COLLEGE OF HEALTH SCIENCE SCHOOL OF NURSING AND MIDWIFERY NURSING

ELECTROCARDIOGRAPHY INTERPRETATION COMPETENCY AND ASSOCIATED FACTORS AMONG NURSES WORKING IN CARDIAC CENTERS OF SELECTED PUBLIC HOSPITALS IN ADDIS ABEBA ETHIOPIA

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A RESEARCH THESIS SUBMITTED TO ADDIS ABEBA UNIVERSITY COLLEGE OF HEALTH SCIENCE SCHOOL OF NURSING AND MIDWIFERY FOR A PARTIAL FULFILMENT OF THE REQUIREMENTS FOR MASTER OF SCIENCE OF DEGREE IN CARDIOVASCULAR NURSING.

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MASTER OF SCIENCE RESEARCH REPORT SUBMISSION FORM.

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Contents

DECLARATION

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ACRONYMS/ABBREVIATIONS

ACC/AHA - American College of Cardiology/American Heart Association

ACS - Acute Coronary Syndrome

AF - Atrial Flutter

AOD-Adjusted Odd Ratio

CAD - Coronary Artery Disease

CPR – Cardiopulmonary Resuscitation

ECC – Emergency Cardiovascular Care.

ECG **–** Electrocardiography

ED - Emergency Department

EMS - Emergency Medical Staff.

ESC - European Society Cardiology

MOHME – Ministry of Health and Medical Education

OPD – Out Patient Department

SPH-Saint Peter Hospital

SPSS-Statistical Package for the Social Science

TASH – Tikur Anbessa Specialized Hospital

VT - Ventricular Tachycardia

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

Background: Electrocardiographic interpretation abilities are essential for healthcare practitioners who provide cardiac assessments to patients. However, there is inconclusive evidence on the level of electrocardiography interpretation competency and associated factors among nurses working in selected public cardiac centers in Addis Ababa, Ethiopia.

Objective: To assess electrocardiography interpretation competency and associated factors among nurses working in selected public cardiac centers in Addis Ababa, Ethiopia.

Material and Methods: An institutional-based cross-sectional study design was employed from March 2023 through May 2023 in selected public cardiac centers in Addis Ababa, Ethiopia. The study participants were selected according to the unit they were currently working on, using simple random sampling technique. This sampling technique included 172 participants. The data was collected using a self-administered structured questionnaire to describe statistics frequency of using ECG machine, frequency of asking for help were used. For inferential statistics bivariate and multiple logistic regressions were used. The data were entered, cleaned, edited and analyzed by using SPSS software application. As a measure of association, it used the adjusted odds ratio and a 95% confidence interval.

Results: In this study**,** the overall percentage of ECG interpretation incompetency was 54.1% (95% CI: 47.1-61.6%) (mean score <65%). The identified associated factors were a lack of ECG training (AOR = 2.17, 95% CI = 2.03, 14.22), not using self-learning methods for ECG interpretation (AOR = 2.86, 95% CI = 1.40, 5.11), having less than five years of experience (AOR = 1.16, 95% CI = 1.16 (1.12, 2.21), and inadequate ECG classes (AOR = 1.28, 95% CI = 1.14, 2.59).

Conclusions: This study found that study participants' ECG comprehension capabilities (competencies) were often inadequate and raised distressing concerns. Lack of ECG training, not using self-learning methods for ECG interpretation, having less than five years of experience (service), and inadequate ECG classes were the identified modifiable factors that reduced ECG interpretation competence. Thus, the focus of any action should be on each of the identified relevant factors in order to improve ECG interpretation competency.

Keyword: Cardiac center, Electrocardiography Interpretation,competency.

1. INTRODUCTION

1.1 Background

An electrocardiogram (ECG) is a non-invasive test that examines the heart's rhythm and electrical activity. It is recognized as the initial diagnostic tool for chest pain because it assists medical personnel in examining potential hazards and symptoms.(1) ECG recording is necessary in all hospital units since it aids in the detection of conduction and electrical heart abnormalities as well as the prediction of the risk of such diseases.(2)

Only a small percentage of professionals are confident in their interpretation of independent electrocardiograms (ECGs). ECG interpretation is a cognitive talent that takes time and effort to learn.(3) In turn, inaccurate interpretations increase health-care expenses and can cause admission delays, placing both hospitals and patients under strain. To address the issue of falling ECG interpretation literacy, the required ECG interpretation competences of all health care employees must be defined. Clinical competency is defined as a set of skills, knowledge, attitude, attitudes, and abilities that lead to successful or great performance in professional settings. Competency in ECG interpretation requires expertise with ECG interpretation, lead placement skills, regular monitoring, and a positive attitude toward ECG interpretation. People who are knowledgeable to pathological abnormalities can aid in the prevention of cardiac illnesses and the reduction of mortality.(4)

ECG interpretation competency gaps are not simply the result of individual learner failure. In the relatively limited period allotted for formal medical school, students are required to study a wide range of topics and develop a number of clinical skills. Health care practitioners (for example, physicians, nurses, anesthesiologists, and paramedics who perform ECG) who work in situations where ECG interpretation may have an impact on patient treatment must be qualified to interpret ECG. According to worldwide standards for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC), accurate and timely assessment of cardiac arrhythmias leads to early identification of appropriate therapy and promotes patient survival. Although ECG interpretation is a critical skill for health workers, there is currently a dearth of standard training programs and evaluation approaches for obtaining and assessing ECG interpretation expertise.(5)

An ECG is sometimes the only and most effective method of diagnosing life-threatening conditions, allowing for immediate treatment. Furthermore, accurate ECG interpretation in an emergency situation can help nurses rule out non-cardiac causes of chest discomfort, such as gastrointestinal, esophageal, and musculoskeletal illnesses, or panic attacks, allowing for improved patient care.(6)

Because nurses are the only health-care providers who are constantly present at the patient's bedside, their ability to differentiate between normal and abnormal ECGs is crucial. Nurses and EMS professionals who care for patients in ECG scenarios must be able to interpret ECGs. Nurses in particular should be able to record and interpret a 12-lead ECG correctly so that therapy can begin as soon as possible and better clinical outcomes can be reached. As a result, nursing staff must be able to identify specific irregularities in ECG signals and correlate them to clinical issues. Organizing ECG training sessions can help enhance ECG interpretation. Medical educators encounter a tremendous challenge in building skill in ECG interpretation.(7,8)

Traditionally, educators depended on traditional methods such as textbook reading and face-to-face interaction between teacher and student. Recent study has explored and compared various teaching strategies, such as self-directed learning (such as online courses or modules), lecture-based or workshop-based formats, and small-group peer training. To maintain content, ECG interpretation abilities must be continually improved. Thus, medical educators are challenged not just to provide effective training methods, but also to establish a training methodology that ensures long-term sustainable progress.(7)

As a result, health professionals and students who work with patients must be able to receive and interpret ECGs. If healthcare providers and students can independently interpret a 12-lead ECG, they can foresee any emergency treatment and deliver the essential interventions. A small number of studies have evaluated the competence of ECG interpretation for health professionals and students. In reality, only some studies examined and compared hospital emergency and medical emergency (EMS) nurses' ECG interpretation. As a result, the purpose of this study is to evaluate healthcare practitioners' ability to read ECGs.(9)

1.2 Statement of the problem

ECG recording is necessary in all hospital units since it aids in the detection of conduction and electrical heart abnormalities as well as the prediction of the risk of such diseases. Nurses are typically the first responders at health care facilities to an in-hospital cardiac arrest, and they must be adept in basic resuscitation methods of this hospital cardiac arrest. Any nurse should be able to distinguish basic ECG rhythms such as normal sinus rhythm, sinus tachycardia, sinus bradycardia, atrial fibrillation, atrial flutter, heart blocks, ventricular fibrillation, and asystole.(10) . Although ECG interpretation is an essential skill for health professionals, there is still a gap in standard training programs and evaluation strategies to achieve and evaluate competency in ECG interpretation**.** To help solve the problem of declining literacy in ECG interpretation, the expected ECG interpretation competencies must be defined for all health care professionals (4)

The nurse is in charge of monitoring and helping patients based on monitor data for inpatient Basic ECG rhythms such as normal sinus rhythm, sinus tachycardia, sinus bradycardia, atrial fibrillation, atrial flutter, heart blocks, ventricular fibrillation, and asystole should be recognized by every nurse. But a relatively small number of health professionals are confident in their independent ECG interpretation. According to the study conducted on Determination of the abilities of nurses in diagnosing the ECG findings about emergency heart diseases and deciding the appropriate treatment approaches in Turk 60.5% of the nurses expressed that they did not know the right electrocardiography monitoring and thus could not recognize the type of arrhythmia.(7) Research ECG Competency in ECG interpretation is not a universal skill, and the barriers to achieving ECG fluency are rooted at multiple levels of medical curricula.(11) . Medical educators face a significant problem in developing ECG interpreting expertise.

Inappropriate interpretation usage frequently raises healthcare expenditures and may cause delays in the admission process, imposing an unpleasant strain on the hospital and its patients having cardiac problem. To deliver better health care outcomes for patients and to reduce errors in ECG interpretation and actions, nurses' electrocardiogram awareness and experience must be improved.(12)

1.3 Justification

The need for immediate pattern recognition and subsequent procedures involves nurses in the process of evaluation, registration and initiation of reperfusion therapies as well as in the detection of complications and the request for assistance. The ECG interpretation competency can be pivotal in clinical practice and academic. However, according to certain studies, nurses' ECG interpretation ability is low. There should be an orientation program for nurses to improve their knowledge of ECG interpretation, and researchers should investigate the factors that influence this competency level of nurses in Ethiopia.

1.4 Significance of the study

Exploring and defining Nurses' experiences with Electrocardiography Interpretation Competency can help health professionals create effective interventions to alleviate the burdens of Electrocardiography Interpretation Competency from a variety of viewpoints. The outcomes of this study will help raise healthcare professionals' understanding of Nurses' experiences with Electrocardiography Interpretation Competency; they will also help them provide meaningful clinical care assistance to cardiac patients who visit the cardiac unit. It will aid academics and educators at academic institutions in emphasizing potential deficiencies in the present cardiac patient care services curriculum that need to be addressed.(12,13)

Furthermore, recognizing the level of Electrocardiography Interpretation Competency and the Nurse's expertise with Electrocardiography Interpretation is critical for reducing stressful situations and psycho-emotional difficulties. It will also help to better the management of Echocardiography and improve the health outcomes of patients.(13) Furthermore, the outcomes of this study would assist policymakers and programmers in developing a strategy to lessen the burdens of cardiac-related problems felt by cardiac patients in Cardiac units. It also increases communication between cardiac patients and healthcare personnel, hence boosting the cardiac unit's existing cardiac care offerings. Furthermore, it gives baseline data for other hospitals to use in improving the quality of electrocardiography interpretation services in the cardiac unit.

Organizing ECG training sessions can help enhance ECG interpretation. Medical educators face a significant problem in developing ECG interpreting expertise. Traditionally, educators depended on traditional methods such as textbook reading and face-to-face interaction between teacher and

student. Recent study has explored and compared various teaching strategies, such as self-directed learning (such as online courses or modules), lecture-based or workshop-based formats, and small-group peer training.(14)

2. LITERATURE REVIEW

2.1 ECG interpretation competency

Clinical assessment, critical thinking, and appropriate nursing interventions should be promoted through ECG training.(14) According to one study, nurses specialized in the critical area of emergency care who had previously obtained preparatory training on the ECG throughout their university courses had a significant ability to read electrocardiographic signals. The research of registered nurses in the critical care unit of the hospital Raja permaisuri bainun Ipoh found a high level of competence, which may be attributable to the fact that the majority of them had previously completed an ECG training course. The combination of teaching and research, as well as a training and systematic evaluation program of the processes involved in clinical care practice, are key features in the certification of these professionals.(15)

Ten electrodes are placed on the patient's limbs and on the surface of the chest, recording the electrical activity of the heart from 12 different viewpoints or leads by attaching cables to the patient's limbs and chest, capturing the overall magnitude and direction of the heart's electrical depolarization at each moment throughout the cardiac cycle. ECG is now used to diagnose cardiac disorders in patients, and it is regarded as the first diagnostic tool in chest pain, providing objective information about the anatomy and function of the heart.

Despite its widespread use, numerous investigations have revealed that health professionals' ECG reading skills are deficient. When compared to the expert reference, up to 33% of ECG interpretations are wrong, and up to 11% result in inappropriate therapy, according to the study. Pedagogy for ECG interpretation is lacking. A 12-lead ECG must be meticulously documented since inadequate methodology might result in misunderstanding of the data, wrong diagnosis, patient mismanagement, and inappropriate hospitalization.(11,16) ECG is used to identify patients and provide thorough information in a variety of clinical contexts, including arrhythmias, coronary artery disease (CAD), electrolytes abnormalities, genetic cardiomyopathies, and drug-induced abnormalities.(17)

2.2 Factors associated with ECG interpretation competency among cardiac nurse's

2.2.1 Sociodemographic factors

2.2.1.1 Sex

The cross sectional descriptive study conducted on registered nurses who work in both near east university hospital and Dr. Suat Gunsel University hospital, Majority of the participants were females which is 66.2%.(18) According to a study conducted in Iraq, approximately two-thirds (64.0%) of the studied sample were males (48%) of participants were between the ages of 25 and 28. A study from Iran showed that the female nurses employed in hospital emergency unit demonstrated higher ECG interpretation competencies than male nurses.(2)

2.2.1.2 Age

According to a study done in Tanzania from 141 nurses participated in the study. The majority of participants (44.0%) were aged 31-40 years, with a mean age of 34.1± 7.3 years. The study done on knowledge and practice of nurses on electrocardiography interpretation by oyacer, from the total of 65 respondents mean of age was 26.94 years.(2) A study conducted at the University of Kyrenia, Turkish Republic of Northern Cyprus shows that the mean age of the participants was 26.94 ± 4.26 years.

2.2.1.3 Professional level

Continuous medical education is a significant approach that equips nurses with ECG interpretation competencies. In a study conducted in Spain, the authors found that the emergency nurses' knowledge of ECG who attended an ECG education session was significantly higher than nurses who did not.(18) Furthermore, structured and adequate preparation in ECG interpretation skills helps nurses to identify, intervene and care for emergency conditions. Moreover, another study indicated a significant improvement in nurses' competencies after educational intervention.(9) Additionally, the type of hospital, specialty and educational courses showed significant difference in the competency level. Nurses from cardiac-specialty who took training had higher competencies than others. In a cross-sectional study conducted in Cairo, Egypt, nurses with only a diploma performed substantially worse on ECG interpretation than nurses with a bachelor's degree. Beginner nurses have a lower knowledge level than intermediate (U = 678.0, p 0.001) and

advanced nurses (U = 38.5, p = 0.004) nurses. The majority of the examined nurses (73%) stated that they were given some theoretical information relevant to ECG throughout their course, and 86% had completed the Advanced Cardiac Life Support (ACLS) course and were certified by the American Heart Association (AHA) within the validity period.(2)

2.2.1.4 Year of experience

As study conducted on nurses ECG from175 respondents 127(72.6%) responds there is no ECG machine available in their institution where as 48(27.4%) responds ECG machine is available in their institution. As this study implies the experience of ECG depends on the availability of machine itself. There was a statistically significant difference between the nurses' years of work experience and their level of practice in ECG interpretation. (10) According to research conducted on critical nurses in Saudi Arabia, the majority of respondents (115(65.7%) had job experience ranging from 1 to 5 years, with 4(2.3%) having more than 10 years of experience.

Esparza et al. discovered that nurses with practical experience performing ECGs have a good ability in early identification of potential problems among patients through ECG interpretation, and are able to describe patients' conditions to other health professionals, resulting in patients being

discharged earlier. (10) The study on ICU nurses at Eldemershal hospital in Cairo, Egypt, revealed that nearly three-fifths of the sample had more than five years of experience (9). The study on nurses' knowledge and practice of ECG interpretation.

In two university hospitals in the Turkish Republic of Northern Cyprus, nurses with less than one year of employment tenure had the lowest average of correct responses, while those with six or more years of working experience had the highest average of correct answers. (21)

2.2.1.5 Working area

There was a statistically significant association between the nurses' work unit and proper ECG information. It was also shown that the hospital's working unit was significantly effective in the nurses' ECG interpretation practice. (22) As part of the study on ECG interpretation knowledge and practice among nurses, questionnaires were distributed with the goal of targeting nurses who

work in critical departments such as the emergency department (23.1%), intensive care unit (27.7%), coronary care unit (24.6%), cardiology department (10.8%), and recovery unit (13.8%).

As a result, the nurses who worked in the cardiology department had more right answers, which is consistent with the findings of Zhang's study. CCU nurses had a significant percentage of right answers as well. Lak further noted that having experience working in a CCU was connected with better ECG test outcomes. The recovery unit nurses had a much lower mean of correct answers. (21)

2.3 Source of knowledge of ECG

2.3.1 Having regular class

According to the study conducted on association of implementation of practice standards for electrocardiographic monitoring with nurses' knowledge, quality of care, and patient outcomes the majority of the respondents had ECG related classes which result in satisfactory interpretation competency of their respondents. It seems that individuals who are more educated and training in ECG interpretation may have more accurate interpretations due to their greater self-confidence.(2)

2.3.2 Frequency of asking for help

Having the behavior of gathering knowledge by asking question of people around us in working area help us to develop our knowledge. Interpretation competency should start from the placement of electrode leads, because improper placement of leads may cause incorrect interpretation of ECG which may lead to improper diagnose and treatment of patients.(3)

2.3.3 Self-learning methods

Online self- directed learning methods are often referred to as a ‘flipped- classroom’ approach, in which online modules are completed on the learner’s own time and then later reinforced through clinical application. Although a technology- based approach may offer a promising and effective teaching model for ECG, these methods are still in their infancy and have yet to show that they are capable of producing ECG interpretation competence.(19)

Self-learning is essential for developing nurses' ECG interpretation competency because it provides continual updating of information and practice, which increases degree of proficiency. These programs could include reading books, visiting other websites, watching films, and so forth. The researchers attributed the nurses' lack of understanding to the absence of an ECG course in the nursing curriculum of the taught nursing program.(20)

2.3.4 ECG Training

ECG training should aim to promote clinical assessment, critical thinking, and appropriate nursing interventions. Some research found that nurses specializing in the crucial area of emergency who had previously gained preparatory training on the ECG throughout their university studies had a substantial ability to read electrocardiographic signals. The study on registered nurses in the critical care unit of hospital Raja permaisuri bainun Ipoh indicates a high level of competence, which could be attributed to the fact that the majority of them have already completed an ECG training course. A training and systematic evaluation program of the processes involved in clinical care practice, as well as the integration of teaching and research, are critical aspects in the certification of these professionals.(20) Furthermore, nurses who attended educational training and advanced cardiac life support training had high knowledge and skills. Ideally, ECG interpretation training methods should be efficient, flexible, sustainable, and capable of taking learners from a novice to an advanced interpreter level. In the modern era of technology- based medical education, online training or ‘e-learning’ has emerged as a promising and increasingly popular educational format.

2.4 Conceptual framework

The factors associated with competency of nurses at ECG interpretation work experience, level of education, availability of ECG machine and training.

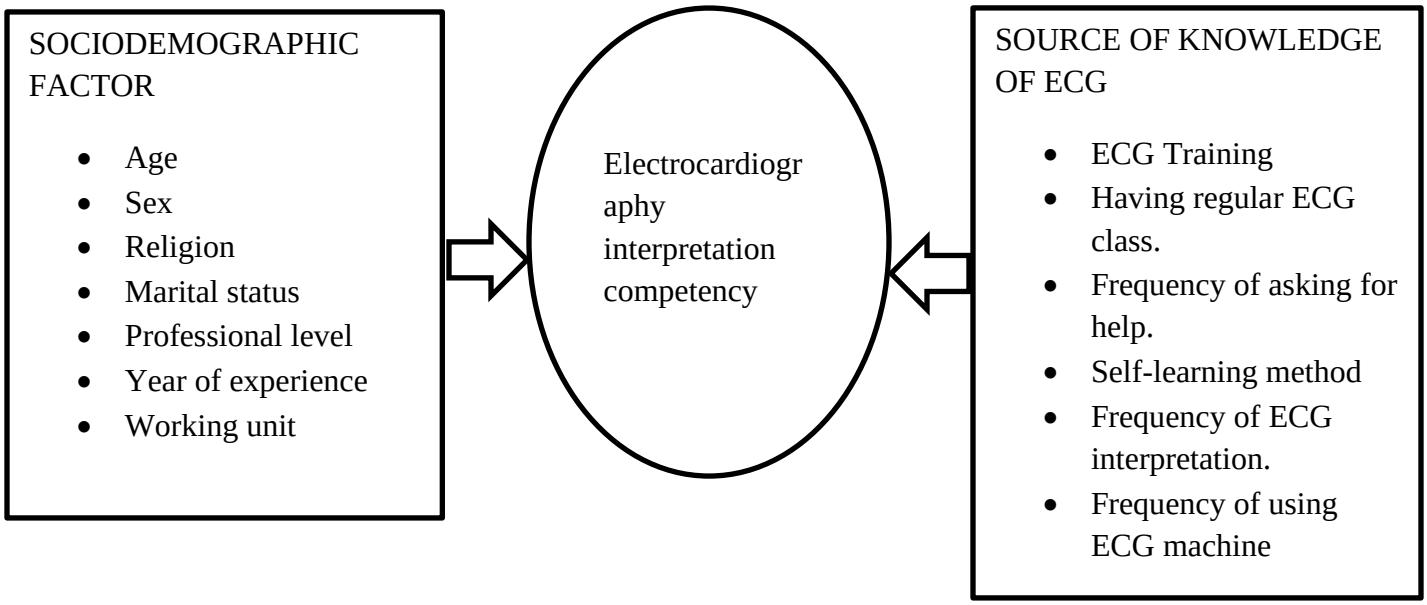


Figure 1 A conceptual framework for ECG interpretation competency modified by investigator.

3. OBJECTIVES

3.1 General objective

To assess Echocardiography Interpretation Competency and Associated Factors Among Nurses at the cardiac Center in selected public hospitals Addis Ababa, Ethiopia.

3.2 Specific objectives

To determine the level of nurses' competency in electrocardiography interpretation at cardiac unit of selected public hospitals in Addis Ababa, Ethiopia.

And also, to identify factors associated with Electrocardiography Interpretation Competency of nurses in cardiac unit of selected public hospitals in Addis Ababa, Ethiopia

4. MATERIAL AND METHOD

4.1 Study area

Addis Ababa is the capital city of Ethiopia. The city has ten sub-cities and lies at 7,546 feet (2,300 meters) and has twelve governmental hospitals. This study was conducted in selected public hospitals in Addis Ababa Ethiopia from march to May 2023. We selected three public hospitals purposively by considering the cardiac unit, patient flow and number of cardiac nurses they do have. Those hospitals are Tikur Anbessa Specialized Hospital (TASH), St Peter Referral Hospital (SPH) and Cardiac Center Ethiopia (CCE).

Tikur Anbessa Specialized Hospital (TASH): is one of the largest specialized and teaching hospitals which is stuffed with 98 cardiac unit nurses and different multidisciplinary residents and senior physicians.

St Peter Referral Hospital (SPH): is one of the main tuberculosis hospitals in Ethiopia. Currently, the hospital receives both trauma and medical patients. The hospital staffed by around 64 cardiac unit nurses who are belongs to St poul hospital.

Cardiac Center Ethiopia (CCE): The Cardiac Center – Ethiopia is now located inside Tikur Anbessa Specialized Hospital (TASH) and has around 102 nurses. So, the total number of nurses in those hospitals are 264. Generally, cardiac patients are treated and served in these hospitals as inpatient and outpatient

4.1 Study Design and period

Institutional based cross-sectional study with a quantitative research method were conducted to address the objectives of the study from march to May 2023.

4.2 Source population

The source population for this study were all Nurses working in cardiac center of selected public hospitals, Addis Ababa Ethiopia.

4.3 Study population

The study population were all sampled Nurses who are working at the cardiac center of selected cardiac hospitals during the study period and who fulfilled the eligibility criteria.

4.4 Eligibility criteria

4.5.1 Inclusion criteria

We would include Nurses working in Addis Ababa selected public hospitals with cardiac units with emergency and who are degree holders and above with having >6 months' work experience.

4.5.2 Exclusion criteria

We would exclude Nurses who do not fulfill inclusion criteria, who suffer from mental and cognitive disorders and not willing to participate during data collection period.

4.5 Variables of the study

4.6.1 Dependent variable

Electrocardiography Interpretation Competency

4.6.2 Independent variable

- ECG training
- Year of experience (service)
- Unit of work
- Socio-demographic (age, sex, professional level)
- Self-learning methods
- ECG class
- Frequency of use of ECG machine
- Frequency of asking for help
- Use of ECG machine

4.7 Sample size determination and sampling techniques

4.7.1 Sample size determination

The study determined the sample size using proportion in single population proportion formula with an assumption that about of nurses experienced Electrocardiography Interpretation Competency. The critical value at 95% confidence level of certainty (1.96), d = the margin of error between the sample estimate and actual population value of 5% where p=0.5.

The study used the following sample size determination formula.

$n=\frac{z^2 p(1-p)}{d^2}$ ..... equation 1

$n= \frac{1.96^2}{0.05^2}(0.5)1-0.5=384$

Final correction formula for n < 10,000

$n = \frac{n}{1+\frac{n}{N}}$ ----------equation 2

n=384/1+384/264) =156

Ten percent non-respondent rate added, and final sample size is 172 nurses.

4.7.2 Sampling Technique

A simple random sampling technique was used by involving all nurses who are working in selected cardiac unit of cardiac hospitals. Then the number of participants in each selected hospital is determined using the population proportionate sampling (pps).

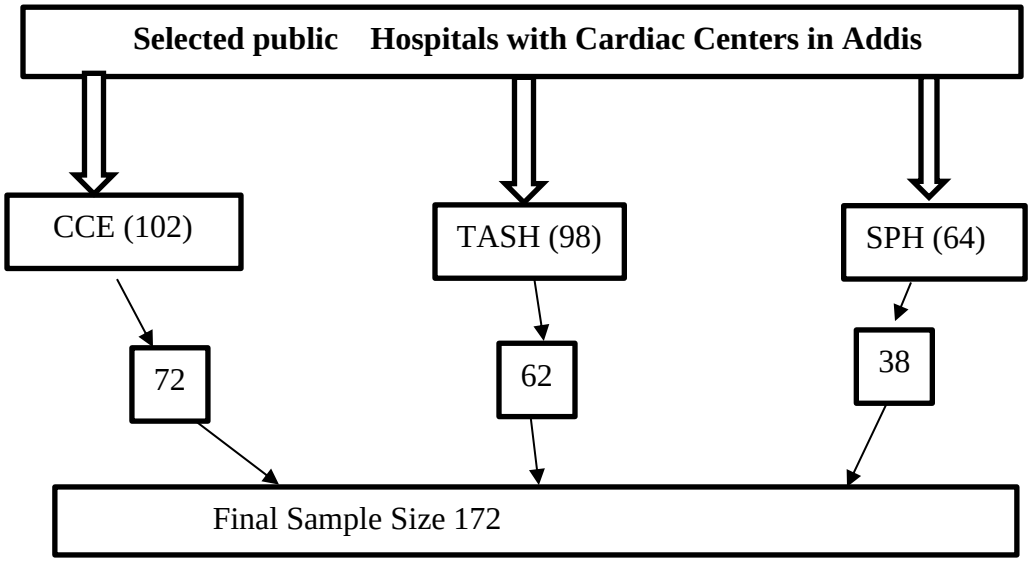


Figure 2. Schematic presentation of sampling technique in selected public Hospitals with cardiac center including emergency in Addis Ababa Ethiopia 2023.

The number in the large boxes represents the total number of cardiac nurses in respective Hospitals and the numbers in the small boxes represents the total number of nurses included in the study from respective hospitals after proportional allocation is made, using proportion allocation formula of number of nurses in the hospital divided by total number of nurses in all hospital times by the final corrected sample size.

x=ab/c where x=final sampled nurse from one selected hospital.

a=total number of nurses in study unit of that hospital.

b=final corrected sample size.

c=total number of nurses in the three hospitals.

4.8 Operational definition

Nurse: a person trained to care for the sick or infirm, especially in a hospital with the responsibility for both technical aspects of ECG monitoring (e.g., electrode placement, alarm parameter settings) and taking necessary action based on information obtained from the monitor and getting information about basic ECG abnormalities from the strip.

Electrocardiography: the process of producing an electrocardiogram or a recording of the heart's electrical activity.

Electrocardiography Interpretation: understanding the normal and abnormal heart's activity and morphology from the captured graph of ECG. This means, appreciating the normal ECG waves from the abnormal one with its indication to take action accordingly.

Competency: Meeting specified qualification to perform some tasks. will be considered competent if the percent score was equal to or above 65% and not competent if less than 65% based on a statistical analysis which measured from the total 42 variables in questionnaire. This amount is accepted because knowing our patient's status with more than 50% under the supervision of physician is considered enough.

4.9 Data collection tools and technique

The Electrocardiography Interpretation Competence questionnaire (EICQ) was adopted from previous study. The instrument consists of three parts with Part 1: including demographic data such as age, gender, professional level with 07 questions. Part 2: knowledge of nurses' competency which consists of 23 questions. Part 3: practice of nurses' ECG interpretation with 12 questions with ECG strips representing the most important arrhythmias. Each question had one correct answer and three distractors.

The study would collect the data by interviewing the participant Nurses by using a self-administered questionnaire. Inpatient and outpatient working Nurses were included. The data collectors were two nurses working in the unit, and the supervisor was a public health expert.

4.10 Data quality assurance

Data assurance was applied from the very beginning by review prior study and a pretest was done by taking 5% of the study sample in Alert hospital. Trained data collectors with a degree in Nursing

will gather the data. The principal investigator trained data collectors for a day on data collection tools, procedures, and research ethics. The principal investigator will closely monitor the field-level, data collection process daily to ensure conformity with the study protocol. The validity of the questionnaire was checked by three specialist nurses and one cardiologist for its clearance and reliability.

4.11 Data management

The code list and the data were remained confidential and was accessed only by the research team. The study will generate a codebook to pass the collected data to a code sheet. It was also creating the data file from the code sheet information by typing on the computer keyboard. Case sorting was executed to find missing variables. It will provide a non-lagging numerical code for each query.

4.12 Data processing and analysis

The study used IBM SPSS version 25 to analyze the data. Both descriptive and analytical statistical procedures were utilized. Descriptive statistics like percentage, mean, and standard deviation were used for the presentation of socio-demographic data and competency of nurses about ECG interpretation. The study uses a binary logistic regression model to see the association between independent and dependent variables. It took the adjusted odds ratio (AOR) as a measure of effect, along with a 95% confidence interval. The author declared statistical significance at a p-value of 0.05.

4.13 Ethical consideration

Ethical approval of the research was obtained from the Institutional Review Board (IRB) of Addis Ababa University's College of Health Sciences. A formal letter was written to study area and the hospitals permitted us to undertake the research. Informed verbal consent was obtained from all study subjects before conducting the data collection. For this purpose, a consent form was attached to each questionnaire that explains the purpose of the study, its confidentiality, and the respondent’s full right to take part or not in the study. The respondents were given an honest clarification of the survey's intent, a summary of the benefits, and an invitation to answer all inquiries. This study process has no harmful form of inducement or coercion, and the study does

not bring any risks that incur compensation. To protect the confidentiality of the meeting, participants' privacy was identified using a code.

4.14 Dissemination of the finding and expected outcome

This study's primary objective is to fulfill the requirements for a Master of Science degree in Cardiovascular nursing. The study will be submitted to the Addis Ababa University College of Health Sciences. A copy will be given to the Ministry of Health and hospitals where the study had conducted. It will be presented in different seminars and attempts will also be made for presentation in National /International Science of the conference and the public in a peer-reviewed journal. It will attempt to publish in reputable journals.

This study will highlight and recommend to policymakers, decision-makers, and Electrocardiography Interpretation Competency of Nurses authorities the importance of having a good priority setting while allocating the required professional right according to the local context.

5. RESULT

5.1. Socio-demographic characteristics of the participants

In this study, a total of 172 participants were included. Female participants accounted for 115 (66.9%). The mean ± standard deviation (SD) of the age of participants was 33.5±5.7 years. Regarding the level of education, about 126 (73.3%) were first-degree holders. Additionally, 110 (64%) of the study participants had less than five years of work experience.

Table 1: Socio-economic characteristics of participants at the cardiac centers in selected public hospitals in Addis Ababa, Ethiopia.

Variables		Frequency	Percent	Mean (SD)
Sex of participants	Male	57	33.1	
	Female	115	66.9	
Age in years				33.5 (5.7)
Marital status	Single	44	25.6	
	Married	98	57	
	Divorced	29	16.9	
	Widowed	1	0.6	
Religion	Orthodox	97	56.4	
	Muslim	1	0.6	
	Protestant	74	43	
Year of experience (service)	<=5 years	110	64	
	>=6	62	36	
Professional level	Fist degree	126	73.3	
	Masters and above	46	26.7	

5.2. The level of knowledge of participants on electrocardiography interpretation

The outcomes of this study revealed that about (93 = 54.1%; 95% CI: 47.1-61.6%) of the study participants were insufficiently competent (mean score <65%) in ECG interpretation. The overall percentage of study participants with ECG interpretation competency was 79 (45.9%) (95% CI 38.4-52.9%), with mean ECG interpretation scores more than 65%. In this investigation, about 114 (66.3%) of the study participants didn't receive ongoing ECG training.

This study indicated that the most frequently known and correctly responded item (90.1%) was the QRS complex, which represents right and left ventricular depolarization. However, the most frequently incorrectly answered item (76.2%) was the T long wave and QRS wide wave that was seen in hypokalemia, as illustrated in Table 2.

Table 2: Knowledge of the study participants on ECG interpretation at the cardiac centers in selected public hospitals in Addis Ababa, Ethiopia, 2023

Characteristics		Frequency (%)	Mean (SD)
The p wave represents the right and left Atrial repolarization	Yes	59 (34.3)	
	No	113 (65.7)	
QRS complex represents the right and left ventricular depolarization	Yes	155 (90.1)	
	No	17 (9.9)	
T wave represents ventricular repolarization	Yes	112 (65.1)	
	No	60 (34.9)	
T wave is one of the negative waves in ECG	Yes	97 (56.4)	
	No	75 (43.6)	
Normal PR interval is between 0.12 and 0.2	Yes	108 (62.8)	
	No	64 (37.2)	
Pathologic Q waves are a sign of previous MI	Yes	65 (37.8)	
	No	108 (62.2)	
AF could be regular rhythm.	Yes	88 (51.2)	
	No	84 (48.8)	
ECG can detect left ventricular hypertrophy (LVH)	Yes	85 (49.4)	
	No	87 (50.6)	
ST depression in ECG indicates ischemic myocardial	Yes	109 (63.4)	
	No	63 (36.6)	
T long wave and QRS wide wave seen in hypokalemia	Yes	131 (76.2)	
	No	41(23.8)	
Attending all ECG classes	yes	65(37.8)	
	No	107(62.2)	
Amount of ECG class	Enough	54(31.4)	
	Not Enough	118(68.6)	
ECG training received	Received	58(33.7)	
	Not received	114(66.3)	
Confidence level on ECG interpretation	Confident	63(36.6)	
	Not confident	109(63.4)	
Frequency of ECG interpretation per month	5	25(14.5)	
	5 to 10	48(27.8)	
	>10	49(28.5)	
Ask for help for ECG interpretation	Not at all	50(29.1)	
	Rare	63(36.6)	
	Some times	46(26.7)	
	Always	11(6.4)	
	Not at all	52(30.2)	
	Yes	60(34.9)	

Self-learning method used for ECG interpretation	No	112(65.1)

5.3. The practices of the study participants on electrocardiograph

This study illustrated that 53.5% of the study participants identified heart rate from the ECG strip. In addition, 56.4% and 55.2% of the study participants identified ventricular tachycardia and ventricular fibrillation, respectively, on the ECG strip. Besides, about 60.5%, 58.7%, and 54.7% of the study participants have identified second-degree AV blocks, first-degree AV blocks, and third-degree AV blocks, respectively (Table 3).

Table 3: The possible answer for each ECG abnormalities among the study participants at the cardiac centers in selected public hospitals in Addis Ababa, Ethiopia, 2023.

ECG finding	Frequency	Percent
Heart rate	92	53.5
Rhythm	92	53.5
Axis	75	43.6
Asystole	85	49.4
Ventricular tachycardia	97	56.4
Ventricular fibrillation	95	55.2
Atrial fibrillation	92	53.5
STEMI (Antero-septal)	96	55.8
STEMI (inferior)	94	54.7
Hyperkalemia	99	57.6
First degree AV block	101	58.7
Second degree AV block	104	60.5
'Third degree AV block	94	54.7
LVH	104	60.5

5.4. Factors associated with electrocardiogram interpretation competency

In the present study, the following factors were associated with electrocardiogram interpretation competency in the fully adjusted model: lack of ECG training, not using self-learning methods on

ECG interpretation, having less than five years of experience (service), and inadequate ECG classes (Table 4).

In this study, a lack of ECG training decreased the likelihood of electrocardiogram interpretation competency by 2.17 times compared to those who got ECG training (AOR = 2.17, 95% CI = 2.03, 14.22). This study finding confirmed that, when compared to their peers, refraining from using self-learning methods for ECG interpretation decreased the participants' probabilities of good electrocardiogram interpretation competency by 2.86 times (AOR = 2.86, 95% CI = 1.40, 5.11), as illustrated in Table 4.

This study's findings showed that having less than five years of experience (service) reduced the odds of electrocardiogram interpretation competency by 1.16 times compared to individuals who had more than five years of work experience (AOR = 1.16, 95% CI = 1.16 (1.12, 2.21). Our study results revealed that inadequate ECG classes elevated the odds of incompetency in ECG interpretation by 1.28 times among the study participants working in inadequate ECG classes compared to their peers (AOR = 1.28, 95% CI = 1.14, 2.59), as illustrated in Table 4.

Table 4: Bivariate and multivariable analysis of factors associated with ECG interpretation competency among participants, 2023.

Associated factors	ECG interpretation status		COR (95% CI)	AOR (95% CI)
	competent (n)	not competent (n)		
Sex of participants				
Male	35	22	2.56 (0.33, 4.93) *	1.77 (0.03,30.29) **
Female	44	71	**1**	
ECG training status				2450/1012
Received	35	23	1	
not received	44	70	2.42 (1.26,4.62) *	2.17 (2.03, 14.22) **
Self-learning methods ECG interpretation used				
Yes	37	23	1	
No	42	70	2.68 (1.40,5.11) *	2.86 (1.40,5.11) **
Attending all ECG class				
Yes	39	26	1	
No	40	67	2.51 (1.34,4.73) *	1.59 (0.82,3.08) **
Year of experience (service) in nursing				
>=6	35	27	1	
<=5	44	66	1.94 (1.03,3.65) *	1.16 (1.12, 2.21) **
Amount of ECG classes				
adequate	28	26	1	
Inadequate	51	67	2.15 (1.14,4.06) *	1.281.14,2.59) **

6. DISCUSSION

Data-driven evidence on the level of ECG interpretation competency could help key stakeholders grasp the issue better. This expertise helps them improve the clinical abilities and in-depth knowledge of health care providers operating in various heaths' tier systems throughout the country in order to give high-quality health care services. This study aimed to assess echocardiography interpretation competency and associated factors among nurses at the cardiac centers in selected public hospitals in Addis Ababa, Ethiopia. The findings of this study demonstrated that a significant percentage of the study participants had low echocardiography interpretation competency. This suggests that many of the study participants lacked the knowledge and abilities needed to appropriately and efficiently evaluate clinical findings, particularly ECG findings.

Moreover, in our study, the level of ECG interpretation incompetence among study participants was higher than the findings of the study conducted in Saudi Arabia (35%).(25) in Spain (7%).(18) China (12.5%).(26) that documented a low level of ECG interpretation incompetence among various caregivers. The variation in the level of ECG interpretation incompetence between our results and prior studies could be explained by a difference in the study locations' infrastructure, the composition of assessed hospitals, the approach (design) and ECG education, as the majority of the study participants in our study have not attended ECG training or basic life support skills where they learn to operate the ECG machine and carry out systematic rhythm analysis.

Furthermore, the extent of incompetence in ECG interpretation in the current data appears incompatible with relevant literature.(7,27,28) This discrepancy in the level of incompetence in ECG interpretation among nurses between the findings of our investigation and the reports of previous studies could be due to the sample size, the level of education of the study participants, or the components of the ECG evaluated.

This study suggested that the competency of healthcare professionals such as doctors, nurses and emergency personnel to record and interpret ECGs to diagnose pathological disorders can assist in preventing heart disorders and decreasing the rate of mortality. The findings revealed that nurses who assessed their proficiency as beginners had less knowledge and practice in ECG interpretation than nurses who ranked their competency as intermediate or advanced. It could be because they

are new employees or junior nurses. This finding is similar with the study conducted in two university hospitals in the Turkish republic of Northern Cyprus.

In terms of the variables impacting ECG interpretation incompetency, healthcare providers, hospital management, clinical researchers, and policymakers can select the area of focus for better decision-making by understanding the factors influencing ECG interpretation. The findings of this study revealed a statistically significant association between a lack of ECG training and incompetence in ECG interpretation among respondents who had previously taken an ECG training course and those who had not. Hence, our study found that the odds of sustaining ECG interpretation incompetency among respondents who didn't receive ECG training were higher as compared to their counterparts. This indicates that not comprehensively attending ECG training had a negative impact on the respondent's ECG knowledge, which allowed them to make the correct diagnosis and final interpretations leading to conclusions. Our result was consistent with the outcomes of earlier investigations,(9,19,27) that has been documented that a lack of ongoing training on ECG greatly influences both the right diagnosis and interpretation among various medical professionals.

Moreover, this study examined the relationship between self-learning methods for ECG interpretation and capabilities for making the correct ECG interpretation. Thus, the odds of experiencing not being competent enough in the interpretation of ECGs were higher among the study participants who did not use self-learning methods for ECG interpretation. This could be due to the fact that a lack of self-learning methods for ECG interpretation reduced self-capacity building. Our study findings were have been supported by previous documented literatures(12,20,29) that indicated the absence of self-learning methods for ECG interpretation negatively affected the good performance of care givers as we did.

The current study discovered that having less than five years of experience (service) had a negative impact on the participant's ability to correctly interpret an ECG. The odds of sustaining incompetency in ECG interpretation were high among study participants who had less than five years of work experience in departments providing ECG services. This might be related to lack of repetitive exposure to ECG and junior personnel may be inadequately competent in ECG acquisition and interpretation. Several studies' reports corroborated our findings,(11,30,31) that lack of expensive work experience badly reduced the caregiver's capabilities, making the ECG interpretation competency acceptable, as we found in our investigation. Additionally, compared to

their colleagues, the odds of facing ECG interpretation incompetency were higher among participants working in areas inadequate ECG classes.

A few limitations of the analysis should be noted, including: this study only involved nurses from few departments in one hospital; which could have affected how representative our sample for that hospital nurses were and how generalizable or transferable our findings were. The other limitation of the study was that information bias may have entered the study participants' interviews. In this study, the tendency of survey participants to provide responses that will be seen favorably by others may also contribute to social desirability bias.

7. CONCLUSIONS

This study found that study participants' ECG comprehension capabilities (competencies) were often inadequate and raised distressing concerns in concluding the right diagnosis for those seeking health care. Lack of ECG training, not using self-learning methods for ECG interpretation, having less than five years of experience (service), and inadequate ECG classes were the modifiable potential factors that reduced ECG interpretation competence among the study participants in this investigation. The interpretation of electrocardiograms (ECGs) is critical for patient care. Incorrect interpretation of ECG data can lead to erroneous management decisions, which can have negative and occasionally deadly consequences for patients.

8. RECOMMENDATIONS

Following are the recommendations made by the study in light of its findings:

For hospital managers and cardiac treatment center

- The focus of any action should be on each of the identified relevant factors in order to improve ECG interpretation competency and reduce the economic cost of a wrong diagnosis.
- Strategies to facilitate better ECG skills should involve an extended focus on ECG in the undergraduate.

For Ministry of Health

- Should formulate a national-level ECG implementation curriculum and upgrade the hospital's ECG infrastructure including competency-based educational programs.

For researchers

In order to taking the present study knowledge or practice forward more broadly;

- Interventional studies and concrete motivational methods that can encourage nurses to adopt good practice voluntarily will be necessary.
- Future research should take into account cohort studies that measure the level of ECG interpretation among various groups of caregivers.

9. REFERENCES

1. Kashou A, May A, DeSimone C, Noseworthy P. The essential skill of ECG interpretation: How do we define and improve competency? Vol. 96, Postgraduate Medical Journal. The Fellowship of Postgraduate Medicine; 2020. p. 125–7.
2. Yaser O, Tahboub H. Knowledge and Practices of Electrocardiogram Interpretation of Nurses In Partial Fulfilment of the Requirements for the Degree of Master of Nursing (Adult Acute Care) NICOSIA 2018.
3. Kashou A, May A, Desimone C, Noseworthy P. The essential skill of ECG interpretation : How do we define and improve competency ? :125–7.
4. Amini K, Hosseini M, Zandian H, Azizpour I, Haghi Y. Assessment of Electrocardiogram Interpretation Competency among Health Professional staff and Students of Ardabil University of Medical Sciences: A Multidisciplinary Study. 2022; Available from: https://doi.org/10.21203/rs.3.rs-1465406/v1
5. Funk M, Fennie KP, Stephens KE, May JL, Winkler CG, Drew BJ. Association of implementation of practice standards for electrocardiographic monitoring with nurses' knowledge, quality of care, and patient outcomes. Circ Cardiovasc Qual Outcomes. 2017 Feb 1;10(2).
6. Abdalla AA, Khanra D. Electrocardiography Interpretation Proficiency Among Medical Doctors of D1. Abdalla AA, Khanra D. Electrocardiography Interpretation Proficiency Among Medical Doctors of Different Grades in the United Kingdom. Cureus. 2022;14(9). ifferent Grades in the Un. Cureus. 2022;14(9).
7. Haimanot Y. DEPARTMENT OF EMERGENCY MEDICINE THESIS SUBIMITION FORM.
8. Amini K, Mirzaei A, Hosseini M, Zandian H, Azizpour I, Haghi Y. Assessment of electrocardiogram interpretation competency among healthcare professionals and students of Ardabil University of Medical Sciences: a multidisciplinary study. BMC Med Educ. 2022 Dec 1;22(1).
9. Breen CJ, Kelly GP, Kernohan WG. ECG interpretation skill acquisition: A review of learning, teaching and assessment. J Electrocardiol. 2022;73:125–8.
10. Ros SC, Isa R, Fauzi R, Isa SN, Arifin W, Mansor W. Critical Care Nurses ' Competency in Electrocardiogram Interpretation : A Cross-Sectional Study. 2022;18(9):124–31.
11. Tahboub OY, Dal Yilmaz U. Nurses' knowledge and practices of electrocardiogram interpretation. Int Cardiovasc Res J. 2019;13(3).
12. Saffi MAL, Bonfada MS. Nurses' knowledge of electrocardiogram management and interpretation. Rev Baiana Enferm. 2018;32.
13. Rubbi I, Carvello M, Bassi V, Triglia C, Di Lorenzo R, Cremonini V, et al. The skill of nursing students trained in the evaluation of electrocardiographic trace: a comparison with

emergency nurses. Acta Biomed. 2021 Dec 22;92(S2):e2021507.

14. McGrath A, Sampson M. Electrocardiograms: A guide to rhythm recognition for emergency nurses. Vol. 26, Emergency Nurse. RCN Publishing Company Ltd.; 2018. p. 23–30.

15. Getachew M. Competency in ECG Interpretations among Graduating Medical Students: Experience from two Ethiopian Medical Schools Addis Ababa. 2019.

16. Ho JKM, Yau CHY, Wong CY, Tsui JSS. Capability of emergency nurses for electrocardiogram interpretation. Int Emerg Nurs. 2021 Jan 1;54:100953.

17. Mellor P, Gregoric C. Ways of being: Preparing nursing students for transition to professional practice. J Contin Educ Nurs. 2016;47(7):330–40.

18. Coll-Badell M, Jiménez-Herrera MF, Llaurado-Serra M. Emergency Nurse Competence in Electrocardiographic Interpretation in Spain: A Cross-Sectional Study. J Emerg Nurs. 2017 Nov;43(6):560–70.

19. Antiperovitch P, Zareba W, Steinberg JS, Bacharova L, Tereshchenko LG, Farre J, et al. Proposed In-Training Electrocardiogram Interpretation Competencies for Undergraduate and Postgraduate Trainees. J Hosp Med. 2018 Mar;13(3):185–93.

20. Zhang H, Hsu LL. The effectiveness of an education program on nurses' knowledge of electrocardiogram interpretation. Int Emerg Nurs. 2013;21(4):247–51.

21. Batra MK, Khan A, Farooq F, Masood T, Karim M. Assessment of electrocardiographic criteria of left atrial enlargement. Asian Cardiovasc Thorac Ann. 2018 May;26(4):273–6.

22. Breen CJ, Kelly GP, Kernohan WG. ECG interpretation skill acquisition: A review of learning, teaching and assessment. J Electrocardiol. 2022 Jul 1;73:125–8.

23. Ruhwanya DI, Tarimo EAM, Ndile M. Life threatening arrhythmias: Knowledge and skills among nurses working in critical care settings at muhimbili national hospital, Dar es Salaam, Tanzania. Tanzan J Health Res. 2018;20(2).

24. Funk M, Fennie KP, Stephens KE, May JL, Winkler CG, Drew BJ. Association of Implementation of Practice Standards for Electrocardiographic Monitoring With Nurses' Knowledge, Quality of Care, and Patient Outcomes: Findings From the Practical Use of the Latest Standards of Electrocardiography (PULSE) Trial. Circ Cardiovasc Qual Outcomes. 2017 Feb;10(2).

25. Aljohani MS. Competency in ECG Interpretation and Arrhythmias Management among Critical Care Nurses in Saudi Arabia: A Cross Sectional Study. Healthc. 2022;10(12).

26. Wu J, Kors JA, Rijnbeek PR, van Herpen G, Lu Z, Xu C. Normal limits of the electrocardiogram in Chinese subjects. Int J Cardiol. 2003 Jan;87(1):37–51.

27. Chen Y, Kunst E, Nasrawi D, Massey D, Johnston ANB, Keller K, et al. Nurses' competency in electrocardiogram interpretation in acute care settings: A systematic review. J Adv Nurs. 2022 May;78(5):1245–66.

28. Ho JK-M, Yau CH-Y, Wong C-Y, Tsui JS-S. Capability of emergency nurses for

electrocardiogram interpretation. Int Emerg Nurs. 2021 Jan;54:100953.

29. Brooks CA, Kanyok N, O'Rourke C, Albert NM. Retention of Baseline Electrocardiographic Knowledge After a Blended-Learning Course. Am J Crit care an Off Publ Am Assoc Crit Nurses. 2016 Jan;25(1):61–7.

30. Otto CM. The practice of clinical echocardiography. Elsevier Health Sciences; 2007.

31. Nishiguchi S, Sugaya N, Saigusa Y, Mayama M, Moromizato T, Inamori M, et al. Effects of Electrocardiographic Monitoring Education on Nurses' Confidence and Psychological Stress: An Online Cross-Sectional Survey in Japan. Int J Environ Res Public Health. 2022;19(8).

Addis Ababa University College of Health Sciences

Annex 1: Information Sheet

My name is ---------- I am working as a data collector for the study being conducted by Addis Ababa University, college of health Sciences. I kindly request you to give me your attention to explain about the study.

Title of the study: Electrocardiography Interpretation Competency and Associated Factors among Nurses at the cardiac Center of selected hospitals in Addis Ababa, Ethiopia**.**

Objective of the study:

To assess Electrocardiography Interpretation Competency and Associated Factors among Nurses at the cardiac Center of selected Hospitals, Addis Ababa, Ethiopia**.**

The purpose/Aim of the Study: The findings of this study will provide base line information for educational programmer and health care providers to strengthen the cardiac care service.

Risk and Benefit: The participants will not have any risk being participating in this study. There is no direct benefit given being participated in this study, but your participation will help to generate base line information for strengthening the cardiac center service.

Confidentiality: Participant's information will be confidential. Your name and other personal identifiers will not be recorded on data collection format and the information that you give us will be kept confidential and will be used for this study purpose alone.

Rights: The participants will have the right to refuse the participation or to answer any questions that they feel uncomfortable. And if you have any questions about the conducted study, you can ask the principal investigators with the following address Phone =+251911003868/913480683

Are you volunteer to participate in this research as a participant?

A. Yes B. No

Annex 2: Questionnaire for quantitative data

Informed consent certified by data collector Name_____ signature___ Date of data collection_____ Time started_____ Time completed_____

Section One: Socio-demographic characteristics

S.n	Characteristics	Possible responses
001	Sex	A. Male 2. Female
002	Age in year	_____
003	Highest level of education you have attained	A. First Degree B. Masters and above
004	Marital status	A. Single B. Married C. Divorce D. Widowed
005	Religion	A. Orthodox B. Muslim C. Protestant D. Other
006	In which Hospital you are working?	_____
007	Did you have any ECG class	A. Yes B. No
008	If your answer is yes for Q. No 007, years since last ECG course	A. Less than 10 years B. 2 – 5 years C. 5-10 years D. Above 10 years
009	If your answer is Yes in Q. No 007, did you attend all classes?	A. Yes B. No
010	Do you think the amount of ECG class was enough?	A. Yes B. No
011	Have you received any ECG training?	A. Yes B. No

012	How confident you are on interpretation of ECG?	A. Confident B. Neutral C. Not confident
013	How frequently ECG machine do you use per month?	A. <5 B. 5-10 C. >10 D. Not at all
014	How frequently do you interpret ECG per month?	A. <5 B. 5-10 C. >10 times D. Not at all
015	How frequently did you ask for help for interpretation of ECG?	A. Rarely B. Sometimes C. Always D. Not at all
016	If your answer for #015 is D. Jump this question. If you have been asking help for ECG interpretations who did you ask?	A. Medical student (peer) B. General Practitioner C. Resident D. Internist E. Emergency physician F. Cardiologist G. Another nurses
017	Did you use any self-learning methods for ECG interpretations other than training and regular class?	A. Yes B. No
018	If your answer is yes for Q.no 017 what was your methods.	A. Internist B. Self-learning books C. Conferences D. Another thinks, specify

Section Two: Nurses knowledge of ECG

19. The p wave represents the right and left Atrial repolarization

    A. YES B. NO

20. QRS complex represents the right and left ventricular depolarization

    A. YES B. NO

21. T wave represents ventricular repolarization

    A. YES B. NO

22. T wave is one of the negative wave in ECG

    A. YES B. NO

23. Normal PR interval is between 0.12 and 0.2

    A. YES B. NO

24. Pathologic Q waves are a sign of previous MI

    A. YES B. NO

25. AF could be regular rhythm.

    A. YES B. NO

26. ECG can detect left ventricular hypertrophy(LVH)

    A. YES B. NO

27. ST depression in ECG indicates ischemic myocardial

    A. YES B. NO

28. T long wave and QRS wide wave seen in hypokalemia

    A. YES B. NO

29. A heart rhythm that takes over when the sinus node fails is called

    A. Atrial fibrillation C. An irritable rhythm

    B. Ventricular fibrillation D. An escape rhythm

30. First degree heart block is seen on an electrocardiogram as

    A. Absence of regular P waves

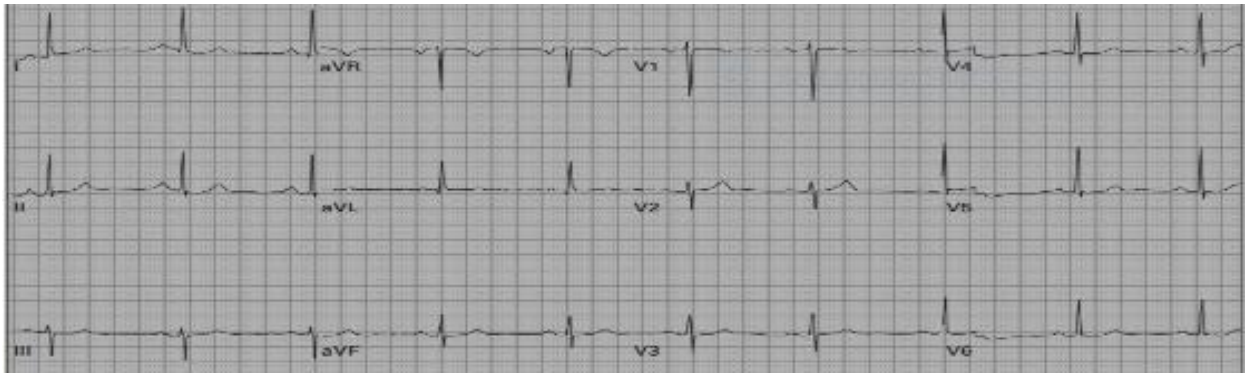
    B. A PR interval less than 0.12 seconds or three small squares

C. PR interval more than 0.2 seconds or five small squares

D. A cyclical increase in the PR interval until one QRS is 'dropped'

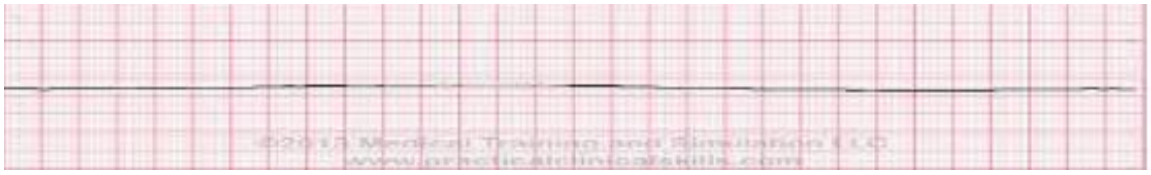
Section Three: Practice of nurses on ECG interpretation

31. Based on the following ECG strip please fill your answer from question A to C



A. Heart rate_____ B. Rhythm_____ C. Axis_____

32. What is your diagnosis of a 40 years old female patient presented with loss of consciousness of 1 hour and having the following ECG strip?



A. A fib B. V tach C. Asystole D. V fib

33. For a 70 years old male patient presented to ED with compliant of chest pain, palpitation and shortness of breath You perform an ECG and observe the following strip, what is your diagnosis?

A. A fib B. Asystole

B. V tach C. V fib

34. A 55 years old man brought by his family after they found him on bed with loss of consciousness and upon arrival he was gasping and BP and pulse was not recordable with the above ECG strip, what is your diagnosis for this patient?

A. Myocardial infarction B. Electrolyte imbalance C. V tach

35. A 25 years old male known cardiac patient on follow up has the following ECG strip, what is his diagnosis?

A. First degree heart block B. Second degree heart block C. Third degree heart block

36. 64-years-old woman presents after a syncopal episode and has the following ECG strip, what is your diagnosis?

A. First degree heart block B. Second degree heart block C. Third degree heart block

37. What pathology you think the patient with the following ECG has?

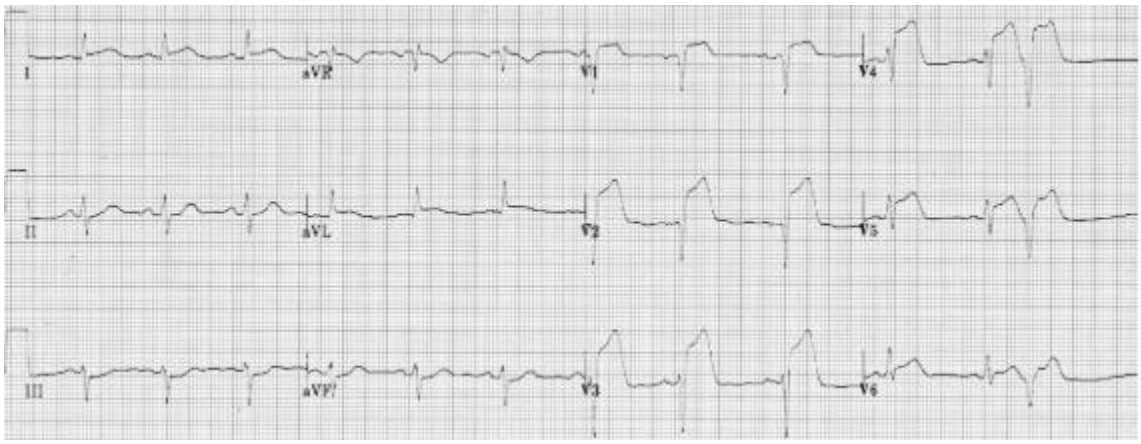
A. First degree heart blocks

B. A third-degree heart blocks.

C. He does not have any pathology.

D. I do not know.

38. A 60 years old male patient presented with left side chest pain of 1 hour which radiates to right shoulder with the following ECG strip, what is the diagnosis?



A. First degree heart block

B. Second degree heart block

C. V fib

D. Myocardial infarction

Approval Sheet

I, the undersigned MSc student, declare that I have submitted my original thesis on a title ELECTROCARDIOGRAPHY INTERPRETATION COMPITENCY AND ASSOCIATED FACTORS AMONG NURSES WORKIND IN CARDIAC CENTERS OF SELECTED PUBLIC HOSPITALS IN ADDIS ABEBA, ETHIOPIA 2023 to the institutional review board of Addis Ababa University College of health science school of nursing and midwifery

Submitted by:

Asanti Chemed _____ _____

Name of student Signature Date

This thesis by Asanti Chemeda is accepted in its present form by the member of examiners as satisfying thesis requirement for the degree of master in cardiovascular nursing.

Approved by:

Zuriyash Mengistu (PhD) _____ _____

Name of major advisor Signature Date

Sr Nete Tewfik (Lecturer) _____ _____

Name of co -Advisor Signature Date

Examiner

_____ _____

Name Signature Date

Department Head

Dr.Girum Sebsibe (PhD, Associate prof). _____ _____

Name Signature Date