

**HEALTH CARE PROVIDERS' KNOWLEDGE, SKILLS
AND INSTITUTIONAL FACTORS THAT DETERMINE
EFFECTIVE CARDIOPULMONARY RESUSCITATION
AT NAKURU COUNTY HOSPITAL**

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**Health Care Providers' Knowledge, Skills and Institutional Factors
that Determine Effective Cardiopulmonary Resuscitation at Nakuru
County Hospital**

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

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ABBREVIATIONS AND ACRONYMS

ACLS	Advanced Cardiac Life Support
AHA	American Heart Association
A&E	Accident and Emergency
BLS	Basic Life Support
CA	Cardiac Arrest
CCU	Critical Care Unit
CPR	Cardiopulmonary Resuscitation
HBM	Health Belief Model
ROSC	Return of Spontaneous Circulation
US	United States

OPERATIONAL DEFINITION OF TERMS

Cardiopulmonary Resuscitation This is a procedure that is performed on patients who suffer a cardiac arrest to restore spontaneous breathing and circulation

Effective Cardiopulmonary resuscitation This is when cardiopulmonary resuscitation is performed according to the accepted guidelines to ensure positive outcomes such as ROSC, 24-hour survival, and survival to discharge with or without neurological deficits.

Health Care Provider Any person who is qualified and authorized by a professional body to carry out cardiopulmonary resuscitation.

Outcomes How a patient presents after cardiopulmonary resuscitation following cardiopulmonary resuscitation, which can be a return of spontaneous circulation, survival within 24 hours, a patient suffering from a neurological deficit, or death.

Return of Spontaneous Circulation (ROSC) This is when the patient regains optimal cardiac activity that presents with a palpable pulse with organized cardiac rhythms.

ABSTRACT

Cardio Pulmonary Resuscitation refers to a sequential chain of measures taken to save and maintain the quality of life of a patient following cardiac arrest. The process involves recognition of absent breathing and circulation, basic life support with chest compressions and rescue breathing, and post resuscitative care. Effective cardiopulmonary resuscitation improves the patients' outcomes hence reducing mortality related to cardiac arrest. The determinants of effective cardiopulmonary resuscitation (CPR) among health care workers are not well researched in African countries. The study sought to examine the knowledge, skills, and institutional factors that determine effective cardiopulmonary resuscitation among health care providers at Nakuru County hospital. The study adopted an analytic cross-sectional design; incorporated quantitative study tools. The study was carried out at Nakuru County Hospital. A census sampling technique was adopted to select 175 respondents who participated in the study. Data was collected using questionnaires and checklists. Data analysis was done using SPSS computer software, version 24 for descriptive analysis to generate frequencies, percentages, and tabulations. Chi-square tests and multiple regression analysis were done to determine the significant association between variables. Ethical approval was obtained from National Commission for Science, Technology, and Innovation (NACOSTI). Permission to collect data was also sought from Nakuru County Hospital administration. Informed consent was sought from the respondents before data was obtained. Majority, 54.3% (n=88) of the respondents had low knowledge of cardiopulmonary resuscitation. The majority 70.9% (n=112) did not have a BLS/ACLS certificate. According to the findings, 55.1% (n=87) and 51.9% (N=81) indicated that they did not have all the necessary resources for CPR. There was a significant relationship ($p<0.001$) between CPR knowledge and CPR practice. Among institutional factors, having a BLS/ACLS certificate ($p=0.003$), a refresher course in the last 2 years ($p<0.001$) and necessary resources ($p=0.014$) were significant. Respondents who had a BLS/ACLS certificate and those who had a refresher course in the last 2 years and those who indicated that necessary resources were 3.4, 2.9, and 3.1 times more likely to have good CPR practice. The poor practice of cardiopulmonary resuscitation among health care workers at Nakuru County Hospital is attributable to low CPR knowledge. Institutional factors also influenced effective CPR. More emphasis should be placed on continuous professional development and supervision be done after training. The hospital managers to enact a policy ensuring all health care workers possess a valid BLS/ACLS certificate.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Cardio Pulmonary Resuscitation (CPR) refers to a sequential chain of measures taken to save and maintain the quality of life of a patient following a CA. The 2015 guidelines were aimed at ensuring that CPR is uniformly and effectively performed (Bhanjiet al., 2015). Due to the alarming rate of deaths that are related to cardiac disease, the American Heart Association (AHA) set a target of reducing death due to CA through the adoption of the new Cardiopulmonary Resuscitation (CPR) guidelines that are used today (Lee, 2012).

Cardiac arrest (CA) has proven to be among the most challenging health issue worldwide. An estimated 300 000 to 370 000 people die of CA, and 50% of the deaths are related to cardiovascular diseases (Patil et al., 2015). In Europe, cardiac arrest (CA) resulted in 7,000,000 deaths annually (Xanthos et al., 2012).

According to the AusROCEpistry in Australia and New Zealand, patients who immediately survived after a CA were approximated to be 12% with a range of 9- 17%. A very low survival rate was recorded in other Asian Pacific countries. According to the Pan-Asian Resuscitation outcomes study, the patients who survived right to discharge level were approximately 5.6% in Japan, 9.9% in Korea, 1.0% in Malaysia, 2.5% in Singapore, and 2.7% in Thailand, 4.8% in Taiwan and 2.8% in the Arab Emirates. In the US the out-of-hospital survival rate was found to be 12.4% and that of Europe was reported to be 10.3% (Wong et al., 2019).

Even though statistics and quality data about CA in Africa are not readily available, studies from some of the African countries have revealed that it is one of the major health problems in the continent. For instance, according to the study that was done by Stassen et al. (2021), in South Africa, the prevalence of CA in the country is 23.2 per

100, 000 persons. Based on the findings of the study, a significant number of CA incidences in South Africa occur in private residences. Additionally, Stassen et al. (2021) found that only 7.4% of the patients are subjected to emergency medical services (EMS) resuscitation. Also, a study by Bonny et al. (2017) in Cameroon revealed that the prevalence of CA in the country is 31.3 per 100,000 persons with a mortality rate of 37%. The studies therefore confirm that there is a high prevalence of CA in Africa.

Like in many countries in Africa, there are limited statistics about CA in Kenya. A study by Wachira et al. (2015) however, found that CA accounts for between 3.8-13.1 per 1000 admissions, indicating a high prevalence of the disease in Kenya. This is aligned with a report that was released by the WHO in 2020, which revealed that heart diseases account for 4.54% of the Kenyan total deaths (World Health Rankings). CA, therefore, is a serious and common disease in Kenya.

1.2 Statement of the Problem

CA cases that occur within the hospital are the leading cause of death and morbidity worldwide (Patil et al., 2015). CPR is very critical for the survival of patients with cardiac arrest. The outcomes of patients following cardiac arrest depends on timely recognition and prompt initiation of CPR. Additionally, of utmost importance is the quality of CPR provided. CPR that is of low quality is considered to be a harm to the patient that would have otherwise been prevented. Many approaches have been adopted to improve the quality of CPR provided to patients to improve their survival. Despite the many efforts to enhance effective CPR, its success is still poor. The quality of life of those who survive remains poor, due to neurological impairments that ultimately affect the patients' physical, psychological and social functioning (Meaney et al., 2013).

A study done in England revealed that, out of the 828 patients who had undergone cardiopulmonary resuscitation, only 162 patients who are estimated at 20% survived right to discharge. Among those who survived to discharge, 5 of them went to a vegetative state, and 51 of them died a few days following discharge (Koldobskiy et al.,

2014). In the US, a study revealed that out of 29% of the patients who were discharged home following CPR, only 54% survived for 31 months (Goodarzi et al., 2014).

The chain of survival was initiated to ensure timely recognition of a CA and prompt initiation of CPR, and defibrillation. However, despite the efforts, the incidence and outcomes of CA following interventions have remained unexplored in the Sub-Saharan countries (Wachira & Tyler, 2015).

Very few studies have been done about CPR in Kenya. The few that have been conducted have majorly focused on pediatrics CPR (Ngunga et al., 2018). The number of death cases recorded in Kenya following CA arrest is approximately 56%. The mortality has been attributed to poor knowledge of CPR (Merab, 2016). Although, effective CPR is important in the clinical setup, factors that determine CPR remain unexplored in Kenya (Wachira & Tyler, 2015). At Nakuru County Hospital, it has been observed that, even though CPR is performed, health care providers do not follow the recommended guidelines that are prescribed by AHA. Additionally, there is no documented data on the incidence and outcomes of CA. Consequently, the research aims at assessing knowledge, skills, and institutional factors that determine effective cardiopulmonary resuscitation among health care providers at Nakuru county hospital.

1.3 Justification/ Significance of the Study

The knowledge and skills of cardiopulmonary resuscitation among health care providers is very crucial as it promotes effective CPR. The institutional factors such as provision of equipment, staff and policies that promote effective CPR are equally important. According to Merab (2016), about 56% of patients die of CA. The study will help to address the gap that deter effective CPR to reduce the number of people who die of CA.

The study will communicate to the hospital management about the staff CPR competence level, sensitize them to formulate and streamline the policies for effective management of patients with cardiac arrest during the CPR process and eventually

improve the post-cardiac arrest outcomes. The study will help individual health care providers to identify practice areas for improvement to enhance CPR competence. The study will help patients by increasing the survival rates following cardiac arrest and reducing hospital stay. This will serve as a useful resource for future students and researchers who will be interested to research on CPR as they can refer to the research findings.

1.4 Objectives of the Study

The study was guided by the following objectives:

1.4.1 Broad Objectives

To establish health care providers' knowledge, skills and institutional factors determining effective cardiopulmonary resuscitation at Nakuru county hospital

1.4.2 Specific Objectives

- i. To determine the level of knowledge of cardiopulmonary resuscitation among health care providers at Nakuru County Hospital.
- ii. To assess the practice of cardiopulmonary resuscitation among health care providers at Nakuru County Hospital.
- iii. To determine the institutional factors influencing effective cardiopulmonary resuscitation among health care providers at Nakuru County hospital.

1.4.3 Research Questions

- i. What is the level of knowledge of cardiopulmonary resuscitation among health care providers at Nakuru County Hospital?
- ii. What is the practice of cardiopulmonary resuscitation among health care providers at Nakuru County Hospital?

- iii. What are the institutional factors influencing effective cardiopulmonary resuscitation among health care providers at Nakuru County Hospital?

1.5 Hypothesis

1.5.1 Null Hypothesis

There is no significant relationship between knowledge of CPR and effective CPR among health care providers at Nakuru County Hospital.

1.5.2 Alternative Hypothesis

There is a significant relationship between knowledge of CPR and effective cardiopulmonary resuscitation among health care providers at Nakuru County Hospital.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In an effort to understand more of key concepts of the study, the researcher explored various literature relating to the key concepts and the research questions and objectives. This literature review is aimed at digging deep into the researches that were previously done on CPR to understand the study better. Exploring the various literature under the sub-topics that represents the researcher's objectives will prevent duplication of the topic hence reducing redundancy (Creswell, 2013). The review was divided into parts: health care workers' knowledge and skills and institutional factors that influence effective CPR. These represented the research objectives that the researcher is interested in. The literature review also had a conceptual framework that gave a pictorial representation of the variables the researcher was interested on. A theoretical framework that was borrowed from the Health Belief Model that tried to explain and predict phenomena under study. The literature review was organized to ensure that individuals can follow the content that was presented in the study.

2.2 Health Care Providers' Knowledge of Cardiopulmonary Resuscitation

According to Mendheet al. (2017), who conducted a cross sectional study for 2 months among medical and nursing students, 36% of the nursing interns and 46% of the medical interns had poor knowledge of CPR. Similarly, according to Alkandariet al. (2017) who conducted a research in Kuwait on the knowledge of dentists on CPR, their knowledge of CPR was not sufficient to enable them to perform effective CPR. This informed the need for regular training among dentists. Similarly, a research conducted in India on the knowledge and attitude of BLS revealed that dental interns and postgraduate students had average knowledge of CPR. The researcher then recommended that BLS should be

incorporated into the curriculum to equip the students with the CPR knowledge (Narayan, 2015).

Aliyu, et al. (2019), conducted a study in Nigeria on the knowledge of CPR among health care providers. The research showed that despite 73.3% of the respondents taking the BLS training less than a year before participating in the study, their knowledge on CPR was still poor. The researcher further noted that majority of the respondents were not aware of the CAB as an acronym used to guide the steps of CPR. Additionally, most of the respondents were not aware of the steps used by single rescuers during CPR. Out of the 175 respondents who participated in the study, only 5(2.9%) scored between 50% and 69%. The rest scored less than 50%. Therefore conclusions were drawn from the study that, much as the knowledge of CPR among health care providers is poor, the cadre of the health care providers and the time between the last training of CPR has no relationship with the knowledge of CPR (Aliyu et al, 2019).

Another study conducted in Tanzania on the assessment of cardiopulmonary resuscitation knowledge and skills among health care providers at the urban tertiary referral hospital revealed that there was poor knowledge and skills of CPR among the health care providers of all cadres and experience levels in all the departments investigated. The researcher observed that despite the poor knowledge and skills, the health care providers still performed CPR, as such urgent training was required to enhance optimal outcomes among patients who suffer a cardiac arrest (Kaihulaet al., 2018). Additionally, a study conducted in Debre Markos Referral hospital in Ethiopia revealed that among the 352 health care providers who participated in the study, the majority of the respondents who constituted 77.8% of the entire participants had inadequate knowledge regarding CPR. The researcher further recommended that the health care providers be trained in assessment of the critically ill patients and CPR (Abebe, 2021).

2.3 CPR Training

In Spain, Garcia et al. (2015) conducted a study where a survey based on the AHA was adopted. The results showed that the majority (64.7%) of the respondents were trained in CPR after the year 2010, however, only 10.1% of the population trained took a refresher course thereafter. The study further revealed that only 30% of the entire faculty and 7% of the nursing staff had undergone CPR training. The research then concluded that the higher the more the number of times the staff are trained the higher the level of knowledge among health care providers.

A study done in Pennsylvania on the challenges of CPR quality revealed that most health care providers were not able to perform effective CPR despite being trained in CPR (Leary &Abella, 2018). This was attributed to long periods between training or lack of in-service training that led to the deterioration in CPR knowledge and skills. This results in hesitance among health care workers in performing CPR (Leary &Abella, 2018). Another study done by Xanthos et al. (2012), who conducted a study on the evaluation of nurses' theoretical knowledge in Basic Life Support in Greece, 10.3% of the respondents had very good knowledge of CPR, 31.2% had good knowledge, 44.2% had moderated knowledge, whereas 14.3% were categorised to have knowledge that was not good. The study further revealed that there was no difference in CPR knowledge among respondents who had undertaken CPR training after they graduated from college and those who were not trained on BLS after they graduated from their respective colleges. The study then concluded that those respondents who did not have prior BLS training had a higher probability of passing the BLS test compared to those who were trained before.

Another study conducted at Kist Medical College Hospital in Nepal showed that the poor knowledge among health care providers was attributed to a lack of CPR training before employment, and lack of exposure to the clinical area hence contributing to the deterioration of the knowledge. The study further revealed that those health care providers who had received training more than 5 years before employment proved to

possess poor knowledge compared to those who were trained less than 5 years ago. CPR should then be a core competence in all the medical disciplines to facilitate its effectiveness (Roshanaet al., 2012). According to Sindale (2011), institutions should have a team of experts who will be organizing CPR training so that health care providers have adequate knowledge that will aid in providing quality care for victims of CA.

A study conducted in South Africa revealed that health care workers who had CPR training before employment retained CPR knowledge. The study further revealed that the health care providers who had vast work experience had better knowledge of CPR compared to the novices. (Botha et al., 2012). A similar study conducted in Pakistan revealed that the knowledge of BLS among health care providers was poor. The researchers proposed that there is need for measures to improve the knowledge base. The research further recommended that strict accreditation programs should be activated to ensure that the undergraduate curriculum incorporates BLS training and that the health care providers should be regularly reassessed to ensure that their knowledge of BLS is optimal (Ifranet al., 2019).

2.4 Health Care Providers' Skills of Cardiopulmonary Resuscitation

In Greece, Xanthos et al. (2012) reported that the BLS skill had gaps since nurses failed to adhere to the recommended guidelines when performing CPR. According to Xanthos et al., (2009) Basic Life Support (BLS) skills, is very important in managing patients with such conditions as it is aimed at maintaining the airways and supporting breathing and circulation in both cardiac and respiratory arrest. On the contrary, a study conducted in Philadelphia to evaluate the effectiveness of CPR training on the skills competency among nurses revealed that 36% of the nurses trained were able to effectively perform the chest compressions with the recommended depth and rate. Therefore, conclusions were made that there is no relationship between training and compliance with the recommended CPR guidelines (Sutton et al., 2011).

Erenleret al. (2015), researched on the outcomes of cardiopulmonary resuscitation on trauma patients in the emergency department in Istanbul Turkey and concluded that the more time it takes to perform CPR the lesser the chances of survival among patients. Out of the total number of patients who were resuscitated, only 9.5% survived. In China, a study revealed that the health care workers' skills have greatly impacted the outcomes of CPR. The duration of CPR performed also influenced CPR outcomes; health care workers who performed CPR for more than 10 minutes displayed a better outcome of CPR. Additionally, the use of adrenaline has an impact on the outcome of CPR, when the discharge of adrenaline is less than 5mg, the patients proved to achieve the ROSC and have also survived to discharge with better neurological functions (Xue, 2013).

Citolinoet al. (2015) maintained that early detection of cardiopulmonary arrest and early initiation of CPR greatly influence the outcomes of CPR. Therefore, the World Health Organization (WHO) recommends that CPR is initiated within the first 3 minutes of an arrest to increase the chances of survival and reduce complication related to cardiac arrest. A similar study conducted in Kenya on the characterization of in-hospital cardiac arrest in adult patients at a tertiary hospital revealed that timely identification of warning signs of a cardiac arrest by the Health care providers was likely to contribute to the outcome of the patient following CPR (Wachira & Tyler, 2015).

According to Elsaieet al. (2012), when nurses are trained effectively in CPR, their knowledge of CPR improves as well. However, if the same nurses are assessed a month later, it has been proven that there is a decrease in the knowledge of CPR. To enhance the retention of both the knowledge and skills of CPR, annual assessment and routine refresher courses should be conducted to include the current guidelines of BLS contributing to standardized care for the victims of CA.

2.5 Training of CPR Skills

According to Sindale (2011), institutions should have a team of experts who will be organizing CPR training so that health care providers have adequate skills that will aid

in providing quality care for victims of CA. Similarly, a study conducted in Mbarara regional referral hospital in Uganda to assess the nurses' knowledge and skills of CPR among nurses working in the ICU, operating theatres, accidents and emergency, medical, and surgical wards indicated that respondents had poor knowledge of CPR. The study further informed that the respondents who had more working experience had higher knowledge of CPR. According to the study the knowledge of CPR among nurses improved significantly following BLS training. Therefore, the researcher drew conclusion following the results obtained from the study that there is need for regular training of so as to increase the nurses' competence of CPR and enable retention of the knowledge acquired during the training (Munzero et al., 2018).

A study done in Botswana revealed that poor CPR skills among the nurses contributed to their unwillingness to initiate the CPR process (Rajeswaran et al., 2018). The researcher then recommended that nurses engage in bi-annual CPR training to enable them to be at par with the current guidelines on CPR and also equip themselves with skills irrespective of their year of experience, workstation, or even education level. This is recommended that it will prevent the deterioration of the CPR skills among the health care providers (Rajeswaran et al., 2018). Meaney et al, (2013) conducted a study in the US on the knowledge of BLS among medical and nursing students and reported that the practice of CPR is still poor despite the students having a positive attitude towards BLS. The researchers further reported that for the effectiveness of CPR, BLS training should be incorporated into the curriculum.

Studies have shown that most rescuers hesitate to initiate CPR in the event of out-of-hospital cardiac arrest because they fear causing injury to patients and contracting infections. Similarly, the lack of CPR knowledge and the legal implications attached to the performance of CPR has also been proven to make the rescuer hesitate to initiate CPR. This has led to many public initiatives taking up the responsibility of training the public so that they are equipped with the basic CPR knowledge and skills to save patients with cardiac arrest outside the hospital set-up (Dukes & Girotra, 2018). A similar study conducted in Kenya on the assessment of the knowledge of neonatal resuscitation

skills among health care providers revealed that the lack of adequate CPR skills among the health care providers translated to poor performance of the CPR skills in neonates. The researchers stated that the increase in the duration and quality of training should be considered to enhance better knowledge that will ultimately translate to better skills (Mulira et al., 2012).

2.6 Institutional Factors Influencing Effective Cardiopulmonary Resuscitation

Institutional factors play a vital role in cardiopulmonary resuscitation outcomes. Factors such as policies and resuscitation protocol have an impact on the outcome of resuscitation for critical care patients. As such, the resuscitation team needs to be updated periodically about the policies that they are aware of them and can implement to enhance good CPR outcomes (Berger & Polivka, 2015). Additionally, Dzenget al. (2015), indicated that all hospitals should come up with policies and protocols that are locally acceptable and also meet the international standards in terms of the competency of the resuscitation team, the environment whereby the resuscitation takes place, and the resuscitation process. A similar study indicated that proper CPR policies need to be outlined to guide in the event of a CA to ensure that the resuscitation process runs smoothly. Without a proper framework to guide on how things should be done, mistakes during practice are bound to happen (Xue, 2013).

A study conducted in Botswana hospitals revealed that inadequate lack of adequate resources to facilitate CPR and non-functional instruments were identified as a challenge in most hospitals. Lack of in-service training among the health care providers, lack of policies and guidelines to enhance the effectiveness of CPR, inadequate space to accommodate the staff and instruments for resuscitation, lack of clear communication channels, and negative attitudes among the doctors were found to be the major challenges in Botswana hospitals (Rajeswaran & Ehlers, 2013)

In the Xanthos et al. (2012) study, it was noted that 64% of the participants had not taken refresher courses ever since they were trained on BLS as students. Also, 61% of

them had a refresher course on BLS within 12 months. The research reported that there a decline in CPR skills and knowledge among the nurses who took refresher courses. Strategies to enhance mastery of the procedure are recommended for preventing the deterioration of skills and knowledge acquired during the training.

2.7 Resuscitation Team

Hunziker et al. (2011) observed that the process of alerting the resuscitation team in the event whereby cardiopulmonary arrest has occurred also contributes to the outcome of cardiopulmonary resuscitation. (Hunziker et al. (2011 further indicated that bureaucracies and lack of a team leader to coordinate the resuscitation process usually affect the flow of events, this ultimately leads to confusion among the resuscitation team delaying the process. Similar study conducted in the US whereby a systematic review was conducted and 63 articles reviewed. The review revealed that proper coordination during CPR enhances the effectiveness of CPR. This can only be achieved if a good team leader is identified. Communication is very important, since during CPR, the team assisting has to have coordinated activities, this is only possible if proper communication is achieved (Castello et al., 2013). Another study conducted on outcomes of CPR in trauma patients in the A&E department in Turkey found that the success of CPR is dependent on the person who coordinates the activities involved (Erenler et al., 2015).

The environment where CPR is done also influences the CPR outcome while an organized environment with a good sense of teamwork and a team that can easily coordinate contribute to effective CPR. When there is poor coordination, the health care workers waste a lot of time that could have otherwise been invested to save the patients' lives. Good outcomes following CPR are determined by the care given to the patient even before the arrest, therefore, hospitals should invest in enough professionals who can care for the patients effectively (Citolino et al., 2015). Additionally, Leary and Abella (2018), indicated that lack of debriefing following CPR among health care providers has also contributed to ineffective CPR, this has contributed to the repeat of mistakes among health care providers when conducting CPR. Understaffing in the hospital setting limits

the number of personnel who assist in CPR. The fatigue experienced by the rescuer prevents optimal chest compression affecting the quality and outcomes of CPR.

Nurses play a very vital role in patients' care as they spend time with the patients around the clock. As such, their skills in initiation and performance of CPR should be excellent. Despite their crucial role in patients' care, it's observed that their knowledge and skills declined among all nursing professionals. Therefore, all hospitals must invest in nurses who are equipped with the current evidence-based practice on BLS (Sankar et al., 2013) Similarly, a study conducted in two referral hospitals in Botswana revealed that inadequate staffing cannot allow the formation of resuscitative teams; this has led to a huge burnout amongst the staff hence posing a challenge in effective CPR. (Rajeswaran& Ehlers, 2013).

2.8 Availability of Resources

Availability of the resources needed during resuscitation is very a crucial CPR determinant. These resources include enough staff, drugs, basic equipment such as oxygen masks, ambu bags, and defibrillators in case the patient had a shockable cardiac rhythm (Citolinoet al., 2015). Additionally, a study by Salary (2013) revealed that institutional factors such as understaffing, and lack of provision of basic requirements of resuscitation have affected the quality of resuscitation. This affected the outcome of CPR. In settings where there is understaffing, health care providers are usually overworked and they may not be able to be keen enough to identify the onset of the cardiac arrest. This usually affect early initiation and so affect the outcome as well (Salary, 2013).

According to Dhar et al. (2018) who conducted a study to analyze the functioning and efficiency of the code blue systems in tertiary hospitals, the outcome of CA is largely dependent on resources. The researchers found out that as much as there were equipment, some of them were malfunctioning, the crash cart lacked all the drugs and basic instruments used for CPR, and technical problems and problems related to the

health care workers that assisted with the performance of CPR were factors noted to contribute to ineffective CPR. (Dhar et al., 2018).

A similar study informed that unavailability of the basic resources has largely affected CPR quality that directly affects the patient's outcome. For a successful CPR, the emergency trolley should always have all the required materials and supplies and should always conform to the set standards since CPR is an emergency Xanthos et al. (2012). Similar study conducted revealed that an updated and well-organized resuscitation tray plays a very crucial role during resuscitation. Equally, the resuscitation team should be well acquainted with the tray to aid in the smooth acquisition of drugs and instruments required during resuscitation. Despite its importance, only the nurses were familiar with the trolley. Doctors and clinical officer barely knew how the trolley looks like. This made them waste time trying to locate whatever is required in the process (Citolino et al. 2015).

2.9 Summary of Research Gap

CPR is a very important technique as it helps in saving the lives of many patients with CA. It has been proven through research that knowledge and skills of CPR among health care providers enhances its effectiveness. However, compelling evidence has shown that despite all the benefits of CPR, there is a lack of adequate information on the knowledge, practice, and institutional factors influencing the effectiveness of CPR in Africa, Kenya included. Despite frequent reports in the hospital of patients being resuscitated due to CA in Kenya, there is no evidence to confirm the trends of CA in Kenya. The research was aimed at addressing the gap in the determinants of effective CPR to reduce mortality while improving the outcomes and quality of life of the victims of CA.

2.10 Theoretical Framework

The study utilized the Health Belief Model (HBM), which was developed by Hochbaum, Rosenstock, and Kegels in the 1950s to guide researchers. The model is aimed at evaluating behaviour and also assessing the perceived threats that an individual is likely to be exposed to. An individual was either susceptible to a health problem or susceptible to the severe consequences following a particular disease. Behaviour was evaluated based on the cost, benefits, and barriers to achieving optimal health (Bishop et al., 2014). The model has six constructs: risk susceptibility, risk severity, benefits to action, barriers to action, self-efficacy, and cues to action. The following constructs apply to the research.

Risk Susceptibility

This construct applies in the study in that when the health care providers have poor CPR skills regarding identification and management of patients with cardiac arrest, the patients are likely to suffer from permanent neurological deficits or die altogether. However, if effective CPR is performed, the patients are likely to recover and lead a healthy life. This construct is also applicable in the research in that, health care providers who have good knowledge of assessment of patients at risk of CA will apply the skill by thoroughly assessing patients at risk. Precautions will also be taken and close monitoring done to enhance the timely initiation of CPR which has been proven to improve its outcomes.

On Risk Severity

The health care providers' skills when performing CPR determines the severity of complications following a cardiac arrest. For instance, if the health care providers can identify a cardiac arrest early and institute CPR measures promptly, the outcome is usually good compared to when there is a delay in intervention.

Benefits of Action

When the health care workers have good CPR knowledge and skills, they usually perform CPR effectively. The patients usually regain ROSC and the complications following arrests are unlikely to occur. This improves the quality of life of patients and preserves their lives. It also cushions both the individuals and the government from costs that are relative to long hospital stays

Barriers of Action

The research helped in identifying the perceived barriers to effective CPR such as the health care providers' skills, knowledge, equipment needed during CPR, and drugs. This will help the management to come up with programs and policies that will enhance effective CPR skills consequently enhancing quality services to the patients.

Cues to Action

The recommendations of the study served as an external trigger in that the gaps in knowledge, and skills of health care providers in CPR. This will motivate both the management and health care providers to put up measures to bridge the gaps. Consequently, effective CPR will be enhanced. The institutional factors that were identified to contribute to poor CPR knowledge and skills will assist the management in planning to ensure full support towards effectiveness of CPR.

Self- efficacy

The study ensured that the gaps in CPR knowledge, skills and institutional factors are addressed by the stakeholders. This will contribute to effectiveness of CPR.

2.11 Conceptual Framework

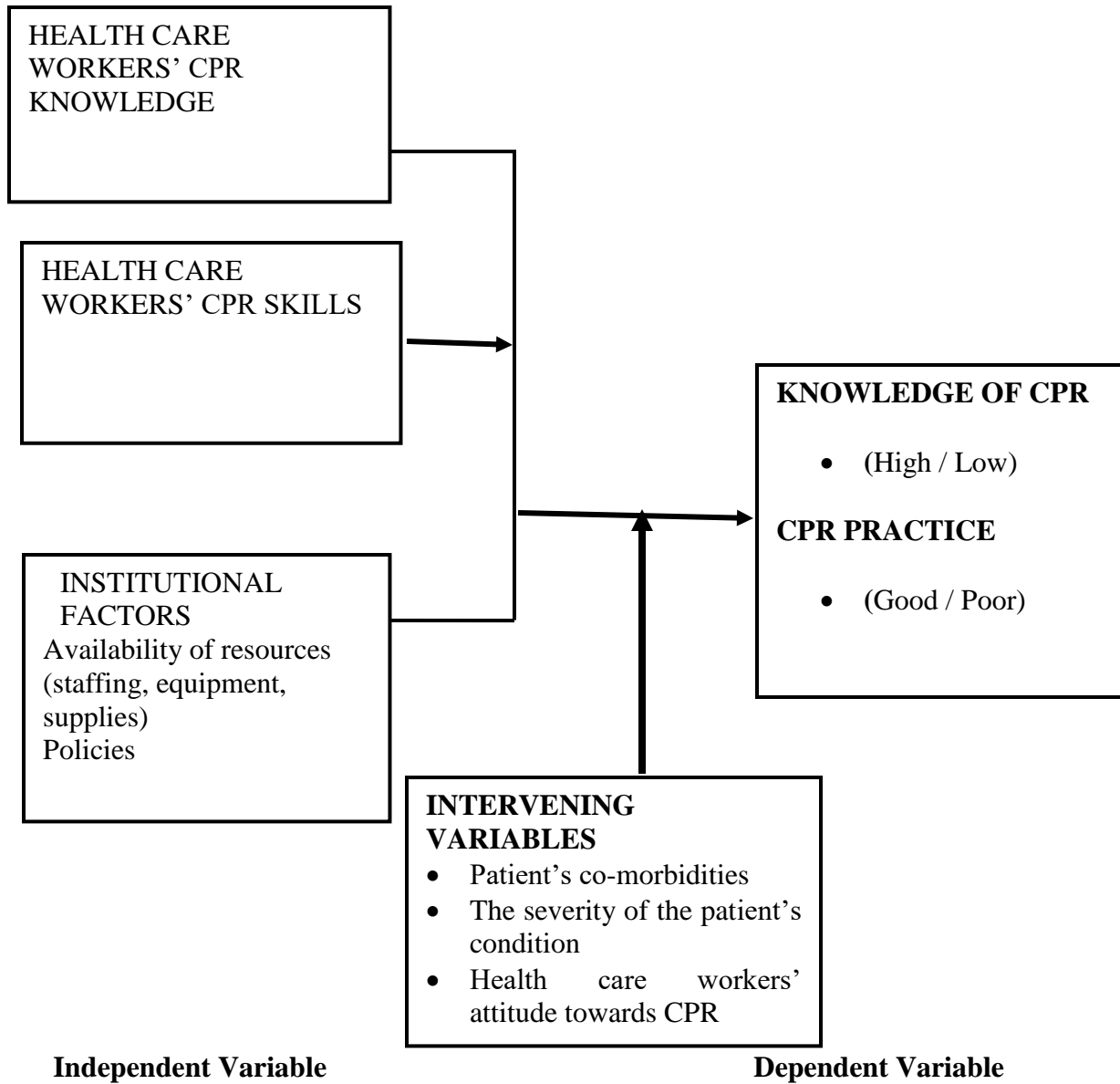


Figure 2.1: Conceptual Framework

Source: Manono (2020)

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter provides the procedures and techniques used to attempt to answer the research questions. It relates to the systematic approach of gathering information depending on the procedures and processes established that are drawn from scientific research techniques (Kothari, 2011). This chapter discussed the research design, study area, study population, sampling technique, data collection and management, Data Analysis and Presentation, and ethical considerations.

3.2 Study Design

An analytical cross-sectional study was used to assess knowledge, skills, and institutional factors that determine effective cardiopulmonary resuscitation among health care providers at Nakuru County Hospital. This was achieved through the collection of information at one point in time. A cross-sectional study was adopted. A cross-sectional study helped in giving authentic information insights about the factors that influence effective CPR. A quantitative approach was incorporated into the study to determine the health care providers' knowledge and skills in CPR.

3.3 Study Area

The study was carried out at Nakuru County Hospital. The hospital was founded in 1906 as a military hospital. The hospital serves approximately 2.1 million patients/ clients from the South and Central rift valley and the neighbouring Sub-Counties. Nakuru County hospital has a capacity of 500 beds with an occupancy of about 120%. The hospital has 8 general wards, 2 operating theatres, labour ward, a new-born unit, ICU, High Dependent Unit (HDU), Out Patient Departments, Laboratory, Dental Unit, Eyes Unit, and Radiology department with MRI and CT scan services. The study was carried

out in the CCU, HDU, A&E department, medical, surgical, theatre, and paediatrics wards. The CCU and HDU admit patients with both medical and surgical conditions requiring close monitoring and specialized care. The CCU has a bed capacity of 6 whereas, the HDU has a bed capacity of 3. The A&E department receives patients referred from other institutions or those who seek care from home. The department offers a variety of services including triaging, general consultation, diabetic follow-up, surgical outpatient clinic, medical outpatient clinic, first aid, and stitching. The facility has a main theatre and an ENT theatre where various surgical procedures are performed. The medical, surgical, and pediatric wards admit patients with various medical-surgical conditions.

3.4 Study Population

The study population included all doctors, anaesthetists, and nurses working at Nakuru County Hospital who had served for more than 3 months and hence are fully oriented to the work setup. The target units were served by 175 health care providers.

Table 3.1: Study Population

PROFESSION	FREQUENCY
Nurse	152
Clinical Officers	7
Medical officers	10
Anesthetist	6
Total	175

3.5 Sampling

3.5.1 Sample Size Calculation

Since the population of interest is small, a census was used. All the health care providers who were eligible to participate in the study were considered.

3.5.2 Sampling Procedure

Since the number of health providers working in the CCU is very small a census was adopted for the study. All the eligible research subjects were considered for the study.

3.5.3 Inclusion Criteria

All health care providers who were working in A&E, CCU, HDU, medical, surgical, and pediatrics wards were considered for the study.

3.5.4 Exclusion Criteria CPR

- Doctors, nurses, and clinical officers on internship

3.6 Data Collection and Management

3.6.1 Study Tools

A self-administered questionnaire and checklist were used to collect quantitative data. The questionnaire had both open and close-ended questions. It had three sections: the first section collected health care providers' demographic data, the second part assessed the health care providers' knowledge of CPR, and the third part assessed the institutional factors influencing effective CPR. A checklist adopted from AHA was used to assess the critical performance steps of CPR.

3.6.2 Validity of Tools

To ensure that the research questionnaires were valid and checklists was practical, a pre-test was done at Thika County hospital. A tenth (10%) n=18 of the questionnaires were used. Thika County hospital was preferred since it shares the same characteristics as Nakuru County hospital. Ambiguous questions in the questionnaire were rephrased before the administration of the tool to the respondents.

3.6.3 Reliability of the Instruments

To ensure reliability, the test-retest method was used whereby the research tools were administered to the same individuals after two weeks from the first administration to evaluate whether the findings yield the same results. The tools were analyzed and the results that were obtained were the same as the first. This therefore confirmed the reliability of the study instruments.

3.6.4 Data Collection

Permission was sought from Nakuru County Hospital to collect data from the health care providers. Quantitative data was collected using checklists with the help of seven research assistants (one from each department). Self-administered questionnaires were used to collect quantitative data from the respondents to answer the rest of the research questions. The entire data collection process took 8 weeks.

3.6.5 Data Cleaning and Entry

Questionnaires and checklists filled by both the respondents and research assistants were checked to ensure that they are filled and consistent. Any information that was not consistent was eliminated. Data from the completed research tools were entered using SPSS version 24 in password-protected computers.

3.6.6 Data Storage

Data collected was stored in a locked cabinet and remained under the researcher's care awaiting entry to a computer. The data was then retrieved during analysis and then stored in a password-secured computer before the study is completed. The data remains locked after the completion of the study for five years after which the tools will be shredded.

3.7 Data Analysis and Presentation

Data analysis was done using SPSS computer software, version 24 for descriptive analysis to generate frequencies, percentages, and tabulations. Demographic data was analyzed using descriptive statistics. Categorical data was presented using frequencies and percentages. Chi-square tests and multiple regression analysis were done to determine the significant association between variables. A P value of 0.05 or less was considered to be significant. Thereafter conclusions were made from the findings.

3.8 Ethical Considerations

Ethical consideration describes the moral values to be observed while doing the entire research (Bell, 2014). The following was considered during the research process. The research observed the universal guidelines and policy regarding research work that touched on human beings whereby the researcher had to submit a proposal for vetting and validation by a board of ethics within the jurisdiction of the study setting. Approval to conduct the study was sought from Nairobi Hospital Ethics and Review Committee. A research permit was obtained from National Commission for Science, Technology, and Innovation (NACOSTI). Permission to collect data was also sought from Nakuru County Hospital administration and the ward in-charges were aware that the health care providers were being assessed on their skills of CPR. Participation was voluntary. Informed consent was sought from the respondents before data was obtained from them. The research assistants assisted with the CPR process. The research assistant took a non-participant observation approach where they took a minimal role during CPR. This was aimed at preventing participants from feeling threatened if they did not perform the procedure effectively. Consent was sought after gathering data to avoid the Hawthorne effects in the study. The researcher used codes to identify the research tools to ensure anonymity and confidentiality.

3.9 Limitations

The use of a descriptive design was a limitation because causality could not be established. The use of a questionnaire was a limitation, as the researcher could not verify information collected from the respondent. The respondents were explained to they were not going to be penalized and that the research was only meant for educational purposes and so requested to give genuine responses.

In addition, the use of the observation method to establish skill was a limitation as there was little control over the physical situation and the possibility of distortion. As such, the respondents were not informed about the persons who were assessing their CPR skills to avoid distortion.

Since the research was only conducted in one hospital, they may not reflect the findings in other institutions. For that reason, there is a need for other researchers to explore the topic in other facilities to determine the factors that influence effective CPR.

CHAPTER FOUR

RESULTS

4.1 Introduction

In this chapter, the findings of the study are presented. The findings are presented in both descriptive and inferential statistics in the form of tables and figures.

A total of 162 health care providers working at Nakuru County Hospital participated in the study. This represented a 92% response rate.

4.2 Socio-Demographic Characteristics of Respondents

Data on the respondents' gender, age, level of education, profession, and the department was collected. As presented in Table 4.1 below, results show that the majority (69.1%, n=112) were females. This may be attributed to the fact that the majority (67.3%) of the respondents in the study were nurses, a profession where females are the majority. On age, 36.4% (n=59) of the respondents were aged between 18-29 years while those aged between 30 and 39 years accounted for 32.1% (n=52) of the sample. The mean age was 32 years. This result suggests that the vast majority of respondents were young (<40 years).

As shown in Table 4.1, slightly above half (52.8%, n=85) of the respondents had a diploma in nursing while 31.7% (n=51) had a bachelor's degree. The findings, therefore, show that all the respondents had the minimum required level of education for their profession. The vast majority (89.5%, n=145) of respondents were nurses. The results show that all cadres of health care providers were involved in the study. As shown in Table 4.1, 25.9% (n=42) worked in the medical ward while 24.7% (n=40) worked in the surgical ward. This shows that respondents in the study were well spread out across the various departments in the study site.

Table.4.1: Socio-Demographic Characteristics of Respondents

Variable	Category	Frequency (n)	Percent (%)
Gender	Male	50	30.9
	Female	112	69.1
Age (years)	18-29	59	36.4
	30-39	52	32.1
	40-49	31	19.1
	50-59	20	12.3
Education	Diploma	85	52.8
	Higher diploma	17	10.6
	Degree	51	31.7
	Masters	8	5
Profession	Nurse	145	89.5
	Clinical Officers	4	2.5
	Medical officers	8	4.9
	Anesthetist	5	3.1
Department	ICU	30	18.5
	Medical ward	42	25.9
	Surgical Ward	40	24.7
	Accident	28	17.3
	Pediatric	9	5.6
	Theatre	13	8.0

4.3 Respondents' Knowledge of Cardiopulmonary Resuscitation

The study sought to determine the level of knowledge of cardiopulmonary resuscitation among health care providers at Nakuru County Hospital. Knowledge was assessed by posing a series of questions to respondents on cardiopulmonary resuscitation as shown in Table 4.2. The results showed that there was a gap in knowledge among health care providers regarding operating AEDs. The majority (65.8%, n=104) of the respondents indicated that the automated external defibrillator is indicated for a patient with ventricular fibrillation. Slightly less than half (47%, n=71) gave a correct response by indicating that the proper steps for operating an AED are: to power the AED, attach electrode pads, analyze rhythm, clear the patient, and deliver shock however, (35.8%, n=54) gave incorrect responses by indicating that the steps are check pulse, attach electrodes, and analyze the rhythm, shock patient. These results suggest that there was a gap in knowledge among health care providers regarding operating AEDs

Slightly above half, (50.6%, n=82) of the respondents indicated the correct ratio of chest compressions to breaths i.e. 30:2 while 24.1% (n=39) indicated a ratio of 15:2. Slightly less than half indicated that the location of chest compressions should be mid-chest while 34.4% (n=55) indicated the lower half of the sternum. The majority (62.5%, n=100) indicated that one should press down 2 inches with each chest compression while 30% (n=48) indicated 5 inches. The majority (78.4%, n=127) of the respondents indicated that one should watch for chest rise as a way of telling if ventilations are going into a victim. Results also show that 43.7% (n=69) indicated that rescuers should switch roles every 2 cycles while 41.8% (n=66) indicated after 5 cycles.

Table 4.2: Respondents' Knowledge of Cardiopulmonary Resuscitation

Question	Responses	Frequency (n)	Percent (%)
Indications of AED	With a sinus rhythm	3	1.9
	Asystole	4	2.5
	In ventricular fibrillation	104	65.8
	Pulseless electrical activity	47	29.7
Operating an AED	Power on the AED, attach the electrode pads, shock the analyze the rhythm	17	11.3
	Power the AED, attach electrode pads, analyze rhythm, clear the patient, deliver a shock	71	47
	Attach electrode pads, check pulse, shock patient, analyze rhythm	9	6
	Check pulse, attach electrodes, analyze rhythm, shock patient	54	35.8
Chest compressions ratio	15:1	31	19.1
	15:2	39	24.1
	30:2	82	50.6
Location of chest compression	The left side of the chest	30	18.8
	The right side of the chest	5	3.1
	Mid chest	70	43.8
	The lower half of the sternum	55	34.4
Size of press downs	2 inches	100	62.5
	5 inches	48	30
	0.5 inches	12	7.5
How to tell if ventilations are going into a victim	Watch for chest rise	127	78.4
	Watch for the abdominal rise	19	12.2
	Listen for air going through the airway	4	2.6
	Listen for the victim exhaling air	6	3.8
Frequency of switching roles among rescuers	1 cycle	21	13.3
	2 cycles	69	43.7
	5 cycles	66	41.8
	10 cycles	2	1.3

Respondents who answered correctly 5 or more questions in Table 4.2 were categorized as having a high knowledge of CPR while those who correctly answered 4 or less were classified as having low knowledge (Alkandari et al., 2017; Kaihula et al., 2018).

Figure 4.1 shows that slightly above half (54.3%, n=88) had low knowledge of cardiopulmonary resuscitation.

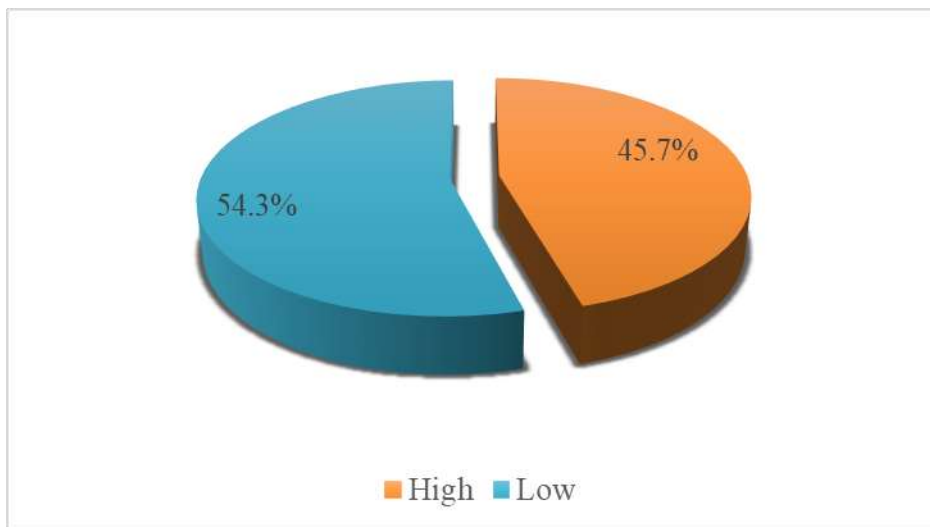


Figure 4.1: Respondents' Knowledge of Cardiopulmonary Resuscitation

4.4 Respondents' CPR Practice

Assessment of the practice of cardiopulmonary resuscitation among health care providers was done through a CPR checklist which had 10 items. Results in Table 4.3 shows that 75.3% (n=122) checked patient responsiveness, 63% (n=102) bared the patient's chest and located the hand position, 68.5% (n=111) delivered first chest compression at the correct rate and 72.8% (n=118) of the respondents gave two breaths. However, results also show that 59.9% (n=97) did not scan for chest movement, 64.2% (n=104) did not activate the emergency response team and get the Automated External Defibrillator or direct the rescuer to activate the emergency response team and get the Automated External defibrillator. Similarly, 61.1% (n=99) did not check carotid pulse for between 5- 10 seconds, while 51.2% (n=83) did not deliver a second cycle of chest

compression at the correct hand position. Regarding breaths and chest compressions, more than half (54.3%, n=88) did not give two breaths while 50.6% (n=82) did not deliver the third cycle of chest compression of adequate depth and complete chest recoil.

Table 4.3: Respondents' CPR Practice

Critical Performance Steps	Correctly done		Incorrectly done	
	N	%	n	%
Checks patient responsiveness(taps and shouts" Are you Alright")	122	75.3	40	24.7
Scans chest for movement (5- 10 seconds)	65	40.1	97	59.9
Activates the emergency response team and gets the Automated External defibrillator or directs the rescuer to Activates the emergency response team and gets the Automated External defibrillator	58	35.8	104	64.2
Check carotid pulse (5- 10 seconds)	63	38.9	99	61.1
Bares patient's chest and locates the hand position	102	63.0	60	37.0
Delivers first chest compression at the correct rate (Acceptable: 18 seconds or less for 30 compressions)	111	68.5	51	31.5
Give two breaths (One second each)	118	72.8	44	27.2
Deliver the second cycle of chest compression at the correct hand position (Acceptable: greater than 23 of 30 compressions)	79	48.8	83	51.2
Give two breaths (one second each) with visible chest rise.	74	45.7	88	54.3
Deliver the third cycle of chest compression of adequate depth and complete chest recoil (Acceptable: greater than 23 of 30 compressions)	80	49.4	82	50.6

Respondents who correctly performed 6 or more items in the CPR checklist were classified as having good practice while those who only performed 5 or less were classified as having poor practice. (Kaihulaet al., 2018). As per Figure 4.2, the majority (61.1%, n=99) had poor CPR practice.



Figure 4.2: Respondents' CPR Practice

4.5 Institutional Factors Influencing CPR Practice

The respondents were asked to indicate the presence or absence of various institutional items, infrastructure, and activities. The majority (70.9%, n=112) indicated that they did not have a BLS/ACLS certificate. Similarly, 81.7% (n=94) indicated that they had not had a refresher course in the previous two years. Slightly above half (53.8%, n=86) indicated that they had a resuscitation team in their department however, 55.1% (n=87) indicated that the staffing was inadequate and 51.9 % (n=81) indicated that they did not have all the necessary resources for CPR. The majority (66.7%, n=104) of respondents indicated that there were no debriefing sessions after CPR. In addition 59.3% (n=96) indicated that their institution did not organize continuous professional development sessions to refresh health care providers' CPR knowledge and skills.

Table 4.4: Institutional Factors Influencing CPR Practice

Item or activity	Response	Frequency (n)	Percent (%)
BLS/ACLS certificate	Yes	46	29.1
	No	112	70.9
Refresher course in the last 2 years	Yes	21	18.3
	No	94	81.7
Resuscitation team	Yes	86	53.8
	No	74	46.3
Adequate staffing	Yes	71	44.9
	No	87	55.1
All necessary resources	Yes	75	48.1
	No	81	51.9
Debriefing sessions after CPR	Yes	52	33.3
	No	104	66.7
Continuous professional development sessions	Yes	51	34.7
	No	96	59.3

The Chi-square tests were conducted between institutional factors and CPR practice. Results in Table 4.5 show that having a BLS/ACLS certificate ($p=0.003$), refresher course in the last 2 years ($p<0.001$) and necessary resources ($p=0.014$) were significant.

Table 4.5: Association between Institutional Factors and CPR Practice

Factor	Chi-square
BLS/ACLS certificate	($\chi^2 = 9.807$, $df=1$, $p=0.003$)
Refresher course	($\chi^2 = 14.501$, $df=1$, $p<0.001$)
Resuscitation team	($\chi^2 = 0.573$, $df=1$, $p=0.449$)
Adequate staffing	($\chi^2 = 0.215$, $df=1$, $p=0.643$)
Necessary resources	($\chi^2 = 11.091$, $df=1$, $p=0.014$)
Debriefing sessions	($\chi^2 = 1.097$, $df=1$, $p=0.295$)
CPD sessions	($\chi^2 = 0.023$, $df=1$, $p=0.878$)

4.6 Hypothesis Testing

The null hypothesis stated that there is no significant relationship between knowledge of CPR and effective CPR among health care providers at Nakuru County Hospital. To test the hypothesis, a chi-square test was conducted between the knowledge of respondents

on CPR and respondents' CPR practice. As shown in Table 4.6, there was a significant relationship ($p < 0.001$) between CPR knowledge and CPR practice. The null hypothesis is therefore rejected and the study adopts the alternative hypothesis which indicated that there is a significant relationship between knowledge of CPR and effective cardiopulmonary resuscitation among health care providers at Nakuru County Hospital.

Table 4.6: Association between CPR Knowledge and CPR Practice

Variable	Chi-square
Knowledge	($\chi^2 = 47.145, df=1, p < 0.001$)

4.7 Determinants of Effective Cardiopulmonary Resuscitation

Respondents who had a BLS/ACLS certificate and those who had a refresher course in the last 2 years and those who indicated availability of necessary resources were 3.4, 2.9, and 3.1 times more likely to have good CPR practice respectively. Similarly, respondents with high knowledge were four times (OR = 4.574 (2.703-7.740) more likely to have a good practice than those who were not knowledgeable.

Table 4.7: Determinants of Effective Cardiopulmonary Resuscitation

		Practice		Odds Ratio (95% CI)	P-value
		Good	Poor		
BLS/ACLS certificate	Yes	39	7	3.403(2.907 – 4.101)	0.001
	No*	24	88		
Refresher course	Yes	17	4	2.911 (2.70 – 3.001)	0.413
	No*	46	48		
Necessary resources	Yes	55	20	3.102(2.817 – 3.300)	0.012
	No*	8	73		
Knowledge	High	50	24	4.574 (2.703-7.740)	0.000
	Low*	13	75		

* Reference group

CHAPTER FIVE

DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a discussion of the results of the study. The researcher's conclusions, as well as recommendations for policy, practice, and research are also enumerated.

5.2 Level of Knowledge of Cardiopulmonary Resuscitation

Slightly above half 54.3% (n=88) had low knowledge of cardiopulmonary resuscitation. Respondents had poor knowledge regarding the proper steps for operating an AED, location of chest compression, chest compressions to breaths ratio, and the frequency of switching roles among rescuers. The low knowledge may be attributed to a lack of adequate training and poor continuous professional development. This finding is similar to the findings of Aliyu et al. (2019) in which knowledge of CPR among Nigerian health care providers was poor. Kaihula et al. (2018) in Tanzania also revealed that there is poor knowledge and skills of CPR among the health care providers of all cadres. The finding is similar to a study conducted by Roshana et al. (2012) which showed that the poor knowledge among health care providers in Nepal is attributed to a lack of CPR training before employment, and lack of exposure to the clinical area hence contributing to the deterioration of the knowledge. The finding is however in contrast with Tsegaye et al. (2015) in Ethiopia where about 93.3% of the respondents had good knowledge of CPR. From the studies, it is evident that there is a gap in knowledge regarding CPR.

5.3 Practice of Cardiopulmonary Resuscitation

The majority 61.1% of the respondents in the study had poor CPR practice. The majority of respondents failed to scan the chest for movement, activate the emergency response

team, check the carotid pulse and give two breaths. The poor CPR practice could be attributed to poor knowledge among the respondents. This finding is consistent with the findings of Xanthos et al. (2012) in Greece where nurses' CPR skill was also noted to have gaps as the nurses failed to adhere to the recommended guidelines when performing CPR. Similarly, Meaney et al. (2013) in the United Kingdom reported that the practice and knowledge of CPR were low among students despite having a positive attitude towards BLS. Studies have confirmed that the health care providers have poor practice of CPR. The studies noted that health care providers failed to follow the guidelines that are prescribed by AHA.

5.4 Institutional Factors Influencing Effective CPR

The majority of respondents did not have BLS/ACLS certificates or had not done a refresher course in the last 2 years. Although there was a resuscitation team, there was inadequate staffing and resources. There was no debriefing session and continuous professional development sessions as well. Chi-square tests showed that having a BLS/ACLS certificate ($p=0.003$), a refresher course in the last 2 years ($p=0.000$) and necessary resources ($p=0.014$) were significant. Respondents who had a BLS/ACLS certificate and those who had a refresher course in the last 2 years and those who indicated that necessary resources were 3.4, 2.9, and 3.1 times more likely to have good CPR practice. This finding, therefore, showed that institutional factors influenced CPR practice. This finding is in support of Leary and Abella (2018) in the UK who indicated that lack of debriefing following CPR among health care providers contributed to ineffective CPR. This contributed to the repeat of mistakes among health care providers when conducting CPR. The finding of this study is similar to that of Rajeswaran and Ehlers (2013) in Botswana where hospital units sometimes had too few staff members and did not have fully equipped emergency trolleys and/or equipment. No CPR teams and no CPR policies and guidelines existed. Salary (2013) in the USA also revealed that institutional factors such as understaffing, and lack of provision of basic requirements of resuscitation have affected the quality of resuscitation. The finding of this study however differs from the findings of Castelaot al. (2013) in the USA and the UK where

planning, leadership, and communication as the three main interlinked coordination mechanisms were found to affect several CPR performance markers. From the studies that are documented, it is shown that policies that guide certification among health care providers is crucial for effectiveness of CPR. The studies further indicate that enough staff is important to coordinate the CPR activities. Basic resources have also been identified as a major contributor towards the effectiveness of CPR.

According to the study's null hypothesis, there is no significant relationship between knowledge of CPR and effective CPR among health care providers at Nakuru County Hospital. As per the Chi-square test, there was a significant relationship ($p=0.000$) between CPR knowledge and CPR practice. Cross tabulation showed that respondents with high knowledge were four times ($OR = 4.574$) more likely to have a good practice. The null hypothesis is therefore rejected and the study adopts the alternative hypothesis which indicated that there is a significant relationship between knowledge of CPR and effective cardiopulmonary resuscitation among health care providers at Nakuru County Hospital. This study agrees with Dukes & Girotra (2018) who noted that health care providers who had vast knowledge of CPR were more willing to assist with CPR and performed it more effectively compared to those who did not have prior training. On the flip side, the findings differed from a study conducted in Iran that indicated that there was no relationship between the knowledge of CPR of emergency medical service providers and their CPR skills (Papiet al., 2020).

5.6 Conclusion

The level of knowledge of cardiopulmonary resuscitation among health care providers at Nakuru County Hospital was low. Knowledge was lacking in the areas of proper steps for operating an AED, location of chest compression, chest compressions to breaths ratio, and the frequency of switching roles among rescuers. Respondents with diplomas and higher diplomas were more likely to have low knowledge. The low knowledge was significantly associated with poor CPR practice.

The practice of cardiopulmonary resuscitation among health care providers at Nakuru County Hospital was poor. The majority of respondents failed to scan the chest for movement, activate the emergency response team, check carotid pulse and give two breaths as recommended. The poor practice of cardiopulmonary resuscitation among health care providers is attributed to low CPR knowledge and some institutional factors.

Institutional factors also influence effective CPR among health care providers at Nakuru County Hospital. Specifically, the lack of BLS/ACLS certification, refresher courses, staffing, and necessary resources were significant in influencing poor CPR practice among respondents.

5.7 Recommendations

1. Ward in-charge should place more emphasis on CPR in the continuous professional development sessions.
2. The education and training department at Nakuru County Hospital should introduce training on CPR to ensure that health care providers follow the recommended guideline when performing CPR. Further training should be conducted on gaps identified in the supervision.
3. The managers at Nakuru County hospital enact a policy to ensure all health care providers possess a valid BLS/ACLS certificate.

5.8 Suggestions for Further Study

This study was limited to Nakuru county hospital therefore a similar study should be conducted to assess the situation in other county hospitals.

A study can be conducted to assess the attitudes of the respondents.

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APPENDICES

Appendix I: Questionnaire

TOPIC: DETERMINANTS OF EFFECTIVE CARDIOPULMONARY RESUSCITATION AMONG HEALTH CARE PROVIDERS AT NAKURU COUNTY HOSPITAL

Introduction

My name is Betty Manono. I am carrying out a research study on “Determinants of effective cardiopulmonary resuscitation among health care providers at Nakuru County Hospital” in partial fulfilment for the award of Degree of Master of Science in Critical Care Nursing at Jomo Kenyatta University of Science and Technology. The information provided in this questionnaire will be used for academic purposes only and confidentiality will be highly upheld.

Thank you.

Instructions:

1. Answer by ticking appropriately on the boxes for the close-ended questions.
2. For the open-ended questions, please write your response in the spaces provided.
3. Feel free to ask for clarifications whenever in need.

SECTION A: DEMOGRAPHIC INFORMATION

Please tick as appropriate:

1. Gender: Male [] Female []
2. What is your Age (Years)

18-29 [] 30-39 [] 40-49 [] 50-59 []

3. What is your profession?

Nurse [] Clinical officer [] Medical officer [] Anaesthetist []

4. Highest level of education:

Diploma [] Higher diploma [] Degree C
Masters

5. In which department are you working?

ICU	[]	Medical ward	[]
Surgical Ward	[]	Accident & emergency	[]
Pediatric ward	[]	Theatre	[]

SECTION B: HEALTH CARE PROVIDERS' KNOWLEDGE OF CARDIOPULMONARY RESUSCITATION

6. Automated External Defibrillator is indicated for a patient with:

With a sinus rhythm [] Asystole
[]

In ventricular fibrillation [] Pulseless electrical activity
[]

7. The proper steps for operating an Automated External Defibrillator(AED) are:

- a) Power on the AED, attach the electrode pads, shock the analyze the rhythm
[]
- b) Power the AED, attach electrode pads, analyse rhythm, clear the patient, deliver shock []
- c) Attach electrode pads, check pulse, shock patient, analyze rhythm []
- d) Check pulse, attach electrodes,analyze rhythm, shock patient []

8. How many chest compressions to breaths do we give when performing Cardiopulmonary Resuscitation?

15:1 [] 15:2 [] 30:2 []

9. What is the location of chest compression?

Left side of the chest [] Right side of the chest []

Mid chest [] Lower half of the sternum []

10. How far should you press down with each chest compressions?

2 inches [] 5 inches [] 0.5 inches []

11. How can you tell if ventilations are going into a victim?

Watch for chest rise [] Watch for abdominal rise []

Listen for air going through the airway [] Listen for the victim exhaling air []

12. Rescuers should switch roles after every

1 cycle of CPR [] 2 cycles of CPR []

5 cycles of CPR [] 10 cycles of CPR []

SECTION C: INSTITUTIONAL FACTORS INFLUENCING EFFECTIVE CARDIOPULMONARY RESUSCITATION

13. Do you have a BLS/ ACLS certificate?

Yes [] No []

14. If yes, have you done any BLS/ ACLS refresher course in the last 2 years?

Yes [] No []

15. Do you have a resuscitation team in your department?

Yes [] No []

16. Is the staffing in your department enough to support effective cardiopulmonary resuscitation?

Yes [] No []

17. Do you have ALL the necessary resources needed to facilitate effective cardiopulmonary resuscitation in your department?

Yes [] No []

18. If No, which ones do you lack?

.....
.....

19. Do you have debriefing sessions after cardiopulmonary resuscitation?

Yes []

No []

20. Does the institution organize continuous professional development sessions to refresh your cardiopulmonary knowledge and skills?

Yes []

No []

21. If Yes, how often?.....

THANK YOU FOR YOUR TIME

Appendix II: CPR Checklist

STEPS	CRITICAL PERFORMANCE STEPS	✓ If correctly done and blank if not correctly done
1.	Checks patient responsiveness(taps and shouts” Are you Alright”	
2.	Scans chest for movement (5- 10 seconds)	
3.	Activates the emergency response team and gets the Automated External defibrillator Or Directs the rescuer to Activates the emergency response team and gets the Automated External defibrillator	
4.	Check carotid pulse (5- 10 seconds)	
5.	Bares patient’s chest and locates the hand position	
6.	Delivers first chest compression at the correct rate (Acceptable: 18 seconds or less for 30 compressions)	
7.	Give two breaths (One second each)	
8.	Deliver the second cycle of chest compression at the correct hand position (Acceptable: greater than 23 of 30 compressions)	
9.	Give two breaths (one second each) with visible chest rise.	
10.	Deliver the third cycle of chest compression of adequate depth and complete chest recoil (Acceptable: greater than 23 of 30 compressions)	

American Heart Association, 2016

Appendix III: Letter of Authorization



**JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY
SCHOOL OF NURSING**

DEPARTMENT OF NURSING EDUCATION, LEADERSHIP, MANAGEMENT & RESEARCH
TEL: 067- 5352181-4 Extn. 2226 FAX: 067-52030 Email :nursingeducation@jkuat.ac.ke

14th July, 2020

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: BETTY KWAMBOKA MANONO - HSN311-2619/2017

The above named is a bonafide second year student at Jomo Kenyatta University of Agriculture and Technology persuing Master Of Science in Nursing (Critical Care). She had succesfully defended her proposal and cleared by school of nursing for submission to ethics review and data collection.

The study is * **Determinants of effective cardio pulmonary resuscitation among health care providers at Nakuru County Hospital***

Any assistance accorded to her will be highly appreciated.

Thank you.

Dr. SHERRY OLUCHINA
COD, NURSING EDUCATION, LEADERSHIP, MANAGMENT AND RESEARCH.



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Appendix IV: Ethical Approval



THE NAIROBI HOSPITAL

Our Ref. TNH/ADMIN/CEO/25/08/20

25 August 2020

Betty Manono
HSN311-2619/2017
Clinical Instructor
Thika School of Medicine and Health Sciences

Dear Ms. Manono,

RE: ASSESSMENT OF KNOWLEDGE, SKILLS AND INSTITUTIONAL FACTORS THAT DETERMINE EFFECTIVE CARDIOPULMONARY RESUSCITATION AMONG HEALTH WORKERS AT NAKURU COUNTY HOSPITAL

Reference is made to your request for ethical review of the research proposal on the above subject.

We are pleased to inform you that ethical review has been done and approval granted. In line with The Nairobi Hospital research projects Policy, you will be required to submit a copy of the final research findings to the Committee for records.

Please note that this approval is valid for the period August 2020 to August 2021, if an extension is required, a fresh application should be done before proceeding with the study.

You will also be required to seek for a research permit from the National Commission for Science, Technology and Innovation (NACOSTI).

Yours sincerely,
FOR: THE NAIROBI HOSPITAL

Dr. Allan Pamba
CHIEF EXECUTIVE OFFICER

C.c. Chairman – TNH Ethics & Research Committee
Director, Medical Services & Research



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Appendix V: NACOSTI Permit


REPUBLIC OF KENYA


NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION

Ref No: **302969** Date of Issue: **15/September/2020**

RESEARCH LICENSE



This is to Certify that Ms. Betty Kwamboka Manono of Jomo Kenyatta University of Agriculture and Technology, has been licensed to conduct research in Nakuru on the topic: ASSESSMENT OF KNOWLEDGE, SKILLS AND INSTITUTIONAL FACTORS THAT DETERMINE EFFECTIVE CARDIOPULMONARY RESUSCITATION AMONG HEALTH WORKERS AT NAKURU COUNTY HOSPITAL, for the period ending : 15/September/2021.

License No: **NACOSTI/P/20/6743**

302969
Applicant Identification Number


Director General
NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION

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