KNOWLEDGE OF AND COMPLIANCE TO CARDIOPULMONARY RESUSCITATION GUIDELINES BY HEALTHCARE PRACTITIONERS' AT THE ACCIDENT & EMERGENCY UNIT, KENYATTA NATIONAL HOSPITAL

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Declaration

I hereby declare that this proposal is my original work and has not been submitted anywhere else by any other person(s) for research purpose or award of any degree or otherwise.

Sign…….

Date…….

Certificate of Approval

We the undersigned certify that this proposal has been submitted with our approval as internal supervisors.

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Dedication

I dedicate this study to students of emergency care and the staff of every Accident and Emergency department throughout East Africa.

Acknowledgement

I acknowledge the guidance and support of my supervisors Dr. Eunice Omondi and Dr. Samuel T. Kimani and, the lecturers at the School of Nursing Sciences, University of Nairobi as I sought to put together this work.

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I am grateful to the Kenyatta National Hospital, School of Nursing, the hospital administration for release and sponsorship to enable me meet the costs and successfully complete my studies.

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I thank the Almighty God for the opportunity He granted me to pursue this training and stay true to my passion.

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Operational Definition of Terms

Accident &Emergency department: The department of a hospital responsible for the provision of medical and surgical care to patients arriving at the hospital in need of immediate care.

Cardiac Arrest: An event that occurs when the heart malfunctions and stops beating unexpectedly and is an "ELECTRICAL" problem.

Cardiopulmonary Resuscitation: An emergency lifesaving procedure performed when the heart stops beating.(American Heart Association (AHA), 2020)

Code Blue Team: Team responsible for initiating cardiopulmonary resuscitation on patients with cardiac arrest.

DNAR: A 'do not resuscitate' (order, is written by a licensed physician in consultation with a patient or surrogate decision maker that indicates whether or not the patient will receive cardiopulmonary resuscitation (CPR) in the setting of cardiac and/or respiratory arrest.(Braddock III and Derbenwick Clark, no date)

DALY: Disability Adjusted Life Years. Conditions with potential emergent manifestations. Time lost due to incapacity arising from ill health

Health Care Practitioners: Qualified clinical personnel providing care to patients in the A&E

Sudden Cardiac Arrest: A condition in which the heart suddenly and unexpectedly stops beating. If this happens, blood stops flowing to the brain and other vital organs.

List of Abbreviations

ABCDE: Airway, Breathing Circulation, Disability, Exposure
ACLS: Advanced Cardiac Life Support
AHA: American Heart Association
ALSO: Advanced Life Support in Obstetrics
BLS: Basic Life Support
CoSTR: Consensus on Science and Treatment Recommendations
CPR: Cardiopulmonary Resuscitation
DALY: Disability Adjusted Life Years.
DNAR: Do not attempt resuscitation
EMT: Emergency Medical Technician
EPILS: European Paediatric Immediate Life Support
ERC: European Resuscitation Council
ETAT: Emergency Triage Assessment and Treatment
GBD: Global Burden of Diseases
HCP: Healthcare Practitioners
ILCOR: International Liaison Committee on Resuscitation
IHCA: In Hospital Cardiac Arrest
ILS: Immediate Life Support
I.V: Intravenous
LMIC: Low and Middle-Income Countries
MO: Medical Officer
N.C.K: Nursing Council of Kenya
PALS: Pediatric Advanced Life Support Course
ROSC: Return of Spontaneous Circulation
SCA: Sudden cardiac arrest
SCD: Sudden Cardiac Death
S.D.G: Sustainable Development Goals
S.O.N: School of Nursing
SSA: Sub-Saharan Africa
UHC: Universal Health Coverage
U.S: United States
WHO: World Health Organization
YLL: Years of Life Lost

Abstract

Background: Cardiac arrests occur in different conditions and could result in permanent neurological damage and death. Cardiopulmonary resuscitation by trained, competent Health Care Practitioners, is required. Health Care Practitioners employ recognized CPR guidelines during such events and their compliance at A&E, KNH is the focus of this study.
Objective: Assessment of knowledge of and compliance to CPR guidelines among healthcare practitioner's during cardiac arrest at A&E, KNH.
Methods: A descriptive, cross-sectional study design was used. Observation of 119 HCP performing CPR was done by the researcher for a period of two weeks. The researcher administered questionnaires, on HCP demography and knowledge of CPR guidelines and, compliance was evaluated. The HCPs who had given voluntary consent were recruited, through random sampling. Ethical clearance was sought from the KNH-UON ERC. The data collected was categorized, entered in a database and, analyzed using SPSS computer package, version 25.0. For inferential statistics, logistical regression models were used to assess whether knowledge of resuscitation guidelines influenced compliance. A P value of < or equal to 0.05 was used to indicate statistical significance.
Findings: Through a logistic regression model determination of the predictors of knowledge and compliance to CPR guidelines was done. Knowledge of basic life support and Knowledge of Advanced cardiac life support were used as the independent variables.

There is a strong relationship between knowledge of the healthcare practitioners performing CPR during cardiac arrest and their compliance to guidelines which direct the practice of resuscitation in the A&E, KNH. There exists a strong positive relationship by 0.812. R squares, 0.66 which implies that 66% of the determinants of compliance can be accounted for in the model while 34% is other determinants in the model.
Conclusion: There is need for enhancing the knowledge of the healthcare practitioners performing CPR on patients who suffer cardiac arrest in the department. Through recertification, availing of current CPR guidelines and deployment of HCPs with the requisite knowledge of resuscitation practice within the department better clinical outcomes will be achieved for patients who unfortunately experience sudden cardiac arrest.

CHAPTER ONE: INTRODUCTION

1.1Background

Cardiopulmonary resuscitation is a lifesaving procedure which when done promptly, can increase chances of survival after cardiac arrest. (American Heart Association (AHA), 2020).

There has been an upsurge in Non-Communicable Diseases (NCDs) in Low- and Middle-Income Countries that result in sudden death. However this state that can be reversed through prompt and effective bystander CPR (Kalu, Oku and Ilori, 2018) High- quality (CPR) that adheres to AHA guidelines has been linked with better survival rates (Association, 2018). This is also dependent on the education and training of Health Care Practitioners performing the procedure (Lim et al., 2010) Sudden cessation of the heart's mechanical function accompanied by the lack of a core pulse, gasping respiration, and unresponsiveness is an indication of cardiac arrest (Ocen et al., 2015; Wachira and Tyler, 2015) The United States, has a reported incidence of more than 500 000 cardiac arrests per year 209 000 of them being In Hospital Cardiac Arrest(IHCA) (Association, 2018). The survival to hospital discharge rates range from of 18% to 20% (Kolte et al., 2015). The implementation of CPR measures within golden minutes has been reported to save lives of 100,000 persons per year. Quick resuscitation, early defibrillation (within 1-2 minutes) can increase survival >60%. Subsequent resuscitation will follow an arrest that occurs in a hospital. This include chest compressions and at times defibrillation. (Wachira and Tyler, 2015)

Kaihula et. al, found that in developed countries, approximately 2 persons from every 1000 admissions suffer IHCAs and are resuscitated by hospital teams (Kaihula et al., 2018a)

The rapid rise in Non-Communicable Diseases (NCDs) in developing countries resulting in ventricular fibrillation followed by sudden death can be reversed through prompt and effective bystander cardiopulmonary resuscitation. Despite the initiation of the chain of survival that includes immediate

recognition, CPR and prompt defibrillation by trained providers in sub Saharan Africa, the incidences and outcomes of these interventions have remained unexplored. (Wachira and Tyler, 2015)

Truhal et al., did however recommend that cardiac arrests of non-traumatic origin that may lead to death should be promptly identified and managed with the available guidelines. (Truhlář et al., 2015)

1.2 Problem Statement

The WHO, ERC, AHA, ILCOR and life support course certifying associations worldwide, use published guidelines for CPR training of HCPs. (Pareek et al., 2018).Emergency care has further been recognized as a neglected but important area that can reduce the global burden of disease at the primary level (World Health Organization, 2015).Initiatives, sponsored by WHO have continued to rally for increased global access to emergency care. (Zha et al., 2018)

However, in LMICs there is a lack of evidence on resuscitative services and the use of the various remedial interventions for cardiac arrest. (Jamison et al., 2018)

KNH being the largest referral hospital in Kenya, receives many patients who suffer cardiac arrest and receive CPR from qualified HCPs. It trains its staff on CPR based upon the AHA guidelines. It is also a requirement by the certifying organizations that the practitioners be recertified after a period. HCP's working in the A&E as a result, have the necessary CPR skills and knowledge that they comply to when managing these cases.

In Kenya a wide gap exists in the knowledge of the utilization of these CPR guidelines and no study has been done to establish that the guidelines are comply to during CPR by HCPs. This is despite the rising case of patients who present with multiple causes that result in cardiac arrest and may subsequently, require cardiopulmonary resuscitation. This study highlights this disparity and, proposes recommendations to guide the direction of cardiopulmonary care in the A&E, KNH.

1.3 Research Questions

i. What is the level of knowledge of CPR guidelines among HCPs at A&E, KNH?

ii. What is the compliance to BLS principles during cardiac arrest among HCPs at A&E, KNH?

iii. What is the compliance to ACLS principles during cardiac arrest among HCPs at A&E, KNH?

1.4 Broad Objective

To assess the knowledge and compliance to cardiopulmonary resuscitation guidelines during cardiac arrest among healthcare practitioner's at A&E, KNH.

1.4.1 Specific objectives

i. To establish the level of knowledge of CPR guidelines among HCPs at A&E, KNH

ii. To establish compliance to BLS principles among HCPs during cardiac arrest at A&E, KNH

iii. To determine compliance to ACLS principles among HCPs during cardiac arrest among HCPs at A&E, KNH

1.5 Study Hypothesis

Null hypothesis

There is no association between healthcare practitioner's knowledge and compliance to CPR guidelines during cardiac arrest at A&E, KNH.

1.6 Study Justification and significance

There is a better understanding of challenges in LMICs facing emergency care based on the (GBD) study. among which, is the realization mortality and morbidity can be reduced through timely interventions. (Haagsma et al., 2016)

The A&E, KNH has as its staff, full-time personnel and those on contract, as well as students. Most have completed emergency life support courses. The emergency nurses who work here have completed a yearlong higher national diploma course offered by the School of Nursing, KNH and recognized by the Nursing Council of Kenya.

Lack of studies on the knowledge of and compliance to CPR guidelines among HCPs in LMICs is detrimental to the desire to improve emergency care among those presenting with cardiac arrest. This is despite the rising case of patients who present with multiple causes that result in cardiac arrest. This study is therefore important and has highlighted this disparity and, proposed recommendations to guide the direction of cardiopulmonary care in the A&E, KNH. It will add to the available body of knowledge and help improve resuscitation outcomes.

1.7 Conceptual Framework

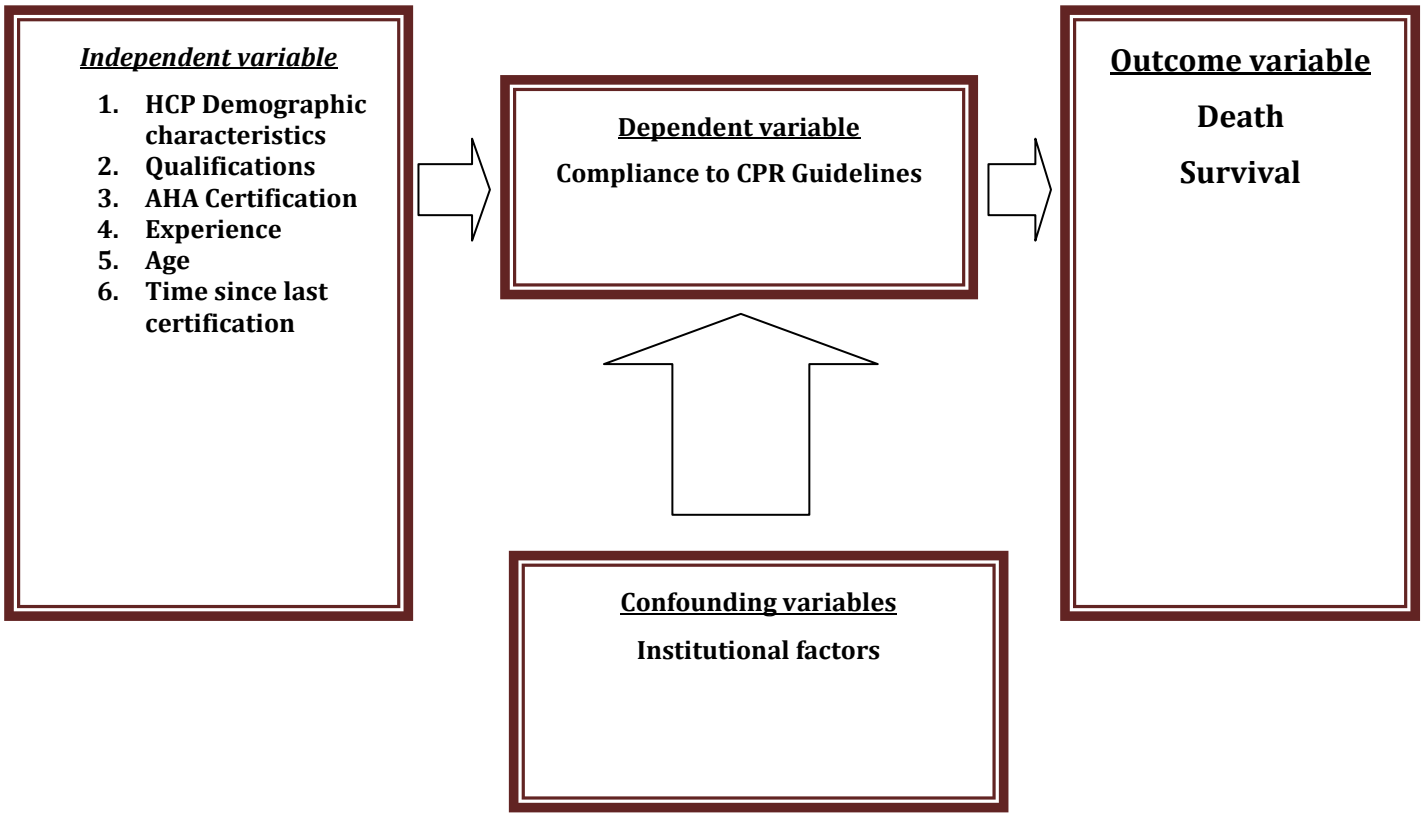

Figure 1.1 Conceptual Framework

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This is an outline of scholarly articles, reports the researcher has interacted with in the process of study. Literature search resources used include Mendeley, Pubmed, Hinari and Google scholar. The key words used are: Cardiopulmonary resuscitation, cardiac arrest, Health Care Practitioners, guidelines, retention and compliance to knowledge on CPR guidelines in the A&E, KNH.

2.2 Cardiopulmonary resuscitation

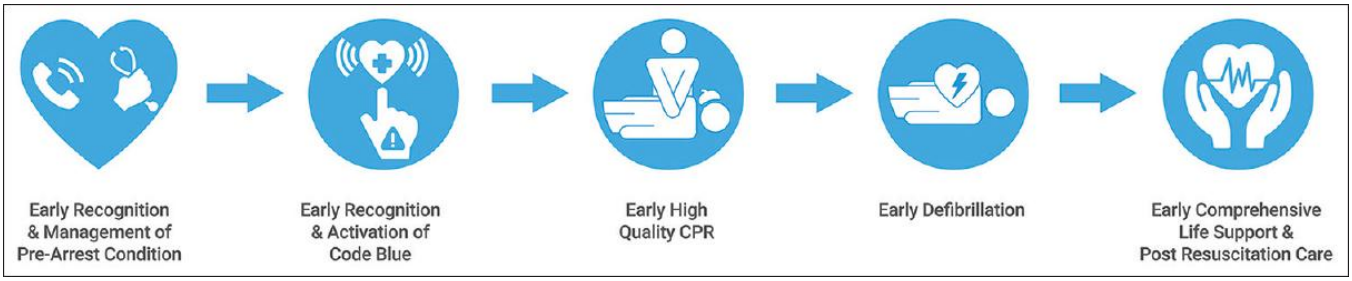

Figure 2. 1 Chain of survival in adult CPR (CCLS)(Garg et al., 2017)

Cardiopulmonary resuscitation (CPR) saves lives and is a medical procedure through which sufficient blood flow to the brain and other vital organs is sustained. (Rajeswaran et al., 2018) CPR decreases incidences of death and corresponding forms of morbidity when attended to by competent HCPs. (Simmes et al., 2012)

Early identification, calls for help, right management of the critically ill, initiation of prompt shocks, and effective CPR with minimal disruption of chest compressions, with identification and resolution of reversible cases are necessary interventions. (Truhlář et al., 2015) A study of CPR in LMICs by Kaihula et.al., concurred with this observation. (Kaihula et al., 2018b)

In adults, VF and pulseless VT, despite being some of the major causes of cardiac arrest, have been shown to respond to early shock therapy. (Bassan, 2008)

The recommended CPR chest compressions to breathing ratio is 30:2. For adults, a range of between 100-120/min, 5 cm for chest compressions and depth respectively in an average adult is advocated. (American Heart Association (AHA), 2020)

Despite these guidelines, suboptimal CPR quality is still exhibited during resuscitation. This has been linked to frequent deviation away from parameters of CPR quality as recommended. (Fried et al., 2011) Some of the errors encountered during CPR include faulty airway management, slow defibrillation, inadequacy of I.V access and medication administration, which resulted in poor resuscitation outcomes. (Lauridsen et al., 2017).

These parameters of resuscitation quality do not get periodically assessed. (Rottenberg and Wik, 2005). There is a dearth of published data from LMICs describing the incidence and results of CPR performed in hospitals (Wachira and Tyler, 2015)This is particularly true in sub Saharan Africa where resources that determine the performance of quality CPR are limited. (Calvello et al., 2013)

2.3 Cardiac arrest

Cardiac arrest is the abrupt halting of the heart's mechanical function and whose accompanying signs are; the lack of detectable pulse, inadequate breathing, with potential unresponsiveness (Ocen et al., 2015). A total of 350 000 people/annually (approximately half of them in-hospital) are reported to suffer a cardiac arrest in the U.S and Canada. (Travers, Rea, Bobrow, Edelson, Berg, Sayre, Berg, Chameides, O'Connor and Swor, 2010) The number is higher across Europe, where an estimated 500,000 people/year experience cardiac arrest. (Kelmend Pallaska, 2014) Deaths caused by cardiovascular diseases in Egypt, were estimated at (5.6%) and by 2018, of the numerous people who had suffered serious CA, less than 8% survived. (Taha and Elbaih, 2017) Girotra et. al., had found that

patients with VF or pulseless VT had an association with better survival outcomes. They later confirmed in a subsequent study that of the admitted patients a fifth presented with cardiac arrest (Girotra et al., 2012; Girotra and Chan, 2013)

2.4 Resuscitation Team

A study in Denmark described the resuscitation team as consisting of personnel from different departments and that this included orderlies, nurses as well as physicians. Unfortunately the physicians were found to be inexperienced, lacking competency in the performance of necessary clinical skills during CPR. (Lauridsen et al., 2017)

Sodhi et. al, described the resuscitation team as comprising an anesthesiologist, a senior house officer , medical officer, staff nurse and the head nurse . (Sodhi, Shrivastava and Singla, 2011). Identified modifiable risk factors for better patient resuscitation outcomes, include the compliance to rapid response teams. These teams consist with high quality resuscitation skills and, this has been linked with a decline in the incidence of SCA and better outcomes (Association, 2018)

The ERC provides training (adults) and EPILS for pediatrics. These are single-day courses whose attention is on the etiology and prevention of heart arrest, emergency care approach to the critically-ill amongst other lifesaving interventions. Deployment of CPR teams and the availing of BLS training to HCPs increases patient outcomes after resuscitation following cardiac arrest. (Yilmaz and Omurlu, 2019)

(ALERT™) is a multidisciplinary program for just qualified HCPs adapted to empower them with greater certainty, ability in identification, care of those admitted with possible or established critical illness. (Smith, Osgood and Crane, 2002) A study in India highlighted the need to train nurses due to the consequently better outcomes after attempted resuscitation on patients with IHCA. (Pareek et al.,

2018) CPR has to continually be adapted and reviewed to enable easy use, and better application of skills. The trained staff members can then rapidly initiate this procedures (Kaihula et al., 2018b) Adequate training of emergency nurses to promptly identify the need for and then initiate CPR when patients suffer SCA, has been shown to reduce in-hospital deaths. (Rajeswaran et al., 2018). Emergency nurses do have a salient role in the recognition and management of the critically ill, where the focus is on severity and time-dependent interventions (Calvello et al., 2013)

2.5 Guidelines

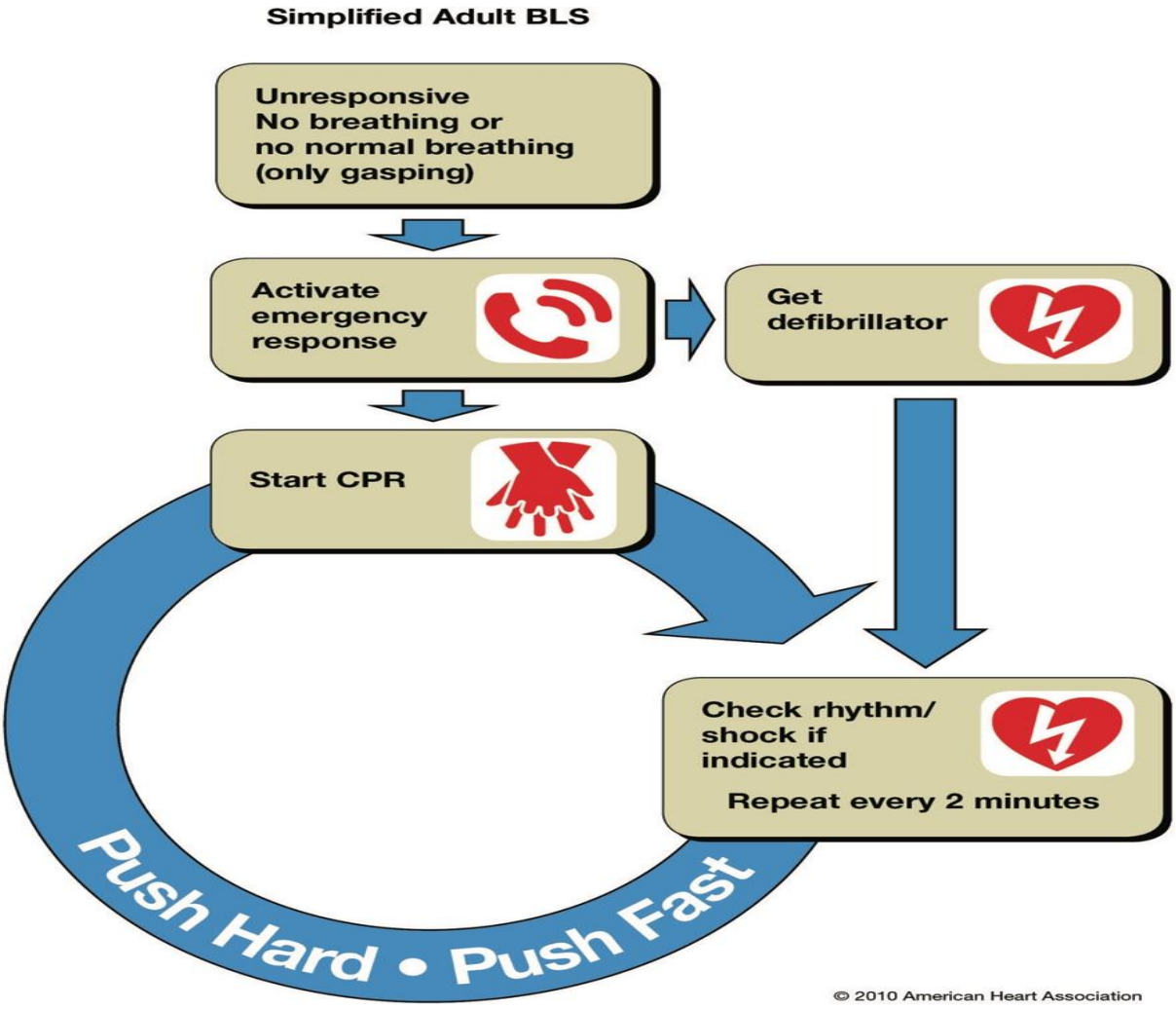

Figure 2.2 Simplified AHA Adult BLS Algorithm

Adherence to CPR guidelines has been shown to be linked to better patient outcomes. Deviation from these guidelines has been related to the reduced likelihood of ROSC (Honarmand et al., 2018)

ACLS guidelines recommend recertification at the end of two years, as the learnt competencies decay by up to a year after training, skills ebbing faster. A dearth of well-designed studies assessing the retention of adult ALS knowledge, in healthcare providers exists (Yang et al., 2012)

A study in Germany, did note however, that HCPs were not required to refresh their knowledge of CPR guidelines as part of their continuing education. Resuscitation situations were seldom available to allow them acquire the requisite skills and CPR knowledge among HCPs was alarmingly low (Siebig et al., 2009).

Guidelines for use by HCPs in CPR can be complied to through well thought out programs that involve their education to improve patient survival from cardiac arrest. Delay in availing of education material and release of staff for training will hamper their compliance to these guidelines.

Combined CPR guidelines clearly prescribe how CPR can be performed however, this is not routinely measured. (Rottenberg and Wik, 2005).

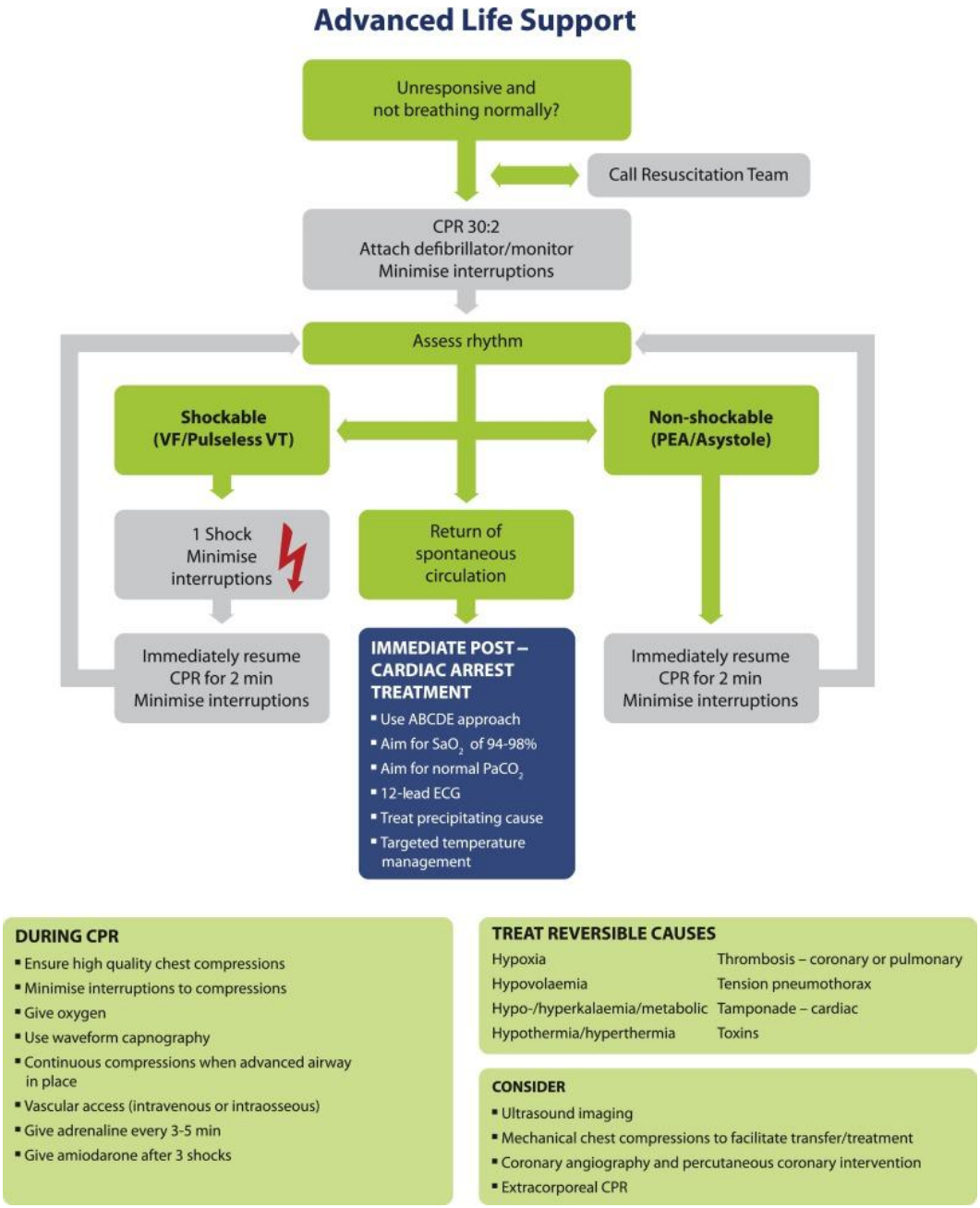

Figure 2.3 ERC ACLS Algorithm(Soar, Nolan, et al., 2015)

2.6 Knowledge

Knowledge of CPR is acquired by health practitioners through training in programs offered by the AHA, ERC, among other global and regional training and certification organizations. However despite

advanced knowledge and training in CPR skills, decline in competency has been noted to occur after 10 weeks. (Madden, 2006)

A study by Soars, demonstrated CPR knowledge deterioration within a duration spanning three to six months. There was therefore need for recertification by HCPs. (Soar et al., 2010)

HCPs are often trusted to possess the ability to identify and manage cardiac arrest (Chandrasekaran et al., 2010).The training, deployment of CPR teams and employer requirements of prior CPR certification have been shown to result in improvement of patient survival after cardiac arrest. (Kaihula et al., 2018b).

2.7 Compliance to CPR knowledge and skills

A study in Egypt highlighted the disparities in resuscitation care amongst nurses. It also shed light on CPR knowledge and experiences between emergency department nurses' hospital pre and post BLS training. (A. H. Elbaih et al., 2019). The delays in compliance to CPR can result in decline in patient survival from IHCA by up to 9%. (Kaihula et al., 2018b) Most health care providers (HCPs) in Africa will attempt CPR despite possessing inadequate resuscitation skills and knowledge. (Osinaike et al., 2008; Murila, Obimbo and Musoke, 2012). Recertification is recommended every 2 years.

2.8 Duration of Resuscitation Attempt

The length of an attempted CPR is often a matter of clinical judgment, with unique cases, patient co-morbidities and legally binding instructions such DNAR guiding the HCPs providing this care. A patient still in VF/pVT, is a candidate for continued CPR, especially when the identified causes can be reversed. (Soar, Nolan, et al., 2015) A study by Lauridsen et. al., found that less than half of physicians in CPR teams in Denmark had been to an ERC ALS training, with even fewer being aware of what the guidelines say on when to quit resuscitation. (Lauridsen et al., 2017)

2.9 Theoretical framework (Dr Patricia Benner's Novice to Expert Theory)

This is a middle range theory that was first presented by Patricia Benner in 1984.It covers the stages of a nurse's clinical skills from the time they complete their training get certified and licensed to start practice and later upon employment gain skills until they become proficient, expert practitioners. (Benner, 1960; Ulrich, 2011).It has 5 stages that provide a structure for the development of nurses' clinical skills.(Hargreaves and Lane, 2001)

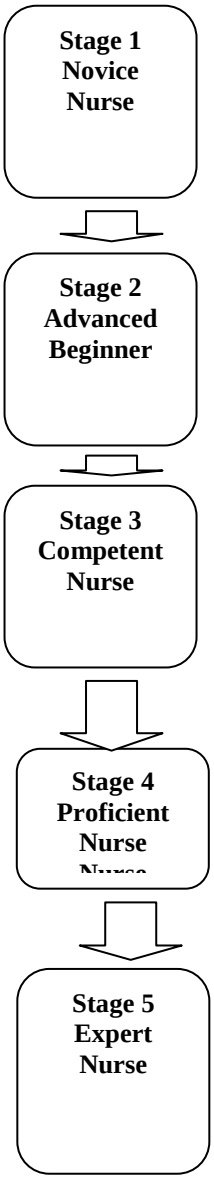

Figure 2.4 Dr. Benner's 5 stages of a Nurse's Clinical Competence

It can be applied to this study as it is a nursing model that describes the stages of clinical competence and proposes that proficient nurses develop nursing competencies through training as well as varied practical experiences.

It looks at how nurses obtain professional competency in a chosen area of specialization, in this case, cardiopulmonary resuscitation.

The model was adapted by Dr. Benner from the Dreyfus Model of Skill Acquisition. (Peña, 2010)The Dreyfus model is based on the belief that learning is experiential, as well as being situation-based. In this model, the learner passes through 5 unique stages in order to be considered proficient. (Benner, 2004; Lyon, 2014)

Nurses involved in emergency care may not have prerequisite recent CPR training and guidelines to use when conducting CPR. However, they are prone to encounter patients who have suffered cardiac arrest and require resuscitation within the A&E dept. Deployment of A&E and ICU trained nurses to the resuscitation rooms in A&E, KNH requires that they be competent in CPR. Similarities were noted between this model and nursing by Dr. Benner, where enhanced compliance hinged on exposure and scientific knowledge and, developing competency was a drawn-out and gradual process. A&E nurses involved in managing various cardiac arrest situations over a period of time, develop "skills of involvement" with patients, fellow caregivers and the next of kin. The model is also relevant to several related professions beyond clinical nursing and, an understanding of its five stages of clinical competence will enable A&E nurses to function better as members of resuscitation teams and recognize that proficiency in CPR compliance is a process acquired over time.

These stages include:

Novice: The nursing student in his or her first year of nursing education; they are limited and rigid in behavior in the clinical area. They may not anticipate what might happen in particular cardiac arrest

scenarios. The ability to note deterioration in signs and symptoms, such as a change in the patient's breathing pattern, severe chest pain of sudden onset is recognizable after the student nurse has encountered several patients presenting in similar ways.

Advanced Beginner: These are graduate nurses in their first job placement in the A&E dept.; they have had more encounters that equip them to identify frequent, relevant components of a cardiac arrest. They have the cognitive appreciation of different cardiac arrest situations without adequate in- depth resuscitation experience.

Competent: There is a lack of the fleet-footedness and dexterity of proficient A&E nurses. However, they have some mastery of varying cardiac arrest situations and can depend on prior planning and organizational skills. These nurses can promptly and accurately, pick patterns and nature of clinical cardiac arrest situations.

Proficient: Here the A&E nurses are able to fully appreciate whole situations with probable anticipated outcomes. They have learnt experientially what events typically occur and are thus able to modify plans as patient situations change such as a shift from labored breathing to an arrest rhythm and return to spontaneous circulation upon initiation of the relevant CPR measures such as defibrillation for VF, pulse less VT and chest compression with assisted ventilation for other arrest rhythms.

Expert: These nurses are able to identify needs and resources in situations and meet their goals. They are adaptable without relying solely on instructions in managing different patient cardiac arrest situations. They have an almost vicarious grasp of the situation due to their vast know-how and experience. Their attention is on the most pressing patient care needs. They use analysis tools when they are new to an event, or when there are unanticipated twists such as a change from a patient having a detectable pulse to an arrest rhythm and back to ROSC.

These theory levels represent movement from past, abstract concepts to past, concrete experiences. Each preceding level builds from the prior one and previously abstract principles are enlarged by experience, as the A&E nurse gains the requisite clinical cardiopulmonary resuscitation experience. The nurse providing the most appropriate CPR care is thus regarded as an expert nurse.

Strengths of the Theory

One of the greatest strengths of Benner's theory is that it focuses on the behavior of nurses depending on their level of understanding with nursing novice, advanced beginner, competent, proficient, expert. Her theory highlights the importance of clinical experience in developing expertise. As observed today, her theory is widely used as it provides a foundation to use for assigning clinical competence. (Upoutheorygrpf2015, 2015)

Novice to Expert theory is relevant to this study in various ways;

i. It forms a basis for understanding how nurses develop professionally and proposes stages for this growth.
ii. Embraces the idea that nurses can develop experientially and through know-how.
iii. Enables the researcher to identify variables to be studied.

Limitations of this theory in this study.

The use of Dr. Benner's theory in this study is wrought with challenges which include;

i. The 5 steps described in her theory are ill defined in the literature, notwithstanding the paucity of evidence from nursing in support of their existence which is weak.
ii. The modality used to categorize nurses into stages (based on years of experience and supervisors' judgments') are not reliable and may not always correlate with expertise.

iii. Establishing the reality of stages is a difficult, requiring a wealth of quantitative data, which are unavailable.

iv. The status of these stages is undefined. Evidence available has demonstrated that individuals, who are proficient in an area, may be less able to perform as well in another sub-field within that domain.

CHAPTER THREE: METHODOLOGY

3.1 Study Design

A descriptive, cross-sectional study design was used and, quantitative data collected for one month using questionnaires, observation checklists**.**

3.2 Study Site

This study was conducted in A&E, KNH where CPR is commonly performed on patients who suffer cardiac arrest while in the unit. The hospital has a bed capacity of 1800-beds but often holds up to 3000 in-patients spanning Kenya's different regions. CPR is performed in the units' 2 resuscitation rooms that have a total capacity of 11 beds. These rooms are staffed with qualified A&E and Critical Care trained nurses. Medical officers and senior house officers in different specialties also attend to patients admitted in these rooms.

The A&E, attends to those with medical, surgical, trauma and gynecological emergencies. Patients are seen within various consultation rooms for different specialties. This includes children over the age of twelve and, those with burn or traumatic injuries age 12 or younger. The dept. sees an estimated 2400 patients every month. About half of these patients are admitted to the wards for further diagnosis and treatment for various conditions that had them referred. The mortality from those who succumb while undergoing treatment within the department forms about 2.5 % of the total no. of patients who pass through the A&E is a great source of concern. It is the focus of cardiopulmonary resuscitation and of this study. (Source: Health Information Records, A&E, KNH). Approximately three observed cardiac arrests occur in a day within the dept. and will require cardiopulmonary resuscitation. (Fredrick Ndiawo, Assistant Chief Nurse, A&E, KNH; Personal Information).

3.3 Study Population

This comprised HCPs stationed at A&E, KNH. The department is staffed by nurses who are 118, 24 of whom report for every shift. The doctors also referred to as MO's are 47. 6 of them report for every shift, making a total of 18 for a 24-hour shift and nurses. These MOs are senior house officers who could have worked in the unit for unspecified periods and may possess other qualifications. These include ACLS, ATLS, ALSO, PALS, ETAT. A&E nurses have undergone emergency nursing training at KNH, SON and been certified and licensed to practice, at the end of a year of training by the Nursing Council of Kenya.

3.4 Study Eligibility

3.4.1 Inclusion criteria

i. Health Care Practitioners who voluntarily consented to take part in the study
ii. Health Care Practitioners who had been trained in AHA cardiac resuscitation guidelines
iii. Health Care Practitioners stationed in A&E resuscitation rooms during the duration of the study.
iv. HCPs who had worked in the A&E for more than 6 months.

3.4.2 Exclusion criteria

i. Health Care Practitioners who were on leave or off duty during the study period.
ii. Nursing, medical and EMT students.

3.5 Sampling size calculation

3.5.1 Sample Size Determination

To obtain a representative sample size Fisher's formula was utilized (Fisher's e

al., 1998).

$$n=Z^2P(1-P)/\underline{d^2}$$

In this case:

n = Sample size [for population >10,000]

Z =Area under the normal curve representing 95% of the population/Confidence level is 1.96.

P = The population estimated to have a characteristic of interest.

Q = Part of population without characteristic of interest.

d^2= Tolerable margin of error; was at 5%

The percentage of HCP who carried out cardiopulmonary resuscitation in the department during IHCA was unknown hence 50% of the population was included:

$$\mathbf{n=Z^2P(1-P)/\ d^2}$$

n = I.96×1.96 [0.5] [0.5]/ [0.05][0.05]

= 384.16

Since the proportion of HCP who carry out cardiopulmonary resuscitation in the department during IHCA is less than 10,000, Yamane's Formula was used to adjust this;

$$\boldsymbol{nf = 1 + n/N}$$

In this formula**:**

nf = the study sample size for a population under study fewer than 10,000

n = a study sample size when the total population is more than10,000

N = the calculated sample size.

$$\mathbf{=384/\ 1+384/}196$$

= 129.73

~130

3.5.2 Sampling frame

Table3. 1 Sampling Frame for the A&E HCP study population

Cadre of healthcare workers	Total number	Sample size (n/196)×130)
Doctors	34	23
Nurses	162	107
Total	196	130

The sampling frame included HCP i.e. doctors, nurses, who consented to participate and were eligible to participate in this study.

3.5.3 Sampling technique

Through simple random sampling each of the participants picked papers with a list of numbers, labeled yes or no. Health Care Practitioners had been informed about the study before being enrolled to participate.

3.6 Research Tools

3.6.1 Checklist

To collect data a structured modified observation checklist on compliance to cardiopulmonary resuscitation guidelines with the following sections was used. It had the following sections;

i. Compliance to BLS and ACLS guidelines
ii. Adult chest compressions
iii. Adult assisted breathes
iv. Administration of shock
v. Cardiac arrest rhythm management
vi. Post cardiac arrest care

The researcher was an inactive participant during the period of data collection. Observation of the Health Care Practitioners was done as they performed cardiopulmonary resuscitation

during day, afternoon and night shifts. The team on day shift was on day duty at least twice before they reported for night duty, this applied for the team on night duty as well, before they went off from work for at least three days. The resuscitation team comprised both nurses and doctors. The observation was done twice weekly for two weeks, the researcher targeted 35 healthcare practitioners on each of the occasions.

3.6.2 Questionnaire

An interviewer-administered, semi-structured questionnaire was used for data collection. The questionnaires had sections namely: socio-demographic data; the level training of Health Care Practitioners in cardiopulmonary resuscitation; use of AHA guidelines for cardiopulmonary resuscitation.

3.7 Reliability and validity

3.7.1 Pretesting of Research Instruments

Pretesting of 10% of the questionnaire and observation checklist was carried out at Mbagathi Level five hospital's Accident and Emergency department. It neighbors KNH, and may have patients who seek similar services to those referred to KNH and who will require cardiopulmonary resuscitation when they suffer cardiac arrest.

The recommended number of participants is 10% of sample size (130), which was 13. Therefore, 13 Health Care Practitioners participated in the pre-testing exercise.

The findings were utilized to adjust the data collection tool to make it more reliable.

3.8 Data Collection and Storage

A research assistant was recruited and training done on the purpose of the research and the tools used for collecting data. This research assistant was a Bachelor of Science in nursing student on who was available for the entire period of data collection. All administered questionnaires were collected and stored in cabinets only accessible to the researcher. 10 questionnaires were administered during each of the shifts and collected as soon as they had been filled by the HCPs in the resuscitation team. No authorized persons were allowed to access the data. Observation of cardiopulmonary resuscitation teams performing CPR was done in the resuscitation rooms by the principal researcher during the morning, afternoon and night shifts on Monday and on Friday of the first week, then Tuesday and Friday of the following week as this was the time when there was an expected increase in the number of patients being referred to the dept. from lower level facilities or who had spilt over from the previous day's patient traffic.

3.9 Data analysis and presentation

Quantitative data obtained was analyzed. Demographic data was analyzed based on the type of data. Data from researcher-administered questionnaire were computed, coded and analyzed using Statistical Package for Social Sciences (SPSS) computer package version 25.0.A P-value of equal/less than 0.05 was considered significant. This information was presented in form of pie charts and bar graphs and histograms. Data cleaning and sorting was done before entry to ensure questionnaires were properly filled without gaps and that there were no gaps in the observation checklist.

Data from observational checklist was presented inform of percentages of the number of 'present' and 'absent' observation and both compared in the A&E. This was summarized in the

form of counts and percentages, while continuous data was summarized using mean (SD) and median (IQR). They were compared with data obtained from the questionnaire.

Descriptive statistics derived from SPSS e.g. mean, median and mode were used for data presentation.

Thematic analysis was done where data was be categorized, coded and organized into various emerging themes as per the study objective.

Compliance to BLS and ACLS principles among HCPs during cardiac arrest at A&E, KNH was assessed descriptively with focus on specific aspects that had been included in the study. The analysis was done using frequencies and percentages and presented in a table.

3.10 Ethical Consideration

Ethical approval was sought from KNH-UON ERC to conduct the study. After approval the researcher sought permission from KNH, A&E administration to carry out the study. Explanation to the study subjects on the purpose and the benefits of the study was done; confidentiality of their information and volunteerism was carried out in addition to obtaining an informed consent from the study subjects. Participants were not coerced in any way. Those who declined to participate did not suffer any negative consequences.

3.11 Study Limitation

Majority of the cardiac arrest events occur in the resuscitation room setting, where providers are arguably more experienced in cardiac arrest care than those on most areas within the A&E or wards where cardiac arrest may occur. The researcher and staff at the study hospital have focused for a number of years on improving hospital-wide cardiac arrest care through education and quality improvement activities.

Taking these points into consideration, this study likely underestimates the prevalence of cardiac arrest and resuscitation attempts compared to other settings of CPR performance.

A myriad of patient and resuscitation quality factors influence cardiac arrest outcome, and therefore generalization of study findings may require a much larger cohort. Further work is required in these noted areas to provide relevant data to help improve the quality of resuscitation care.

3.12 Study Assumptions

i. The Health Care Practitioners had been trained on CPR guidelines.
ii. The Health Care Practitioners complied to their knowledge of cardio-pulmonary resuscitation guidelines to carry out adult resuscitation in in-hospital cardiac arrest.

CHAPTER FOUR: RESULTS

4.1 Introduction

This study section gives an analysis and study findings on the data collected in relation to the research objectives. The purpose of the study was to assess the knowledge and compliance to cardiopulmonary resuscitation guidelines during cardiac arrest among healthcare practitioner's at A&E, KNH. This chapter focuses on the findings of the study and highlights key areas such as response rate, demographic characteristics of the respondents, knowledge of CPR guidelines and the test statistics. A total of 129 questionnaires were administered with a return rate of 92.3% (n=119). Data collected was coded and entered into SPSS Version 25 for analysis. Simple descriptive and inferential statistics were performed and the results presented in tables.

4.1.1 Response Rate

The study response rate was as follows:

Table 4. 1 Response rate

Response		**Frequency (n)**	**Percent (%)**
Returned questionnaires		119	92.3
	Nurses	66	51.2
	Doctors	39	30.2
	Not specified	14	10.9
Unreturned questionnaires		10	7.7
Total		**129**	**100**

As shown in table 4.1, a total of 129 research questionnaires were distributed to the health care workers at the Accident & Emergency unit, KNH.119 questionnaires were filled and returned. The returned questionnaires accounted for 92.3% response rate that was adequate for analysis.

4.2 Respondents demographic

The study sought to determine demographic characteristics of the respondents as they were considered categorical variables that provide some basic insights about the study participants. The characteristics considered in the study were: Age, education level, AHA Certification

training on A&E or critical care and time passed since last certification. Descriptive characteristics of the study participants are discussed below.

4.2.1 Age

The study sought to determine the age of the respondents.

The study findings revealed that a third (37.3%, n=41) of the respondents were between the age of 18 – 29 years, 30% (n=33) were between 40 – 49 Years as shown in figure 4.1.

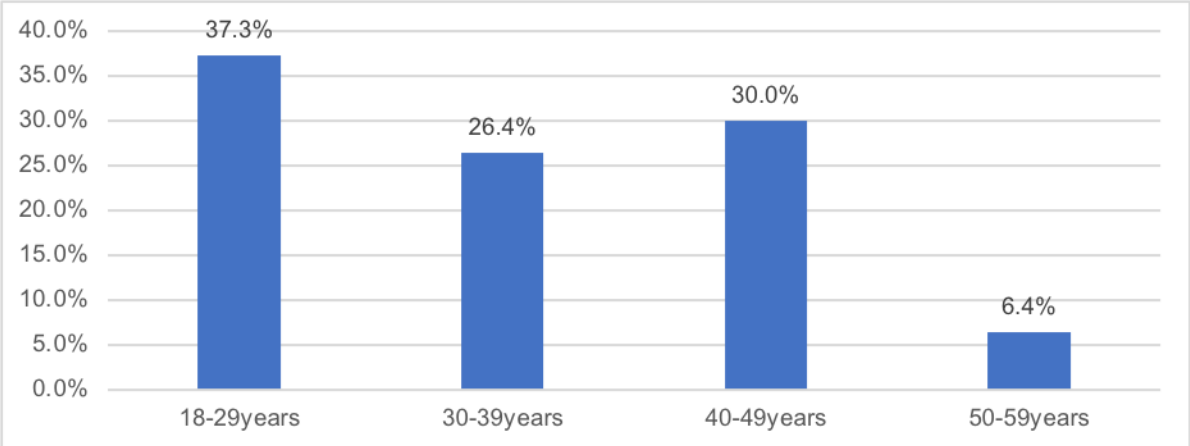

Figure 4.1 Age in Years

4.2.2 Qualification level

The study sought to find out the highest professional qualification of the respondents.

Table 4. 2 Highest Qualification

Qualification	Frequency	Percent
Diploma	30	27.8
Higher National Diploma	29	26.9
Graduate	40	37
Master's Degree	9	8.3
Total	**108**	**100**

According to the study findings shown in Table 4.2, about a third (37%, n= 40) of the respondents revealed that they had a graduate degree as the highest qualification level of the education. 27.8% (n=30) and 26.9% (n=29) of the respondents had attained a Diploma and a

higher Diploma respectively as their highest level of education. 8.3%, n=9 of the respondents had a master's degree. This shows that majority of the respondents were well educated to participate and give reliable information sought for this study.

4.2.3 AHA Certification

The study sought to determine whether the respondents were AHA certified.

Figure 4.2 below shows that majority (77%, n=72) were certified while only 23%, n= 21 were not. One nurse was certified in TECC, ACLS, ATLS, BLS.

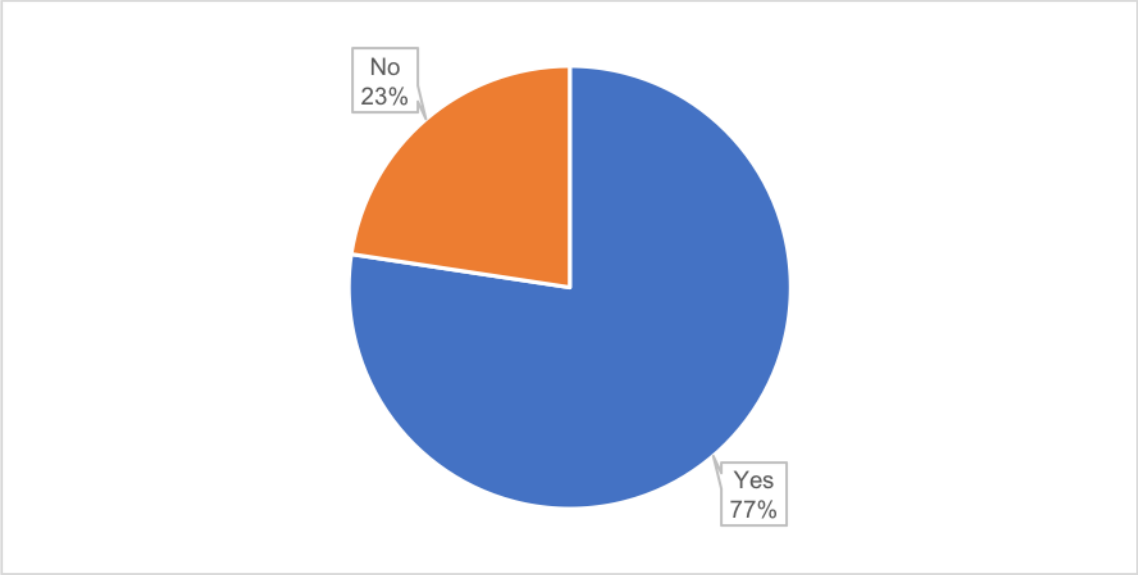

Figure 4.2 AHA Certification

4.2.4 A&E or Critical Care trained

The study sought to determine whether the respondents were trained A&E or Critical Care nurses or Medical officers.

Figure 4.3 below shows that about 2/3 (62.9%, n=66) were either A&E or critical care trained nurses and medical officers while a third (37.1%, n= 39) were not.

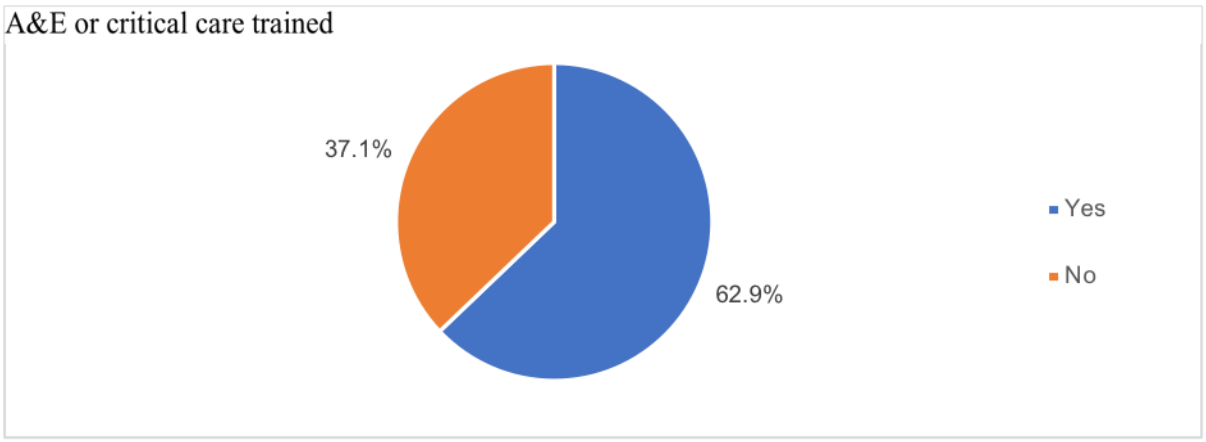

Figure 4.3 A&E or critical care trained

4.2.5 Time passed since last certification

Table 4. 3 Time passed since last certification

Time	Frequency	Percent
Less than 2 years	54	50
More than 2 years	46	42.6
Not specified	8	7.4
Total	**108**	**100**

Table 4.3 shows respondent time passed since last certification. Out of the 108 respondents, 50% (n=54) had been certified within the last 2 years as required, while 42.6%, n=46 had been certified more than 2 years ago.7.4%(n=8) did not specify the duration since last certification.

4.3 Knowledge of cardiopulmonary resuscitation guidelines

4.3.1 Knowledge of Basic Life Support

Table 4. 4 Statements on knowledge on Basic Life Support

Statement on knowledge	True/False	Correct answer n (%)	Wrong answer n (%)	Statistical test X^2 (P Value)
How would you identify an adult patient requiring basic life support	True	91 (76.5)	28(23.5)	0.96(0.619)
What would your initial action be when you encounter a patient who has just collapsed	True	68(57.1)	51(42.9)	5.59(0.018)
How would you manage a collapsed patient's airway?	True	86(72.3)	33(27.7)	9.51(0.009)
How would you estimate the size of an oropharyngeal airway to be used for an adult patient?	True	85(71.4)	34(28.6)	4.30(0.116)
The ratio for two rescuers giving chest compressions to assisted breaths during CPR is:	True	90(75.6)	29(24.4)	11.67(0.003)
For what duration would Health Care Practitioners be required to give assisted breaths/ventilation?	True	26(21.8)	93(78.2)	13.24(0.001)
What is the depth of the chest compressions that you will give to a collapsed patient with no pulse?	True	20(16.8)	99(83.4)	3.88(0.143)
What is the rate at which you will perform effective chest compressions	True	85(71.4)	34(28.6)	37.44(0.000)
How often is the team performing CPR required to change roles or check for presence of a pulse on the patient?	True	55(46.2)	64(53.8)	21.18(0.000)

**P-Value<0.05 statistically significant

Knowledge of Health care practitioner on basic life support which is described in Table 4.4 above shows that the most known practice with 76.5% was identification of an adult patient requiring basic life support. This was reported to be statistically insignificant (X^2=0.96, P=0.619). The next best practice was 75.6%, the ratio for two rescuers giving chest compressions to assisted breaths during CPR which was statistically significant (X^2=11.67, P=0.003). Management of a collapsed patient's airway had a score of 72.3% which was reported to be statistically significant (X^2=9.51, P=0.009). Estimation of the size of an oropharyngeal airway to be used for an adult patient and the rate at which one would perform effective chest compressions had scores of 71.4% each. The former was reported to be statistically insignificant with (X^2=4.30, P=0.116) whereas the latter was statistically significant with (X^2=37.44, P=0.000). Initial action taken when one encounters a patient who has just collapsed had a score of 57.1% and was statistically insignificant with (X^2=5.59, P=0.018). On lower end was the frequency in change of roles or checking for presence of a pulse on the patient by the team

performing CPR which was scored at 46.2% and was statistically significant with (X^2=21.18,P=0.000).The duration required for Health Care Practitioners to give assisted breaths/ventilation had a score of 21.8 % and was reported to be statistically significant with (X^2=13.64,P=0.001). The depth of the chest compressions performed on a collapsed patient with no pulse was the least scored at 16.8% which was the most frequent wrong answer and was reported to be statistically insignificant with (X^2=3.88, P=0.143).

4.3.2 Knowledge of Advanced Cardiac Life Support

Table 4. 5 Statements on knowledge on Advanced Cardiac Life Support

Statement	Correct answer n (%)	Wrong answer n (%)	Statistical test Statistical test X^2 (P Value)
The team transitioning to advanced airway management during cardiac arrest will intubate a patient with a Glasgow Coma Scale score of:	105(88.2)	14(11.8)	6.138(0.046)
The size of endotracheal tube used during adult intubation is	101(84.9)	18(15.4)	11.61(0.003)
In shockable arrest rhythms defibrillation in the male adult is commenced with this dose of energy	83(69.7)	36(30.3)	18.72(0.000)
The emergency drug used for cardiopulmonary resuscitation for shockable cardiac arrest rhythms is:	102(85.7)	17(14.3)	8.604(0.014)
In VF/pulseless VT management the resuscitation drug is given after	39(32.8)	80(67.2)	12.27(0.002)
In the management of a patient with an asystole rhythm:	95(79.8)	24(21.2)	9.81(0.007)

**P-Value<0.05 statistically significant

Knowledge of nurses on knowledge on advanced cardiac life support which is described on table 4.5 shows the most known and correct items and all were statistically significant in terms of compliance. The Glasgow Coma Scale score required by the team transitioning to advanced airway management during cardiac arrest and subsequent intubation on the patient had a score of 88.2% (X^2=6.138, P=0.046). The next item with a score of 85.7%, (X^2=8.604, P=0.014) was the emergency drug used for cardiopulmonary resuscitation for shockable cardiac arrest rhythms. “Knowledge of the correct size of endotracheal tube used during adult intubation had a score of 84.9% (X^2=11.61, P=0.003). Both management of a patient with an asystole rhythm had scores that were statistically significant of 79.8% (X^2=9.81, P=0.007) as well as dose of energy commenced for shockable arrest rhythms defibrillation on a male adult which had a score of

69.7% (X^2=18.72, P=0.000). On the lower end, was the duration after which the resuscitation drug is administered in VF/pulseless VT management which was the least scored correct at 32.8% and was the most frequent wrong answer with 67.2% (X^2=12.27, P=0.002) and was statistically significant.

4.3.3 Post cardiac arrest care

The study sought to determine whether the respondents were knowledgeable on the targeted body temperature management post arrest which showed that more than 2/3 (71.3%, n=77) were aware that the targeted body temperature was between 32-36^{0}c, whereas about a 1/3 (28.7%, n=42) of the respondents were wrong in their response as shown in Figure 4.4

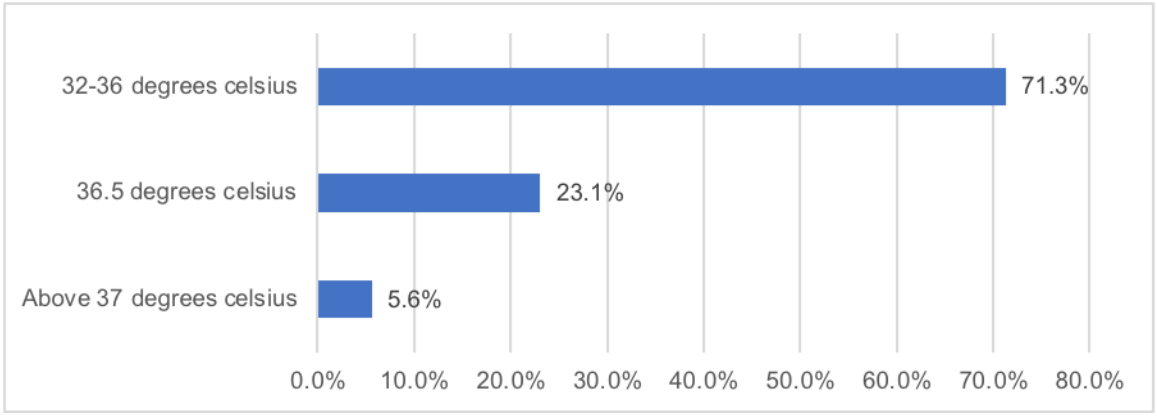

Figure 4.4 Targeted temperature

4.4 Compliance to Cardiopulmonary Resuscitation guidelines by Healthcare Practitioners during a Cardiac arrest

Table4. 6 Compliance to CPR guidelines

Compliance to BLS and ACLS guidelines practices	**Yes n (%)**	**No n (%)**
Checks for patients' responsiveness	41(95.3)	2(4.7)
Shouts for help/Activates emergency response system sends for defibrillator	41(100.0)	0
Checks for patient breathing	42 (100.0)	0
Checks for patient pulse	42 (100.0)	0
Compliance to BLS and ACLS guidelines level	**98.3%**	
Adult Chest Compressions practices		
Maintains recommended chest compression depth	34 (82.9)	7(17.1)
Maintains recommended rate for chest compression	36 (87.8)	5(12.2)
Adult Chest Compressions level	**85.4%**	
Adult Assisted Breathes practices		
Each breath given over 1 second	28 (80.0)	7(20.0)
Visible chest rises with each breath	40 (100.0)	0
Resumes compressions in less than 10 seconds	29 (96.7)	1(3.3)
Compressions	6(15.8)	32(84.2)
Adult Assisted Breathes level	**73.1%**	

Administration of Shock practices		
Compliance to BLS and ACLS guidelines practices	**Yes n (%)**	**No n (%)**
Power Defibrillator	32(80.0)	8(20.0)
Correctly attaches pads	32(82.1)	7(17.9)
Sets the correct energy level for defibrillation	32(82.1)	7(17.9)
Team clears patient for analysis and safely delivers shock	31(81.6)	7(18.4)
The team resumes Compressions	33(86.8)	5(13.2)
Team ensures compressions are resumed immediately after shock delivery	34(87.2)	5(12.8)
Administration of Shock level	**83.3%**	

Cardiac Arrest Rhythm Management practices		
Compliance to BLS and ACLS guidelines practices	**Yes n (%)**	**No n (%)**
Initial rhythm at commence of resuscitation a. Ventricular fibrillation/pulseless Ventricular tachycardia	31(83.8)	6(16.2)
b. Pulseless electrical activity	29(85.3)	5(14.7)
c. Asystole	27(75.0)	9(25.0)
Cardiac Arrest Rhythm Management level	**81.4%**	
Team VF/pVT Management practices		
Team recognizes VF/pVT	31(81.6)	7(18.4)
Team clears away from patient before analysis and delivery of shock	29(74.4)	10(25.6)
Team immediately resumes CPR after-shocks	30(78.9)	8(21.1)
Team correctly identifies need for advanced airway management	37(94.9)	2(5.1)
Team correctly administers adrenaline in correct doses	30(76.9)	9(23.1)
Team VF/pVT Management level	**81.3%**	

Asystole Management practices		
Compliance to BLS and ACLS guidelines practices	**Yes n (%)**	**No n (%)**
Team recognizes asystole	33(84.6)	6(15.4)
Team verbalizes potential reversible causes of asystole (H's&T's)	33(86.8)	5(13.2)
Team administers appropriate drugs and doses	31(79.5)	8(20.5)
Team immediately resumes CPR after rhythm checks	32(82.1)	7(17.9)
Asystole Management level	**83.3%**	

Post Cardiac Arrest Care practices		
Compliance to BLS and ACLS guidelines practices	**Yes n (%)**	**No n (%)**
Team correctly identifies return of spontaneous circulation	38(95.0)	2(5.0)
Team checks blood pressure	38(95.0)	2(5.0)
Team monitors O2 saturation	38(95.0)	2(5.0)
Team performs a 12 lead Electrocardiogram assessment on the patient	38(95.0)	2(5.0)
Team performs a waveform capnography assessment on the patient	30(76.9)	9(23.1)
Team draws blood samples and send them for laboratory tests	33(82.5)	7(17.5)
Team considers targeted temperature management	31(77.5)	9(22.5)
Post Cardiac Arrest Care level	**88.1%**	
Overall Compliance Level	**84.54%**	

Table 4.6 shows that BLS and ACLS guidelines practices had the highest compliance level with 98.3%, followed by Post Cardiac Arrest Care practices with 88.1, Adult Chest Compressions practices with 85.4%, Administration of Shock practices and Asystole Management practices

with 83.3% each, Cardiac Arrest Rhythm Management practices with 81.4% compliance, Team VF/pVT Management practices with 81.3% compliance and Adult Assisted Breathes practices with the least compliance of 73.1%.

4.5 Logistic regression test on predictors of ECG knowledge

Logistic regression model was used to determine the predictors of knowledge and compliance to CPR guidelines. In this model, Knowledge of basic life support and of Advanced cardiac life support were used as the independent variables. Table 4.7 shows logistic regression.

Table 4. 7 Logistic regression

Variable	B	S.E.	Wald	df	Sig.	Exp(B)
Knowledge of basic life support	1.114	0.246	20.540	1	.000	3.045
Knowledge of Advanced cardiac life support	1.112	0.231	23.256	1	.000	3.040

The table shows that knowledge of basic life support and of Advanced cardiac life support are significant predictors of knowledge and compliance to CPR. Consequently, the null hypothesis was rejected, as there is an association between healthcare practitioner's knowledge and compliance to CPR guidelines during cardiac arrest at A&E, KNH

4.6 Multiple regression

Table 4. 8 Multiple linear regression

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.812a	0.66	0.582	0.27811
a. Predictors: (Constant), Knowledge of basic life support, Knowledge of Advanced cardiac life support				
b. Dependent variable: Compliance				

Table 4.8 shows that the coefficient of determination that the percentage variation determination in the determination variables is supported by the variation in the independent variable. Findings shows that there exists a strong positive relationship by 0.812. R squares ia 0.66 which implies

that 66% of the determinants of compliance can be accounted for in the model while 34% is other determinants in the model. The adjusted R squared is coefficient of determination which tells us the variation in the dependent variable due to the alterations in the independent variables**.**

CHAPTER FIVE: DISCUSSION

5.1 Introduction

The purpose of the study was to assess the knowledge of and compliance to cardiopulmonary resuscitation guidelines during cardiac arrest among healthcare practitioner's at A&E, KNH. This chapter discusses the findings of the study and highlights key areas such as demographic characteristics of the respondents, knowledge of CPR guidelines and the test statistics.

5.2 Respondents demographic

5.2.1 Age

Of the HCPs who took part in the study, a third comprised personnel of ages 18-29 years with the lowest distribution being of those aged 50-59 years. This is in tandem with the study by (Kaihula et al., 2018b) where the median age of the participants was 35 years. However an earlier study by Gultekin (et al., 2018) had highlighted the need to prioritize education of a younger population in cardiac arrest care. There is need to evaluate why fewer older HCPs were deployed in such areas as they are more experienced, may be more proficient in certain clinical skills as a result of their experience and practice (Ulrich, 2011).

5.2.2 Qualification level

In the study, the respondents possessing a graduate degree were the highest. This concurs with the findings of a study by (Lim et al., 2010) who had noted that success of any cardiopulmonary resuscitation (CPR) technique or device depended on the education and training of the rescuers as well as on resources (including personnel). A study conducted in Tanzania by (Kaihula et al., 2018b) noted that the respondents were not well educated to participate and give reliable information. However, some of the HCPs in the unit who take part in resuscitation may not necessarily have training in these resuscitation practices (Chandrasekaran et al., 2010; Kaihula et

al., 2018b). Compliance for BLS practices and ACLS is at 98.3%, with P value 0.00 for compliance to BLS practices.

5.2.3 AHA Certification

Certification of those performing CPR is currently a requirement for employment and subsequent deployment in A&E, KNH. A majority of those performing CPR had AHA certification. This translated to better resuscitation outcomes as noted in various studies(Pareek *et al.*, 2018; Rajeswaran *et al.*, 2018; Yilmaz and Omurlu, 2019). A study by Saramma (Saramma *et al.*, 2016) highlighted the importance of having personnel who were certified due to their fomal CPR training. However a study conducted in Germany (Siebig, 2009) argued that it was not a requirement for HCPs taking part in resuscitation here, as compared to Anglo-American countries. More studies are necessary to help evaluate the role of certification in providing a highly specialized skill set such as CPR as it influences compliance to both BLS and ACLS with significance levels of 0.00 for both as noted in this study. However, educational preparation and certification were also not correlated with expertise according to a study by Bobay et. al (Bobay, Gentile and Hagle, 2009).This study suggests that nurses may require more on-the-job experience for the development of clinical nursing expertise than what has been reported in the literature. KNH invests a lot of financial resources on its staff who perform life-saving CPR to enable them gain these competencies. It is therefore necessary that further studies are conducted in this area to evaluate the role and value of CPR training.

5.2.4 A&E or Critical Care trained

Majority of the HCPs in this study had received specialized training in, Emergency, Critical are nursing or were medical officers with prior CPR training (62.9%, n=66). This concurs with study findings by (Sodhi, Shrivastava and Singla, 2011; Saramma *et al.*, 2016) where formal certified BLS and ACLS training of healthcare professionals was noted to lead to definitive improvement

in the outcome of CPR. In contrast, a study done in Denmark (Lauridsen et al., 2015) highlighted Physicians to be inexperienced, deficient in competency in the performance of necessary clinical skills during CPR. The large number of HCPs with specialized CPR training, contributed to better integration and practice of complex skills involved in CPR with P value of less than 0.05.

5.2.5 Time passed since last certification

More than a half of all respondents in this study had obtained AHA certification within the last two years. Knowledge of CPR and the necessary competencies, wane with long durations of inactivity (Madden, 2006) and eventually, deteriorate within a duration spanning three to six months (Soar, Callaway, et al., 2015).This contributes to compliance to guidelines P value 0.00 as the more knowledgeable HCPs can take part in effective CPR (Nielsen et al., 2012). Research in what would enhance retention of this knowledge in a high-pressure environment, with resource limitations such as A&E, KNH is necessary.

5.3 Knowledge of cardiopulmonary resuscitation guideline

5.3.1 Knowledge of Basic Life Support

Retention of knowledge of BLS is made better with certification and practice. This has a positive impact on retention of knowledge and skills. (Yang et al., 2012).This is the case in non-LMICs (Siebig et al., 2009) contrary to the situation in this study, where most patients in the A&E are critically or acutely ill requiring possible CPR when their condition deteriorates (Wachira and Tyler, 2015). In this study, there was a variance in the CPR competency among the HCPs who took part in the study. Besides lack of practice, inadequacy of equipment may lead to knowledge decay (Calvello et al., 2013). Further studies need to be done to evaluate the retention of acquired CPR competencies.

5.3.2 Knowledge of Advanced Cardiac Life Support

HCPs in A&E, KNH were found to be knowledgeable in most of ACLS practices and this contributed to skilled resuscitation practice. The unit is the first point of entry for referred

patients who are acutely ill, from medical conditions or surgical emergencies and who will require resuscitation (Wachira and Martin, 2011; Myers et al., 2017). The statistical significance with regards to compliance was of P value 0.00.

5.3.3 Post cardiac arrest care

Targeted temperature management is part of ACLS training (Travers, Rea, Bobrow, Edelson, Berg, Sayre, Berg, Chameides, O'Connor, Swor, et al., 2010), where post arrest the patient's body temperature is maintained at 32-36^{0}c to aid in recovery.. It is taught to HCPs during CPR training and most of the respondents were knowledgeable about the targeted range. However from previous studies this knowledge (Kaihula et al., 2018b) when not backed with adequate resources to enable practice and opportunities (Broccoli et al., 2015) will lead to deterioration of these competencies. The HCPs in A&E, KNH despite their knowledge may never get to practice this on patients achieving ROSC after successful CPR (Heffner et al., 2012), this is due to lack of the infrastructure required to practice this form of care. Their competency in Post Cardiac arrest care will eventually deteriorate. Compliance to CPR guidelines with regards to post cardiac arrest care, was 88.1% with a P value of less than 0.05.

5.4 Compliance to Cardiopulmonary Resuscitation guidelines by Healthcare Practitioners during a Cardiac arrest

Training impacts on HCPs compliance during CPR (Kaihula et al., 2018b) and maybe impacted by various factors as well. Majority of the personnel had correct responses to questions posed in the structured questionnaire, as well as the performance of various BLS, ACLS skills during CPR were in keeping with the resuscitation guidelines. This concurs with a study pre and post BLS training, in Egypt by Elbaih et. al whose results showed the training of HCPs to result in better resuscitation outcomes (A. Elbaih et al., 2019). Compliance of HCPs to CPR guidelines in A&E, KNH was at 84.54% with P values of both compliance to BLS and ACLS guidelines

being 0.00.Copies of the guidelines are posted in large print within the walls of the resuscitation rooms for ease of access and reference and soft copies of the 2020 version of the guidelines are available on computers within the room for convenient access. A majority of the HCPs at the time of the study data collection process, had undergone a 5-day CPR certification training. Compliance to these practices could be as a result of the presence of guidelines which are accessible to the HCPs carrying out resuscitation in the department. (Soar, Nolan, et al., 2015). Unavailability of the equipment with which to carry out bag valve mask ventilation and this hampers retention of this skill.

5.4.1 Logistic regression test on predictors of ECG knowledge

The model was used to determine the predictors of knowledge and compliance to CPR guidelines. In this model, Knowledge of basic life support and Knowledge of Advanced cardiac life support were used as the independent variables. Knowledge of BLS and Knowledge of ACLS were found to be significant predictors of knowledge and compliance to CPR.as they are both statistically significant with P values of 0.00.

5.4.2 Multiple regression

The coefficient of determination demonstrates that the percentage variation in the determination variables is supported by the variation in the independent variable. Findings show that there exists a strong positive relationship by 0.812. R squares i. e 0.66 which implies that 66% of the determinants of compliance can be accounted for in the model while 34% is other determinants in the model. Knowledge of both BLS and ACLS guidelines and their practical use among healthcare practitioners during cardiac arrest amongst other factors determine compliance. This resonates with Kaihula (Kaihula et al., 2018b) in their study in Tanzania who recommended the need for further training of personnel performing cardiac resuscitation in IHCA.

5.5 Conclusion

The results of this study demonstrate that HCPs' current knowledge of CPR guidelines and their continued practice of the gained competencies gained from education, certification training and deployment in adequately equipped areas where they get to practice these skills influences compliance to these guidelines, particularly in a rapidly changing high pressured, resource limited area such as A&E ,KNH.

The study revealed that HCPs performing CPR who were more experienced in CPR knowledge and proficient in resuscitation skills were more likely to comply with guidelines. There is need to evaluate why fewer older HCPs were deployed in such areas as they are more experienced, may be able to pick out deterioration in non-cardiac associated SCA.

The role of training and certification was also highlighted in this study as having an impact on compliance. The HCPs who had undergone recent resuscitation training, were AHA certified or were A&E, Critical Care trained were more likely to comply with these guidelines when carrying out CPR.

This study highlights the role of frequent practice of CPR among the HCPs performing resuscitation on patients with SCA. Practice of CPR as per the guidelines impacts their compliance. The deployment of HCPs where they practice CPR will affect compliance to these guidelines.

This study also establishes the role of the practice of CPR by HCPs in areas that enhance their compliance to these guidelines. Deployment of HCPs to areas where they can monitor and detect deterioration in patient conditions towards SCA, can greatly enhance their compliance to the guidelines as their efforts will be more effective in ameliorating the change in patient status.

Presence of current guidelines in these areas will in turn effectively impact the management of these conditions.

The study noted the role of evaluation of HCP knowledge and skills of CPR which in turn influence compliance to the AHA guidelines.

The study highlighted the role of other factors that may influence compliance to CPR guidelines among HCPs that may not have been its focus. There is need to conduct other studies to pick out infrastructural issues that may impact HCPs compliance to guidelines besides knowledge of the guidelines and HCP utilization of these guidelines during resuscitation.

5.6 Recommendation

From the observations made in this study, it is suggested that further inquiry be conducted to establish the role of factors besides knowledge and utilization of CPR guidelines that affect HCP compliance.

There is a need to establish the role of recognized policy to guide resuscitation certification training, deployment of HCPs possessing this skillset and how this affects compliance among them at the A&E, KNH.

It is further suggested that impact of training and resuscitation practices among HCPs in A&E, KNH be evaluated, so as to enable them be frequently appraised and be kept in tandem with the current worldwide best scientific, evidence-based CPR practices.

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APPENDICES

Appendix 1: PARTICIPANT INFORMATION

STUDY TITLE: ASSESSMENT OF THE KNOWLEDGE AND COMPLIANCE TO CARDIOPULMONARY RESUSCITATION GUIDELINES BY HEALTHCARE PRACTITIONERS' AT THE ACCIDENT &EMERGENCY UNIT, KENYATTA NATIONAL HOSPITAL

Introduction to study and researcher

My name is George Dulo, a student at the University of Nairobi pursuing a master of science in medical surgical nursing degree. I'm conducting a study to assess healthcare practitioners' knowledge and compliance to cardiopulmonary resuscitation guidelines, at A&E, KNH.

I request your participation through completing a questionnaire that will be given to you. You will be required to tick on the most appropriate response to the best of your knowledge especially with regards to cardiopulmonary resuscitation. Your honesty with regards to this process is important. You will also be asked to fill out your data and any challenges experienced during this procedure.

Confidentiality

The information you will provide in this questionnaire will be highly confidential and will not be shared. Do not indicate your name in any of the questionnaires given to ensure that your information remains anonymous. An identification number known only to the researcher will be allocated for accountability of the questionnaires administered**.**

Rights

You have a right to voluntarily participate in this study; however, you may withdraw at any point of the study without any undue consequences. Kindly note that no monetary benefits will be availed for participating in this study.

Benefits and risks of the study

The study will enable the researcher establish the use of cardiopulmonary resuscitation guidelines by the Health Care Practitioners in the A&E. This could be used to inform the departments' administration on the need for further training, recertification and deployment of staff who care for patients who suffer IHCA, and improve the cardiac arrest patient outcomes. The study findings will also be referred to in future research in related studies.

This study does not have any anticipated risks. You may however experience a sense of vulnerability when answering these questions. When this occurs and does affect your responses, kindly get in touch with the researcher on the contacts provided.

Duration of the study

The questionnaire will take you approximately 30 minutes to fill and the researcher will be available to guide you through if need be. The research assistant assigned by the principal investigator will administer the questionnaire. There will be no follow up interviews after filling the questionnaire.

Contact information

For any clarifications concerning this study, feel free to contact George Dulo (principal investigator) on mobile number: 0700 364 537 or the supervisors; Dr Omondi, 0722 728 123 and Dr Kimani, 0722 384 917.

Consent form

This is a declaration that the details of this study have been explained to me and I volunteer to participate. I hereby give my consent to participate by providing the information required.

Participants' signature/ thumb mark _____

Researchers' signature _____

Date _____

Appendix 2: RESEARCH QUESTIONNAIRE

Topic: Assessment of The Knowledge of And Compliance to Cardiopulmonary Resuscitation Guidelines by Healthcare Practitioners' At The Accident &Emergency Unit, Kenyatta National Hospital

Questionnaire number _____

Instructions:

Do not indicate your name on this questionnaire.

This questionnaire consists of different sections. In each section choose the most appropriate response.

SECTION 1: STUDY PARTICIPANT DEMOGRAPHIC FORM

1. Age in years: 18 -29 ☐30-39 ☐ 40- 49☐50-59 ☐ 60 and above ☐
2. Highest Professional Qualification level: Diploma ☐ Higher National Diploma☐

   Undergraduate degree ☐Master's Degree ☐
3. AHA Certified: Yes ☐ No ☐

Other (specify)____

4. Are you an Accident and Emergency or Critical Care Trained Nurse?

   Yes ☐ No ☐
5. Time passed since last certification:

   a. less than 2 years ☐

   b. more than 2 years ☐

Others specify…….

SECTION 2: KNOWLEDGE OF CARDIOPULMONARY RESUSCITATION GUIDELINES

SECTION 2 A: KNOWLEDGE OF BASIC LIFE SUPPORT

6. How would you identify an adult patient requiring basic life support?
    a) One who has collapsed and is unresponsive
    b) The patient with labored breathing
    c) A patient with a weak, thready pulse on palpation
7. What would your initial action be when you encounter a patient who has just collapsed?
    a) Activate emergency response
    b) Start CPR
    c) Get defibrillator
8. How would you manage a collapsed patient's airway?
    a) Placing the patients head in a head tilt chin lift position
    b) Placing the patients head in a lateral position to avoid aspiration
    c) Placing the patients head in a neutral position to avoid aspiration
9. How would you estimate the size of an oropharyngeal airway to be used for an adult patient?
    a) Using the distance from the corner of the mouth to the edge of the mandible.
    b) Using the distance from the tip of the incisors in the mouth to the edge of the mandible.
    c) Using the distance from the incisors in the mouth to the edge of the mandible
10. The ratio for two rescuers giving chest compressions to assisted breaths during CPR is:
    a) 15:2

b) 30:2

c) 15:1

11. For what duration would Health Care Practitioners be required to give assisted breaths/ventilation?

    a) 3 minutes

    b) 2 minutes

    c) 1 minute

12. What is the depth of the chest compressions that you will give to a collapsed patient with no pulse?

    a) 1 ½ inches of the antero-posterior diameter of the chest

    b) 2 inches of the antero-posterior diameter of the chest

    c) 2 ½ inches of the antero-posterior diameter of the chest

13. What is the rate at which you will perform effective chest compressions?

    a) 60-100 chest compressions per minute

    b) 80-100 chest compressions per minute

    c) 100-120 chest compressions per minute

14. How often is the team performing CPR required to change roles or check for presence of a pulse on the patient?

    a) At the end of 2 cycles

    b) At the end of 3 cycles

    c) After rechecking the patient's rhythm

SECTION 2 B: KNOWLEDGE OF ADVANCED CARDIAC LIFE SUPPORT

15. The team transitioning to advanced airway management during cardiac arrest will intubate a patient with a Glasgow Coma Scale score of:

    a) Less than 8

    b) More than 8

    c) With an adequate cough reflex

16. The size of endotracheal tube used during adult intubation is

    a) 3-4

    b) 2-3

    c) 6-8

17. In shockable arrest rhythms defibrillation in the male adult is commenced with this dose of energy

    a) 200j

    b) 300j

    c) 2j-4j/kg

18. The emergency drug used for cardiopulmonary resuscitation for shockable cardiac arrest rhythms is:

    a) Adrenaline

    b) Atropine

    c) Sodium bicarbonate

19. In VF/pulseless VT management the resuscitation drug is given after

    a) 2 cycles

    b) 3 cycles

c) 3-5 minutes

20. In the management of a patient with an asystole rhythm:

a) Defibrillation is performed using the highest amount of energy available

b) Defibrillation is performed using the lowest amount of energy available

c) Chest compression and bag valve mask ventilation is continued

POST CARDIAC ARREST CARE

21. Targeted temperature management maintains the patient's body temperature at:

a) Above 37^0c

b) 36.5^0c

c) $32\text{-}36^0$c

Appendix 3: OBSERVATION CHECKLIST

COMPLIANCE TO CARDIOPULMONARY RESUSCITATION GUIDELINES BY HEALTHCARE PRACTITIONERS

COMPLIANCE TO BLS AND ACLS GUIDELINES

1. Checks for patient responsiveness

Yes☐ No☐

Others specify…….

2. Shouts for help/Activates emergency response system sends for defibrillator

Yes☐ No☐

Others specify…….

3. Checks for patient breathing

Yes ☐ No☐

Others specify…….

4. Checks for patient pulse

Yes ☐ No ☐

Others specify…….

ADULT CHEST COMPRESSIONS

Cycle 1 of CPR

5. Maintains the recommended chest compression depth

Yes ☐ No ☐

Others specify…….

6. Maintains the recommended rate for chest compression

Yes ☐ No ☐

Others specify…….

ADULT ASSISTED BREATHES

7. Each breath given over 1 second Yes ☐ No ☐

8. Visible chest rise with each breath Yes ☐ No ☐

9. Resumes compressions in less than 10seconds Yes ☐ No ☐

Others specify…….

Cycle 2 of CPR

10. Repeats steps in cycle 1

Compressions☐ Breaths☐ Resumes compressions in less than 10 seconds:

Yes ☐ No ☐

Others specify…….

ADMINISTRATION OF SHOCK

11. Power Defibrillator☐

Yes ☐ No ☐

Others specify…….

12. Correctly attaches pads

Yes ☐ No ☐

Others specify…….

13. Sets the correct energy level for defibrillation

Yes ☐ No ☐

Others specify…….

14. The team clears patient for analysis and safely delivers shock

Yes ☐ No ☐

Others specify…….

15. The team resumes Compressions

Yes ☐ No ☐

16. The team ensures compressions are resumed immediately after shock delivery

Yes ☐ No ☐

CARDIAC ARREST RHYTHM MANAGEMENT

17. Initial rhythm at commence of resuscitation

a. Ventricular fibrillation/ pulseless Ventricular tachycardia Yes ☐ No ☐

b. Pulseless electrical activity Yes ☐ No ☐

c. Asystole Yes ☐ No ☐

Team VF/pVT MANAGEMENT

18. The team recognizes VF/ pVT Yes ☐ No ☐

19. The team clears away from patient before analysis and delivery of shock Yes ☐ No ☐

20. The team immediately resumes CPR after-shocks Yes ☐ No ☐

21. The team correctly identifies need for advanced airway management Yes ☐ No ☐

22. The team correctly administers adrenaline in correct doses? Yes ☐ No ☐

ASYSTOLE MANAGEMENT

23. The team recognizes asystole Yes ☐ No ☐

24. The team verbalizes potential reversible causes of asystole (H's &T's) Yes ☐ No ☐

25. The team administers appropriate drug(s) and doses Yes ☐ No ☐

26. The team immediately resumes CPR after rhythm checks Yes ☐ No ☐

POST CARDIAC ARREST CARE

27. The team correctly identifies Return of Spontaneous Circulation Yes ☐ No ☐

28. The team checks Blood Pressure Yes ☐ No ☐

29. The team monitors O2 saturation Yes ☐ No ☐

30. The team performs a 12 lead Electrocardiogram assessment on the patient, Yes ☐ No ☐

31. The team performs a waveform capnography assessment on the patient Yes ☐ No ☐

32. The team draws blood samples and sends them for laboratory tests Yes ☐ No ☐

33. The team considers targeted temperature management. Yes ☐ No ☐