015). In their studies (Mokhtari Nori et al., 2012; Rajeswaran et al., 2018; Rajeswaran & Ehlers, 2014) found that CPR knowledge started to diminish 3-6 months after training suggesting that it is imperative to conduct CPR trainings and refresher courses at least every 6 months.

In this study, the nurses' knowledge particularly on chest compressions was poor. The nurses that answered correctly the compression to ventilation rate were 8(13%) of the participants. 14(23%) were correct on recommended rate for chest compressions, 21(34%) were correct on the importance of compressing to appropriate depth and 46 % were correct on depth of compressions, and 29(48%) were correct on where to place hands when performing chest compressions. Effective chest compressions are a significant predictor for return of spontaneous circulation following cardiac arrest (Taha et al., 2015). According to the American Heart Association (2015), compressions create blood flow primarily by increasing intrathoracic pressure and directly compressing the heart, which in turn results in critical blood flow and oxygen to the heart and brain. Taha et al. (2015) found that effective chest compressions assessed in three parameters; rate, depth and interruption, was considered

a significant factor for patients survival to discharge with a *p* value of 0.021. Having correct knowledge of this lifesaving skill of CPR seems to be vital for positive patient outcome (Silva et al., Steremberg, & Valença, 2012b; Link et al., 2010). The next step after establishing that a victim needs CPR is prompt CPR with emphasis on chest compression. Chest compressions are therefore core to CPR and having such a poor score can be a contributing factor for poor patient outcome (Lambiase, 2017; Wangtawesap et al., 2017).

Fifty eight percent (n= 35) of nurses with less than ten years of work experience were initiating CPR compared to 21(34%) of those with more than ten years of work experience, showing that the more the time elapsed, the less likely to initiate or participate in CPR. Similar results were also found in a study in India by Saramma, Raj, Dash, and Sarma (2016) where a pre-test for CPR knowledge showed that 46 % of nurses with ten years and less experience passed compared to 22 % of those with ten to fifteen years of work experience. In the current study, test of association at 95 % confidence level also showed that nurses with experience of less than ten years had significantly higher knowledge of CPR at 63.4 % compared to those between ten and fifteen years of experience at 23 % with *p* value of 0.042. This result shows that the more the knowledge on CPR the more the confidence to initiate CPR in agreement with Tsegaye et al. (2015) who recommended that with theoretical knowledge, a healthcare professional may be able to perform CPR sufficiently.

Furthermore, in the current study only 4(7%) had participated in CPR in less than a week before, while the majority, 27(45%) had never participated or initiated CPR. These results are also consistent with a study in India that found that 69 % of the participants had not performed CPR at any time and only 28 % of nursing interns had performed CPR (Mendhe et al., 2017). Lack of involvement in performance of CPR produced poor knowledge result in both studies. Evidence shows that factors like education, experience and exposure to CPR can produce better CPR knowledge results in nurses. A study in Poland,

where nurses working at an intensive care unit, with experience of up to 5 years, and a degree level training and had frequent contact with cardiac arrest, had sufficient knowledge in CPR (Zientarska et al., 2015). This study also found a correlation between nurse carder and CPR knowledge: as knowledge was significantly higher in registered nurses 81% compared to NMTs' 44 % with a *p* value 0.03. Similar observation was made in a study in Bahrain where nurses cognitive knowledge was not adequately retained but in general, those who had less education and experience did not recall essential CPR knowledge (Marzooq & Lyneham, 2009). Plagisou et al. (2015) also found a significant correlation between education level and written test for CPR, where registered nurses with higher education achieved higher scores than assistant nurses. In Malawi, the majority of the nurses are NMTs who are trained at college diploma level. This increases the need to conduct CPR trainings in the hospital setting as the majority are less knowledgeable in the skill. Having more nurses knowledgeable in CPR can improve good patient outcomes as CPR is an important lifesaving skill.

Participant's attitude towards CPR

The nurses' attitude toward CPR was positive on average 45(73%). Similar results were also found in other studies where participants' attitude was positive in CPR (Marzooq & Lyneham, 2009; Mendhe et al., 2017; Tsegaye et al., 2015). Positive attitude, nevertheless, did not produce good knowledge and practice result in CPR. In Belgium, however, a study showed that greater self-confidence was associated with good compressions and good ventilation (Verplancke et al., 2008). Tsegaye et al. (2015) found that lack of confidence was also indicated as a contributing factor affecting CPR practice in 84 % of the participants. Similarly, Taha et al. (2015) found that nurses lacked confidence due to lack of training in CPR, hence the nurses preferred to call the doctor on duty who started CPR in 95.8 % of the cases.

In this study, 59 % of the nurses indicated that they were not afraid to initiate CPR and 25(41%) indicated that they felt competent to conduct CPR while 52(85 %) of the nurses in this study felt that CPR is an essential skill to possess. Similar results were also found in another study by Vural et al. (2017) where they found that the nursing students had very good knowledge of the importance of CPR, however, the majority of them had average score regarding accuracy of CPR. In this study only 4(7%) of the nurses passed the CPR knowledge test, although the majority had positive attitude toward CPR.

Poor attitude on the other hand can be associated with poor performance, according to Gebremedhn et al. (2017) in a study where the results revealed substandard attitude and skill across the different health professionals; the mean attitude score for nurses was poor at 11.5 % and produced poor practice result, however, in the same study the anaesthetists had good attitude and produced good practice result. The nurses' result was attributed to lack of awareness about the advantages of CPR in the management of critically ill patients and limited involvement in the management of critically ill patients during their undergraduate course (Gebremedhn et al., 2017).

Ninety five percent of the nurses in this study were willing to learn more about CPR. Similarly, Plagisou et al. (2015) while assessing theoretical knowledge of CPR, found the majority (91.9%) of the participants willing to take part in ongoing CPR courses. Tsegaye et al. (2015) found that there is a significant association between lack of training, inadequate information and lack of confidence, poor exposure and practice of CPR. The positive attitude result in the present study is therefore imperative. In an era when low-income countries such as Malawi are facing an increase in non-communicable diseases, especially cardiac diseases, nurses in the country need to be aware of the importance of CPR, and be more confident to participate in CPR so that premature deaths are prevented.

Limitations of the Study

One of the limitations in this study is that the competence test that was used was American based and there may have been barriers in communication to the participants, especially metrics as Malawi uses centimetres while the research questionnaire used inches. The data tool did not indicate if participants were trained before or not in CPR.

Another limitation is the sample size which is small; and the use of one setting; therefore, results may not be a generalizable picture of the entire nurse community in Malawi. The lack of documented evidence on CPR in adults in Malawi is further limitation to this study, which resulted in leaving less room for comparisons.

Conclusion

This study has complimented already existing knowledge that CPR skill is not adequate among nurses, especially those working in general wards. Conversely, startling evidence has emerged in this study indicating that those with less than ten years of work experience were more competent in CPR than those with more than ten years of experience.

Taking into consideration the rise of non-communicable diseases in developing countries of which the majority are cardiac related, and cardiac arrest being one of the complications, there is need to enhance CPR skill. With this evidence that the nurses have positive attitude towards attaining CPR skill and that they know how to identify a patient needing CPR, it is therefore, of high importance to teach, train and refresh CPR skill among nurses as they are usually first responders to a cardiac arrest incident.

Recommendations of the Study

Based on the results of the study as well as the research process, recommendations have been made to ensure improvement in attainment and maintenance of CPR skill among

nurses. Recommendations have been made with implications to nursing education, nursing practice, nursing management and nursing research.

Nursing practice

- There is need to consider CPR certification as one of the fundamental skills for nurses
- There is need to ensure that guidelines and CPR protocols are readily available in wards and hospitals as a reference point when need arises.
- There is need to formulate and ensure availability of crash carts (emergency carts) in every general ward to help with monitoring and commencement of advanced resuscitation procedures while in the ward to increase chances of survival.

Nursing education

- There is need to emphasize how essential it is to teach and practice CPR skill in nursing colleges, especially now when non-communicable diseases are on the rise, predisposing more people to cardiac arrests.
- Skills laboratories in the nursing colleges should include special resuscitation manikins for CPR to ensure adequate acquisition of the skill.

Nursing management

- Nurse Managers should advocate for and ensure that their staff are trained and refreshed on CPR skill periodically.

Nursing research

- Future research should employ a mixed method; a two-phase sequential exploratory design where the qualitative data is collected first, followed by the quantitative data.

The qualitative approach would assist in describing and getting a deeper understanding of nurses' knowledge gaps on CPR.

- It would also be interesting if an observational study was done on the same to assess actual skill as some professionals do better in skill than theory, especially the NMTs as they are originally trained as technical carder.

Reference

Abidin, Z., Sila, N. A., Revai, A. & Liputo, G. P. (2017). Modified early warning system (Mews), indicator of changes in patient's condition in the general wards: a systematic review. *8th International Nursing Conference on Education, Practice and Research Development in Nursing*. Doi: https://doi.org/10.2991/inc-17.2017.19

Agyeman-Duah, J.N.A., Theurer, A., Munthali, C., Alide, N. & Neuhann, F. (2014). Understanding the barriers to setting up a healthcare quality improvement process in resource-limited settings: a situational analysis at the Medical Department of Kamuzu Central Hospital in Lilongwe, Malawi. *BMC Health Services Research, 14*(1), 1. Doi: https://doi.org/10.1186/1472-6963-14-1

American Heart Association. (2014). *Facts a race against the clock out-of-hospital cardiac arrest*. Retrieved from www.heart.org/policyfactsheets (accessed December 15, 2018)

American Heart Association. (2015). *American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care.* Dallas, Texas: American Heart Association.

Berdowski, J., Berg, R. A., Tijssen, J. G. & Koster, R. W. (2010). Global incidences of out-of-hospital cardiac arrest and survival rates: systematic review of 67 prospective studies. *Resuscitation*, *81*(11), 1479–1487.

Bream, K. D., Gennaro, S., Kafulafula, U., Mbweza, E. & Hehir, D. (2005). Barriers to and facilitators for new born resuscitation in Malawi, Africa. *Journal of Midwifery & Women's Health*, *50*(4), 329–334.

Burns, N., Grove, S. & Gray, J. (2011). Understanding nursing research: building an evidence-based practice (5th ed.). St Louis, MO: Elsevier Saunders.

Cognata, A. (2013). *Knowledge, skills, and use of neonatal resuscitation in Malawi, before and after participation in helping babies breathe train the trainer program*. Itasca, Illinois: American Academy of Paediatrics.

Cooper, J. A., Cooper, J. D. & Cooper, J. M. (2006). Cardiopulmonary resuscitation history, current practice, and future direction. *Circulation*, *114*(25), 2839–2849.

Dos Santos Silva, J. M., Steremberg, S. & Valença, M. P. (2012). Nurses' knowledge, attitude, and practice when facing cardiac arrest and cardiopulmonary resuscitation. *Revista de Enfermagem UFPE on Line*, *6*(6), 1495–1499.

Ganz, F.D., Kaufman, N., Israel, S. & Einav, S. (2013). Resuscitation in general medical wards: who decides? *Journal of Clinical Nursing*, *22*(5-6), 848-855.

Gebreegziabher, E., Aregawi, A., & Getinet, H. (2014). Knowledge and skills of neonatal resuscitation of health professionals at a university teaching hospital of Northwest Ethiopia. *World Journal of Emergency Medicine*, *5*(3), 196–202.

Gebremedhn, E. G., Gebregergs, G. B., Anderson, B. B. & Nagaratnam, V. (2017). Attitude and skill levels of graduate health professionals in performing cardiopulmonary resuscitation. *Advances in Medical Education and Practice*, *8*, 43–50. https://doi.org/10.2147/AMEP.S114726.

Grimm, P. (2010). Pretesting questionnaire. *Wiley International Encyclopaedia of Marketing, Part 2*, doi: 10.1002/9781444316568.wiem02051 (Accessed April 14, 2017).

Gundo, R., Lengu, E. S., Maluwa, A., Mtalimanja, O., Chipeta, D., & Kadyaudzu, C. (2014). An audit of admissions to intensive care unit at Kamuzu Central Hospital in Malawi. *Open Journal of Nursing*, *4*(8), 583-589.

Hasselqvist-Ax, I., Riva, G., Herlitz, J., Rosenqvist, M., Hollenberg, J., Nordberg, P., Ringh, M., Jonsson, M., Axelsson, C., Lindqvist, J. & Karlsson, T (2015). Early cardiopulmonary resuscitation in out-of-hospital cardiac arrest. *New England Journal of Medicine, 372*(24), 2307–2315.

Hendrick, J. (2004). *Law and ethics: foundations in nursing and health care*. Cheltenham: Nelson Thornes.

Hoffman, M., Mofolo, I., Salima, C., Hoffman, I., Zadrozny, S., Martinson, F. & Van Der Horst, C. (2012). Utilization of family members to provide hospital care in Malawi: the role of hospital guardians. *Malawi Medical Journal*, *24*(4), 74–78.

Hwang, S. O. (2013). Cardiopulmonary resuscitation :from the past into the future. *Journal of Acute Medicine*, *3*(3), 67–72.

Kause, J., Smith, G., Prytherch, D., Parr, M., Flabouris, A., Hillman, K. (2004). A comparison of antecedents to cardiac arrests, deaths and emergency intensive care admissions in Australia and New Zealand, and the United Kingdom: the academia study. *Resuscitation*, *62*(3), 275–282.

Kim, W. Y., Shin, Y. J., Lee, J. M., Huh, J. W., Koh, Y., Lim, C.M., & Hong, S. B. (2015). Modified early warning score changes prior to cardiac arrest in general wards. *PloS One, 10*(6), e0130523. Doi: https://doi.org/10.1371/journal.pone.0130523

Lambiase, P. D. (2017). Reinforcing the links in the chain of survival. *Journal of the American College of Cardiology*, *70*(9), 1118–1120.

Lang, H., Mlotha-Mitole, R., Phiri, A., Anderson, M., Cartmell, E., Schubert, C., Bond R., Mckenny, A., Fitzgerald, E., Mwansambo, C. & Kasembe P. (2014). Reduction of paediatric hospital mortality in a Malawian referral hospital. *Paediatric Critical Care Medicine*, *15*(4_suppl), 11-12.

Link, M. S., Atkins, D. L., Passman, R. S., Halperin, H. R., Samson, R. A., White, R. D., ... & Kerber, R. E. (2010). Part 6: electrical therapies: automated external defibrillators, defibrillation, cardioversion, and pacing. In. 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*, *122*(18 Suppl 3), S706-19.

Mahmoud, M. H., & Ahmed, R. E. (2017). Impact of cardiopulmonary resuscitation/defibrillation program on nursing students'knowledge and performance. *The Egyptian Journal Of Medical Sciences*, *32*(1), 797–816.

Martínez-Mesa, J., González-Chica, D. A., Duquia, R. P., Bonamigo, R. R., & Bastos, J. L. (2016). Sampling: how to select participants in my research study? *Anais Brasileiros de Dermatologia*, *91*(3), 326–330.

Marzooq, H., & Lyneham, J. (2009). Cardiopulmonary resuscitation knowledge among nurses working in Bahrain. *International Journal of Nursing Practice*, *15*(4), 294–302. https://doi.org/10.1111/j.1440-172X.2009.01752.x

McHugh, M. D., Rochman, M. F., Sloane, D. M., Berg, R. A., Mancini, M. E., Nadkarni, V. M., … American Heart Association's get with the guidelines-resuscitation investigators. (2016). Better nurse staffing and nurse work environments associated with increased survival of in-hospital cardiac arrest patients. *Medical Care*, *54*(1), 74–80. Doi: https://doi.org/10.1097/MLR.0000000000000456

Meaney, P. A., Sutton, R. M., Tsima, B., Steenhoff, A. P., Shilkofski, N., Boulet, J. R. Nadkarni, V. M. (2012). Training hospital providers in basic CPR skills in Botswana: acquisition, retention and impact of novel training techniques. *Resuscitation*, *83*(12), 1484–1490.

Mendhe, H. G., Burra, L., Singh, D., & Narni, H. (2017). Knowledge, attitude and practice study on cardiopulmonary resuscitation among medical and nursing interns. *International Journal of Community Medicine and Public Health*, *4*(8), 3026–3030.

Mokhtari Nori, J., Saghafinia, M., Kalantar Motamedi, M. H., & Khademol Hosseini, S. M. (2012). CPR training for nurses: how often is it necessary? *Iranian Red Crescent Medical Journal*, *14*(2), 104–107.

Molyneux, E., & Robertson, A. (2002). Emergency medicine in differently resourced settings: what can we offer each other? *Emergency Medicine Journal*, *19*(5), 378–379.

Msyamboza, K. P., Ngwira, B., Dzowela, T., Mvula, C., Kathyola, D., Harries, A. D. & Bowie, C. (2011). The burden of selected chronic non-communicable diseases and their risk factors in Malawi: nationwide STEPS Survey. *PLoS ONE*, *6*(5), e20316. Doi: https://doi.org/10.1371/journal.pone.0020316

Myrianthefs, P., Kalafati, M., Lemonidou, C., Minasidou, E., Evagelopoulou, P., Karatzas, S., & Baltopoulos, G. (2003). Efficacy of CPR in a general, adult ICU. *Resuscitation*, *57*(1), 43–48.

Neumar, R. W., Otto, C. W., Link, M. S., Kronick, S. L., Shuster, M., Callaway, C. W., … Silvers, S. M. (2010). Part 8: Adult advanced cardiovascular life support. In 2010 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. *Circulation*, *122*(18 suppl 3), S729–S767.

Nori, J. M., Saghafinia, M., Motamedi, M. K., & Hosseini, S. K. (2012). CPR training for nurses: how often is it necessary? *Iranian Red Crescent Medical Journal*, *14*(2), 104-107.

Okonta, K. E., & Okoh, B. A. (2015). Theoretical knowledge of cardiopulmonary resuscitation among clinical medical students in the University of Port Harcourt, Nigeria. *African Journal of Medical and Health Sciences*, *14*(1), 42-46.

Parajulee, S., & Selvaraj, V. (2011). Knowledge of nurses towards cardiopulmonary resuscitation in a tertiary care teaching hospital in Nepal. *Journal of Clinical and Diagnostic Research*, *5*(8), 1585–1588.

Plagisou, L., Tsironi, M., Zyga, S., Moisoglou, I., Maniadakis, N., & Prezerakos, P. (2015). Assessment of nursing staff's theoretical knowledge of cardiovascular resuscitation in an NHS public hospital. *Hellenic Journal of Cardiology*, *56*(2), 149–153.

Polit, Denise F.,Beck, Cheryl Tatano. (2012) *Nursing research: generating and assessing evidence for nursing practice.* Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins,

Rajeswaran, L., Cox, M., Moeng, S., & Tsima, B. M. (2018). Assessment of nurses' cardiopulmonary resuscitation knowledge and skills within three district hospitals in Botswana. *African Journal of Primary Health Care & Family Medicine*, *10*(1), e1–e6. Doi: https://doi.org/10.4102/phcfm.v10i1.1633

Rajeswaran, L., & Ehlers, V. J. (2014). Cardiopulmonary resuscitation knowledge and skills of registered nurses in Botswana. *Curationis*, *37*(1), e1–e7.

Sandroni, C., Cavallaro, F., Ferro, G., Fenici, P., Santangelo, S., Tortora, F., & Conti, G. (2003). A survey of the in-hospital response to cardiac arrest on general wards in the hospitals of Rome. *Resuscitation*, *56*(1), 41–47.

Sandroni, C., Nolan, J., Cavallaro, F., & Antonelli, M. (2007). In-hospital cardiac arrest: incidence, prognosis and possible measures to improve survival. *Intensive Care Medicine*, *33*(2), 237–245.

Saramma, P. P., Raj, L. S., Dash, P. K., & Sarma, P. S. (2016). Assessment of long-term impact of formal certified cardiopulmonary resuscitation training program among nurses. *Indian Journal of Critical Care Medicine* , *20*(4), 226–232. Doi: https://doi.org/10.4103/0972-5229.180043.

Schnittger, T., Downie, P., & Pollach, G. (2011). The effect of providing resuscitation training to front-line staff on rates of maternal and trauma mortality in two health districts in Malawi. *Malawi Medical Journal*, *23*(1), 11-15.

Taha, H. S., Bakhoum, S. W., Kasem, H. H., & Fahim, M. A. (2015). Quality of cardiopulmonary resuscitation of in-hospital cardiac arrest and its relation to clinical outcome: An Egyptian University Hospital Experience. *The Egyptian Heart Journal*, *67*(2), 137–143.

Tejada, J. J., & Punzalan, J. R. B. (2012). On the misuse of Slovin's formula. *The Philippine Statistician*, *61*(1), 129–136.

Timermanthiago, L., Timerman, S., Quilici, A., Gonzalez, M., & Ramires, J. (2010). Characteristics of patients receiving do-not-attempt-resuscitation orders in a Brazilian tertiary hospital. *Resuscitation*, *81*(2), S113. Doi: https://doi.org/10.1016/j.resuscitation.2010.09.460.

Tirkkonen, J., Hellevuo, H., Olkkola, K. T., & Hoppu, S. (2016). Aetiology of in-hospital cardiac arrest on general wards. *Resuscitation*, *107*, 19–24.

Travers, A. H., Rea, T. D., Bobrow, B. J., Edelson, D. P., Berg, R. A., Sayre, M. R., … Swor, R. A. (2010). Part 4: CPR overview 2010 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. *Circulation*, *122*(18 suppl 3), S676–S684.

Tsegaye, W., Tesfaye, M., & Alemu, M. (2015). Knowledge, attitude and practice of cardiopulmonary resuscitation and associated factors in Ethiopian University Medical Students. *Journal of General Practice*, 1–5.

Verplancke, T., De Paepe, P., Calle, P., De Regge, M., Van Maele, G., & Monsieurs, K. (2008). Determinants of the quality of basic life support by hospital nurses. *Resuscitation*, *77*(1), 75–80.

Vural, M., Koşar, M. F., Kerimoğlu, O., Kızkapan, F., Kahyaoğlu, S., Tuğrul, S., & İşleyen, H. B. (2017). Cardiopulmonary resuscitation knowledge among nursing students: a questionnaire study. *Anatolian Journal of Cardiology, 17*(2), 140–145.

Wangtawesap, K., Siriussawakul, A., Chaiwat, O., Chakorn, T., Nuntabut, R., Kusakunniran, D., Methapraphamorn, W. (2017). Ward characteristics associated with delayed defibrillator and doctor presence in cardiopulmonary resuscitation simulated survey. *Siriraj Medical Journal*, *63*(6), 196–199.

Wheeler, I., Price, C., Sitch, A., Banda, P., Kellett, J., Nyirenda, M., & Rylance, J. (2013). Early warning scores generated in developed healthcare settings are not sufficient at predicting early mortality in Blantyre, Malawi: a prospective cohort study. *PLoS One, 8*(3), e59830. Doi: https://doi.org/10.1371/journal.pone.0059830.

World Health Organisation. (2013). *Global action for prevention and control of non-communicable diseases*. Geneva: WHO.

World Health Organisation. (2014). *Global status report on non-communicable diseases; attaining the nine global non communicable disease targets, a shared responsibility*. Geneva: WHO

Zientarska, E., Kaczyńska, A., Belowska, J., Panczyk, M., Dykowska, G., Sienkiewicz, Z., & Gotlib, J. (2015). The attempt to assess nurses' knowledge on selected aspects of cardiopulmonary resuscitation. *Polish Nursing*, *58*(4), 391-396.

Appendix A: Participant Consent Form

Dear participant,

My name is Madalo Macias and I am pursuing a Master of Science degree in Adult Health Nursing at Kamuzu College of Nursing. As part of my training fulfilment, I need to conduct research that will generate evidence to contribute to the nursing profession. I am therefore, conducting research on Cardiopulmonary Resuscitation (CPR) competence among nurses working in adult general wards. Permission for the study has been granted from Kamuzu Central Hospital and College of Medicine Research and Ethics Committee. The results of the study will provide baseline data for recommendation for emergency response system at the hospital as well as CPR trainings.

The researcher is seeking your permission to participate in the study by filling a questionnaire. The questionnaire has four parts that include demography, knowledge on signs of pending cardiac arrest, knowledge on diagnosing need for CPR and a ten-point assessment tool on how to conduct CPR. It will take approximately 30 minutes to fill out the questionnaire.

Your participation in the study is voluntary. You are free to withdraw from the study at any point in time, even during filling the questionnaire if you feel threatened or exploited in anyway.

There are no incentives given for participation in the study. However, by participating in this study you help in adding knowledge to the body of nursing which will help influence quality of care.

If you have any queries or questions about the study, the following may be contacted for clarification.

The researcher; Madalo Macias, cell 088 368 468 email; macias2016madalo@kcn.unima.mw

The supervisor; Dr Gombachika, email; belindagombachika@kcn.unima.mw

COMREC; the secretariat; phone 01877245, email; comrec@medicol.mw

Consent

I voluntarily agree to participate in the study looking at CPR competence in nurses working at general wards at Kamuzu Central Hospital after being given full information about the study, understanding and being convinced of the importance of the study. I make this decision upon full consideration of all issues that would be involved and declare this decision my own.

Participant signature ----------Date ----------

Researcher signature----------Date----------

Appendix B: Data Collection Tool

CODE [2017/ ……]

SECTION A (8 questions)

Demographic data

1. Please tick the box that is suitable to describe you
   Male []

   Female []

2. Professional cadre

NMT []

RN []

RNM []

ADVANCED NURSE [] please specify specialization_____

OTHER [] please specify_____

3. Which ward are you currently working?

Male medical []

Male surgical []

Female medical []

Female surgical []

Male/female paying ward []

Other [] please specify_____

4. How long have you been a nurse/ nurse midwife?

Less than one year []

1 -2 years []

2-5years []

5-10 years []

10-15 years []

More than 15 years [] please specify _____

5. How long have you been working at the current ward?

Less than 3 months []

3months to one year []

1-2 years []

2-5 years

5-10years []

More than 10years [] please specify

6. Have you initiated CPR in your current ward?

Yes [] No []

7. Have you participated in CPR in your current ward?
Yes [] No []

8. If yes in question 6 or 7, when was the last time you did CPR?
Less than a week []

Less than a month []

Less than 6 months []

Less than 1 year []

More than a year ago, []

Section B

Please tick **YES** or **NO** for which patients will need to be initiated on CPR

PATIENT CONDITION	YES	NO
Patient not breathing but heart rate is present		
Patient with no heart-rate but gasping		
Chronically ill patient with organ failure		
Patient with heart rate of less than 40 beats per minute		
Patient in coma		
Patient who has collapsed		
Post-operative patients who suddenly become unresponsive		
Patient who has suddenly fallen ill and has no heart rate and no respirations		
Patient with oxygen saturation of 85mg/dl and below		
Patient who is brain dead		

Section C

Please indicate whether you agree, not sure or disagree with these statements

STATEMENT	**Agree**	**Not sure**	**Disagree**
I feel I am competent to conduct CPR			
CPR is a doctor's duty not the nurses/ nurse midwife			
I can initiate CPR			
I am afraid to initiate CPR			
CPR should be done more often in this ward			
I feel no need to conduct CPR on patients in this ward			
I feel CPR is an essential skill to poses			
I am willing to learn more about CPR			
I see no need to know CPR			

Section D

Knowledge on how to conduct CPR

Please circle the most appropriate answer

1. After you identify an unresponsive victim with no breathing (or no normal breathing) and no pulse, chest compressions should be initiated within:
    a. 25 seconds.
    b. 10 seconds.
    c. 30 seconds.
    d. 60 seconds.

2. Which of the following victims need CPR?
    a. A victim with a pulse and who is having trouble breathing.
    b. A victim with chest pain and indigestion.
    c. A victim who is unresponsive, no normal breathing and absent/ inadequate pulse.
    d. A victim who is unresponsive but is breathing adequately.

3. Where the hands should be placed to perform chest compressions on an adult?
    a. On the lower half of the breastbone.
    b. In the centre of the breastbone.
    c. On the upper portion of the abdomen.
    d. On the upper half of the breastbone.

4. The depth of compressions for an adult victim should be at least
    a. 1 inch.
    b. 2 inches.
    c. 3 inches.
    d. 4 inches.

5. Why is it important to compress to the appropriate depth during CPR?
    a. Adequate depth of compression is needed to create blood flow during compressions.
    b. Adequate depth of compression is needed to create air flow into the lungs and adequate oxygenation.
    c. Adequate depth of compression is needed to prolong asystole.
    d. Adequate depth of compression is needed to stimulate spontaneous respirations.

6. The recommended rate for performing chest compressions for victims of all ages is;
    a. At least 40 compressions per minute.
    b. At least 60 compressions per minute.
    c. At least 80 compressions per minute.
    d. At least 100 compressions per minute.
7. The compression–to-ventilation ratio for 1-rescuer adult CPR is:
    a. 30:2
    b. 5:1
    c. 20:2
    d. 15:2
8. During bag-mask ventilation, which of the following is recommended to minimize the risk of gastric inflation?

a. Give breaths as quickly as you can.
b. Give each breath over as long a time as you can (several seconds).
c. Give the largest breaths that you can.
d. Give a breath just until you see the chest rise.

9. In 2-rescuer CPR, while the first rescuer begins chest compressions, the second rescuer should:
    a. Count compressions out loud.
    b. Check for a pulse during compressions.
    c. Do nothing until the first rescuer needs relief.
    d. Maintain an open airway and give ventilations.
10. Which of the following options lists the correct compression and ventilation rates for 2-rescuer CPR in the presence of an advanced airway?
    a. Compress at a rate of at least 100 per minute, 1 breath every 6 – 8 seconds.
    b. Compress at a rate of at least 60 per minute, 1 breath every 6 – 8 seconds.
    c. Compress at a rate of at least 100 per minute, 2 breaths every 5-10 seconds.
    d. Compress at a rate of at least 60 per minute, 1 breath every 5-10 seconds.

Thank you for participating in the study.

Any comments?

_____

_____

_____

Appendix C: AHA Written Exam: Version A

@ 2011 American Heart Association

PLEASE MARK THIS TEST WITH THE CORRECT ANSWER!

1. **When should the rescuer initially ensure that the scene is safe?**
    a. **When the rescuer first sees a potential victim**
    b. After the rescuer activates the emergency response system
    c. As emergency medical services arrive on the scene
    d. After an AED that is attached to the victim delivers a shock

2. **As soon as an AED becomes available, which of the following is the first step the rescuer should perform to operate the AED?**
    a. Place the AED pads on the chest
    b. Deliver 2 rescue breaths before using the AED
    c. Turn on the AED
    d. Complete 5 cycles of chest compressions

3. **After the AED delivers a shock, the rescuer should**
    a. Wait for the AED to reanalyze the rhythm
    b. Immediately restart CPR, beginning with chest compressions
    c. Provide 2 ventilations to the victim
    d. Immediately check the carotid pulse for no more than 10 seconds

4. **The *2010 AHA Guidelines for CPR and ECC* recommend that to identify cardiac arrest in an unresponsive victim with no breathing (or no normal breathing), a healthcare provider should check a pulse for no more than**
    a. 25 seconds
    b. 10 seconds
    c. 15 seconds
    d. 20 seconds

5. **After you identify an unresponsive victim with no breathing (or no normal breathing) and no pulse, chest compressions should be initiated within**
    a. 25 seconds
    b. 10 seconds
    c. 30 seconds
    d. 60 seconds

6. **Which of the following victims need CPR?**
    a. A victim with a pulse and who is having trouble breathing
    b. A victim with chest pain and indigestion
    c. A victim who is unresponsive, no normal breathing and absent/ inadequate pulse
    d. A victim who is unresponsive but is breathing adequately

7. **Where should the hands be placed to perform chest compressions on an adult?**
    a. On the lower half of the breastbone
    b. In the center of the breastbone
    c. On the upper portion of the abdomen
    d. On the upper half of the breastbone

8. The depth of compressions for an adult victim should be at least

a. 1 inch
b. 2 inches
c. 3 inches
d. 4 inches

9. Why is it important to compress to the appropriate depth during CPR?

a. Adequate depth of compression is needed to create blood flow during compressions
b. Adequate depth of compression is needed to create air flow into the lungs and adequate oxygenation
c. Adequate depth of compression is needed to prolong asystole
d. Adequate depth of compression is needed to stimulate spontaneous respirations

10. The recommended rate for performing chest compressions for victims of all ages is

e. At least 40 compressions per minute
f. At least 60 compressions per minute
g. At least 80 compressions per minute
h. At least 100 compressions per minute

11. The compression–to-ventilation ratio for 1-rescuer adult CPR is

e. 30:2
f. 5:1
g. 20:2
h. 15:2

12. After the airway is opened, which of the following correctly states the proper technique for delivering mouth-to-mouth ventilation?

a. The rescuer opens the airway, seals their mouth over the victim's mouth, pinches the victim's nose closed, and gives 2 breaths while watching for the chest to rise
b. The rescuer opens the airway, seals their mouth over the victim's mouth, and gives several small puffs while trying to avoid making the chest rise
c. The rescuer opens the airway, seals their mouth over the victim's mouth, and gives 1 slow breath for a duration of 5 seconds
d. The rescuer opens the airway, seals their mouth over the victim's mouth, and gives 5 slow breaths, each with a duration of 2 seconds, while watching for the chest to rise

13. The rescuer knows the rescue breath for in infant victim is effective when

a. The stomach visibly rises
b. The chest rises visibly
c. The child ventilation bag is completely compressed
d. The rescuer can hear an air leak around the mask

14. Which of the following ventilation devices/techniques is not recommended for a single rescuer to provide breaths during CPR?

a. Bag-mask device
b. Mouth-to-barrier device technique
c. Mouth-to-mouth technique
d. Mouth-to-mask technique

15. During bag-mask ventilation, which of the following is recommended to minimize the risk of gastric inflation?

a. Give breaths as quickly as you can
b. Give each breath over as long a time as you can (several seconds)
c. Give the largest breaths that you can
d. Give a breath just until you see the chest rise

16. When a child has a pulse rate greater than 60 per minute, but is not breathing effectively, the rescuer should

a. Give breaths and compressions
b. Give breaths without compressions
c. Give chest compressions without breaths
d. Connect the AED to the child and analyze

17. When administering breaths by using a bag-mask device for a child who is not breathing but does have a pulse, the rescuer should

a. Squeeze the bag as often as possible
b. Give breaths at the rate of 1 breath every 3 to 5 seconds
c. Position the child on their stomach
d. Avoid performing a head tilt

18. In 2-rescuer CPR, while the first rescuer begins chest compressions, the second rescuer should

e. Count compressions out loud
f. Check for a pulse during compressions
g. Do nothing until the first rescuer needs relief
h. Maintain an open airway and give ventilations

19. Which of the following options lists the correct compression and ventilation rates for 2-rescuer CPR in the presence of an advanced airway?

e. Compress at a rate of at least 100 per minute, 1 breath every 6 – 8 seconds
f. Compress at a rate of at least 60 per minute, 1 breath every 6 – 8 seconds
g. Compress at a rate of at least 100 per minute, 2 breaths every 5-10 seconds
h. Compress at a rate of at least 60 per minute, 1 breath every 5-10 seconds

20. The compression-to-breaths ratio for 2-rescuer child CPR is

a. 30:2
b. 5:1
c. 20:2
d. 15:2

21. The compression-to-breaths ratio for 2-rescuer infant CPR is

a. 30:2
b. 5:1
c. 20:2
d. 15:2

22. If a victim of foreign body airway obstruction becomes unresponsive, the rescuer should send someone to activate the emergency response system and immediately

a. Perform abdominal thrusts
b. Perform blind finger sweeps

c. Start CPR beginning with compressions
d. Call the victim's doctor

23. If an unresponsive infant is not breathing and has a heart rate of 53 beats per minute and signs of poor perfusion despite oxygenation and ventilation with a bag and mask, which of the following should you perform?
a. One rescue breath every 10 seconds
b. Cycles of back blows and chest thrusts
c. Chest compressions without breaths
d. Both chest compressions and breaths

24. The recommended depth of compressions for an infant is
a. At least one fourth the depth of the chest, approximately 1 inch
b. At least one third the depth of the chest, approximately 1.5 inches
c. At least one half the depth of the chest, approximately 2 inches
d. At least two thirds the depth of the chest, approximately 3 inches

25. The 2 thumb-encircling hands technique for the infant
a. Produces less blood flow than the 2-finger technique
b. Is the preferred chest compression technique for 2-rescuer CPR
c. Is the preferred chest compression technique for 1-rescuer CPR
d. Generates less blood pressure than the 2-finger technique

Appendix D: Letters of Permission

Kamuzu College of Nursing,
Private Bag 1,
Lilongwe.
10th January, 2017.

The Hospital Director,
Kamuzu Central Hospital,
Lilongwe.

Dear Sir,

REQUEST TO CONDUCT A RESEARCH STUDY

I would like to seek permission to conduct a study on the topic Cardiopulmonary Resuscitation competence among nurses working at Kamuzu Central Hospital as partial fulfilment for Master of Science in Adult Health Nursing at Kamuzu College of Nursing.

The result of the study will help to provide baseline evidence for the need to emphasize and train nurses in CPR.

Yours sincerely,

MADALO MACIAS

Kamuzu College of Nursing,

Private Bag 1,

Lilongwe.

The Hospital Director,

Kamuzu Central Hospital,

Lilongwe.

10th January, 2017.

Dear sir,

REQUEST TO CONDUCT A RESEARCH STUDY

I would like to seek permission to conduct a study on the topic; Cardio Pulmonary Resuscitation (CPR) Competence Among Nurses Working at Kamuzu Central Hospital, as partial fulfillment for Master of Science in Adult Health Nursing at Kamuzu College of Nursing.

The proposed study intends to interview as well as administer an exam by American Heart Association on CPR on nurses working in general wards. The result of the study will help to provide baseline evidence for the need to emphasize and train nurses in CPR.

Your favorable response will be greatly appreciated.

Sincerely

MADALO MACIAS

we can only give you a letter of support to CODREC.

17/01/17

Kamuzu College of Nursing,
Private Bag 1,
Lilongwe.
6th March 2017.

The Hospital Administrator,
ABC Community Hospital,
Lilongwe.

Dear Madam,

REQUEST TO PRE-TEST QUESTIONNAIRE FOR RESEARCH STUDY

I would like to seek permission to pre-test questionnaire on ten of your nurses/ midwives with the aim of validating the tool for a study on the topic Cardiopulmonary Resuscitation competence among nurses working at Kamuzu Central Hospital as partial fulfilment for Master of Science in Adult Health Nursing at Kamuzu College of Nursing. The attached is the questionnaire in question.

The result of the study will help to provide baseline evidence for the need to emphasize and train nurses in CPR.

Yours sincerely,

MADALO MACIAS

ABC COMMUNITY CLINIC

March 29, 2017

College of Medicine Ethics and Research Committee

To whom it may concern

AUTHORIZATION LETTER FOR MADALO KALUKUSHA MACIAS

This is an authorization letter for the above named person that she has been granted permission to conduct a Pilot Study at the clinic using a questionnaire that she has compiled for her Masters of Science in Adult Health Nursing.

If there are any questions please do not hesitate to contact the numbers below.

Malla Kawale

(Administrative Director)

"We treat, God heals"

Serving the Lilongwe Community since 1999.

Po Box 161 Lilongwe 3, Area 47, Malawi

Phone: 01-761-670, Fax: 01-761-743 Cell: 0888 211 085, Email: abcclinic@gmail.com

MINISTRY OF HEALTH
KAMUZU CENTRAL HOSPITAL
P. O. BOX 149
LILONGWE
MALAWI
11TH MAY 2017

TELEPHONE NO.: (265) 753 555
TELE FAX NO.: (265) 756 380

PLEASE ADDRESS ALL COMMUNICATIONS TO: THE HOSPITAL DIRECTOR
E-MAIL: Kch@sdnp.org.mw

Ref : COMREC 2017

The Chairman,
College of Medicine Research Committee,
Private Bag 360,
Chichiri,
Blantyre 3.

Dear Sir,

RE: LETTER OF SUPPORT FOR A RESEARCH STUDY TITLED – CARDIOPULMONARY RESCUSCITATION COMPETENCE AMONG NURSES WORKING AT KAMUZU CENTRAL HOSPITAL

I am writing to express my support in the willingness by the researcher to conduct the above named research at Kamuzu Central hospital.

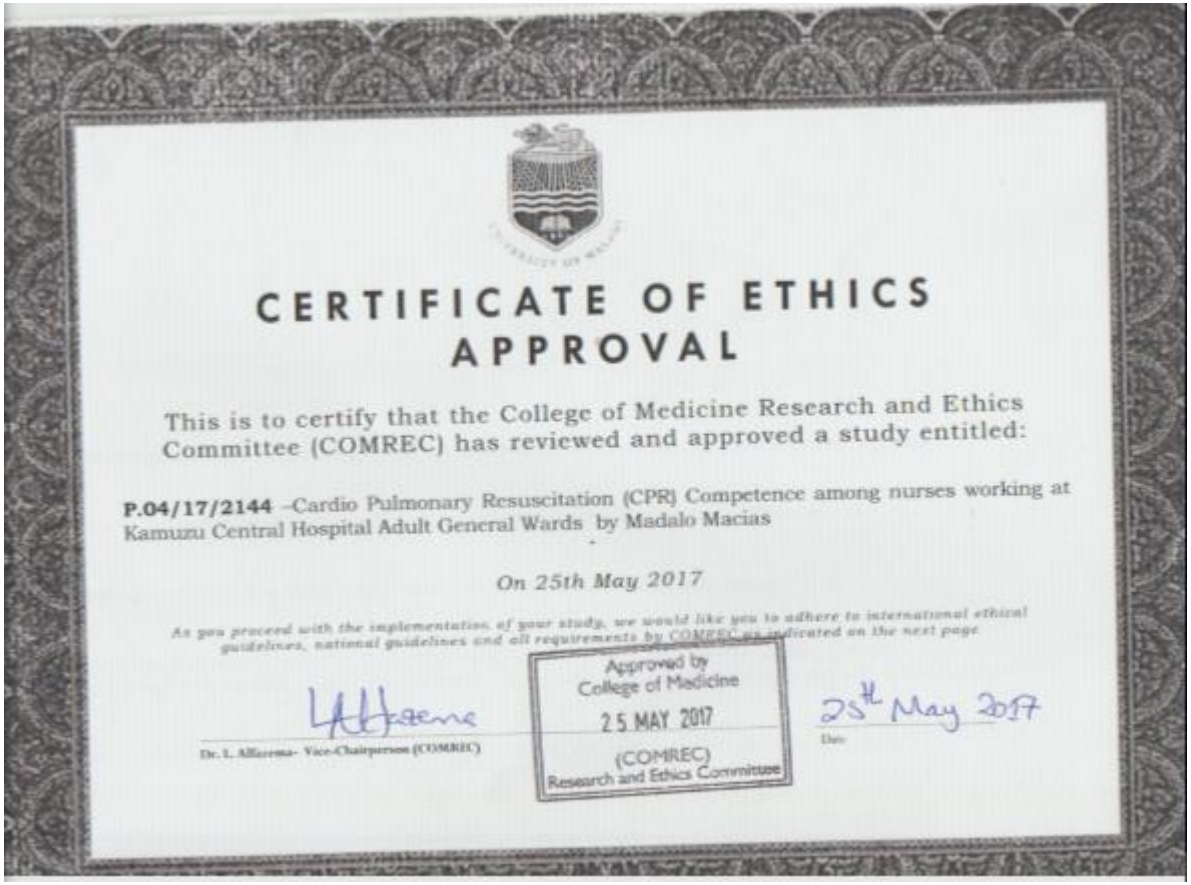
The research will enhance a further understanding on the competence of nurses at Kamuzu Central hospital in conducting cardiopulmonary rescuscitation.

Thanks in advance for the support you are going to give the researcher.

Yours Sincerely,

KAMUZU CENTRAL HOSPITAL
11 MAY 2017
P.O. BOX 149 LILONGWE

Dr. Jonathan Ngoma
Hospital Director



CERTIFICATE OF ETHICS APPROVAL

This is to certify that the College of Medicine Research and Ethics Committee (COMREC) has reviewed and approved a study entitled:

P.04/17/2144 –Cardio Pulmonary Resuscitation (CPR) Competence among nurses working at Kamuzu Central Hospital Adult General Wards by Madalo Macias

On 25th May 2017

As you proceed with the implementation of your study, we would like you to adhere to international ethical guidelines, national guidelines and all requirements by COMREC as indicated on the next page

Approved by
College of Medicine
25 MAY 2017
(COMREC)
Research and Ethics Committee

Dr. L. Allarema- Vice-Chairperson (COMREC)

25th May 2017
Date

TELEPHONE NO: (265).1.753 555
TELE FAX NO: (265).1.756380

PLEASE ADDRESS ALL COMMUNICATIONS TO:
THE HOSPITAL DIRECTOR

MINISTRY OF HEALTH
KAMUZU CENTRAL HOSPITAL
P.O BOX 149
LILONGWE
MALAWI

REF/KCH/GA/0.01

Date: 4th-Oct-2017

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

PERMISSION TO CONDUCT RESEARCH AT KAMUZU CENTRAL HOSPITAL

The bearer of this letter Madalo Macias
has been given permission to carry out a study titled;
Resuscitation (CPR) Competence among nurses working in adult general wards at Kamuzu Central Hospital.
at Kamuzu Central Hospital having satisfied the requirements of the Hospital Research Committee.

By copy virtue of this letter, the bearer is allowed access to patients, staff and medical records for purposes of his/her study.

Yours faithfully,

Kamuzu Central Hospital
Chief Nursing Officer
2017 -07- 03
P.O Box 149
Lilongwe

Research Co-ordinator
for: **HOSPITAL DIRECTOR**

1