



To Assess Competency in Interpretation of Cardiac Arrhythmias among Emergency Medical Professionals in Pune, India

Parag Rishipathak^{1*}, Monesh Bhandari¹ and Anand Hinduja¹

¹*Symbiosis Centre for Health Skills, Symbiosis International (Deemed University), Pune, India.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: The annual number of deaths from Cardiovascular Disease (CVD) in India is projected to rise from 2.26 over the past several decades and have ranged from 1.6% to 7.4% in rural populations and from 1% to 13.2% in urban populations.

Electrocardiography (ECG) is a non-invasive tool which is extensively used to understand and analyze a patient's cardiac condition. It provides information about cardiac condition and helps in diagnosing acute coronary syndromes and cardiac arrhythmias. Emergency Medical Professionals (EMP's) handle numerous cases of medical as well as trauma emergencies daily and are the first responders prior to hospitalization and the only reliable resource to help in revival of the patient. As it is of high priority, to give the upmost necessary care to the patients, being able to interpret and honing the skills to interpret ECG is of utmost importance and necessary.

Despite its immense clinical value, there continues to be a lack of a comprehensive ECG interpretation curriculum in medical education programs. The goal should be to encourage the development of organized curriculum in undergraduate and postgraduate medical education programs, and to ensure the acquisition of level-appropriate ECG interpretation skills while maintaining patient safety.

Objective: To assess competency in interpretation of cardiac arrhythmias among Emergency Medical Professionals

*Corresponding author: E-mail: director_schs@siu.edu.in;

Study Design:

Place of Study: Symbiosis Centre for Health Skills (SCHS), Pune India in May 2021.

Methodology: The present study was conducted in May 2021, amongst 200 Emergency Medical Professionals (EMPs) employed in various hospitals in the city of Pune, India. American Heart Association (AHA) – Pre-course Self-Assessment questions were utilized for the study to assess ECG interpretation competency among Emergency Medical Professionals.

Conclusion: The present study highlights the poor ECG competence amongst EMP's. and is limited by its small sample size and interpretation of only three kinds of cardiac rhythms. Yet the study offers, insight on the current gaps in competence and offers simple solutions to improve the scenario.

Keywords: Competency; ECG interpretation; emergency medical professionals; arrhythmias.

1. INTRODUCTION

The PANARhythmia and Heart Failure Registry (PANARM HF) characterized demographic, clinical and interventional therapy indication profiles of cardiac arrhythmia (CA) and heart failure (HF) patients in India. The Cardiac Arrest (CA) / Heart Failure (HF) distribution of patients was: HF – 58%, bradyarrhythmia – 15%, atrial fibrillation – 15%, other supraventricular tachyarrhythmia – 10% and ventricular tachycardia/fibrillation – 4.5%. The CA/HF population comprised of male – 62 % and below age 60 – 45% [1]. The annual number of deaths from Cardiovascular Disease (CVD) in India is projected to rise from 2.26 over the past several decades and have ranged from 1.6% to 7.4% in rural populations and from 1% to 13.2% in urban populations [2].

Electrocardiography (ECG) is a non-invasive tool which is extensively used to understand and analyze a patient's cardiac condition. It provides information about cardiac condition and helps in diagnosing acute coronary syndromes and cardiac arrhythmias [3]. Emergency Medical Professionals (EMP's) handle numerous cases of medical as well as trauma emergencies on a daily basis. EMP's are the first responders prior to hospitalization and the only reliable resource to help in revival of the patient. As it is of high priority, to give the upmost necessary care to the patients, being able to interpret and honing the skills to interpret ECG is of utmost importance and necessary [4,5].

ECG analysis and STEMI diagnosis during pre-hospital management of patients, helps in reducing the on scene and transportation duration and resulted into reduced time required from door to balloon [6,7]. Despite its immense clinical value, there continues to be a lack of a

comprehensive ECG interpretation curriculum in medical education programs. A comparative study reveals that hospital nurses are comparatively more competent than pre-hospital health professionals and EMP's [8].

There seems to exist a lacuna in established ECG reporting methods, resulting in varied ECG interpretation, across many healthcare professionals. The ubiquity of the ECG in clinical practice cannot be denied and thus for acquisition and retention of this clinical skill, computer softwares and artificial intelligence may be used for ECG interpretation [9].

The online ECG-interpretation programmes have proven to be very useful instrument to learn ECG. In addition to the traditional teaching methods, internet-delivered education may be more effective due to easy availability, greater immediacy, improved visualization and interactivity [10]. The goal should be to encourage the development of organized curriculum in undergraduate and postgraduate medical education programs, and to ensure the acquisition of level-appropriate ECG interpretation skills while maintaining patient safety [11].

1.1 Objective

To assess competency in interpretation of cardiac arrhythmias among Emergency Medical Professionals

2. METHODOLOGY

The present study was conducted in May 2021, amongst 200 Emergency Medical Professionals (EMPs) employed in various hospitals in the city of Pune, India. The hospitals included around 30

General Hospitals and 10 Corporate Hospitals. Questions from American Heart Association (AHA) – Pre-course Self-Assessment of the year 2020 [12]. were utilized for the study to assess ECG interpretation competency among Emergency Medical Professionals.

The participants were asked to identify the rhythm by selecting the correct answer from multiple choices given below each image. Each correct interpretation was awarded a score of 1. Hence, the individual score could range from minimum 0 to maximum 15.

The tool consisted of fifteen items questionnaire to test the competence of EMS professionals with regards to ECG interpretation. Each item consisted of an ECG strip depicting the rhythms obtained in clinical conditions of bradyarrhythmia (4), tachyarrhythmia (6), and cardiac arrest (5). The level of difficulty ranged from cardiac arrest rhythms like asystole, ventricular fibrillation being easy to identify to tachycardia rhythms like atrial flutter and in bradycardia, 2nd degree Type 1 which are more complicated and difficult to identify.

The questionnaire was administered to the participants through online mode. Any queries pertaining to the questionnaire were clarified during data collection by researchers.

All fifteen items were required to be mandatorily filled. The respondents were given one-day deadline to revert with responses. Any queries pertaining to the questionnaire were clarified during data collection. 173 respondents reverted with completely filled questionnaire. The data was tabulated and statistically analyzed with the of SPSS version 23.

3. RESULTS

Table 1. Demographic Table

Parameter	Number (Percentage)
Age:	
Less than 25	59 (34.1%)
25 to 30	96 (55.5%)
30 years above	18 (10.4%)
Sex:	
Male	50 (28.9%)
Female	123 (71.1%)
Undergraduate Qualification:	
BHMS	91 (52.6%)
BAMS	58 (33.5%)
BUMS	11 (6.4%)
Others	13 (7.7%)
Work Experience:	
Less than 1 year	91 (52.6%)
1 to 3 years	62 (35.8%)
More than 3 years	20 (11.6%)

Table 2. Responses to Cardiac Arrest Rhythms

Rhythm	Cardiac Arrest
	Number of correct responses (In Percentage)
Ventricular Fibrillation	63 (36.4%)
Pulseless Ventricular Tachycardia	56 (32.5%)
Pulseless Electrical Activity	50 (28.9%)
Asystole	66 (38.2%)

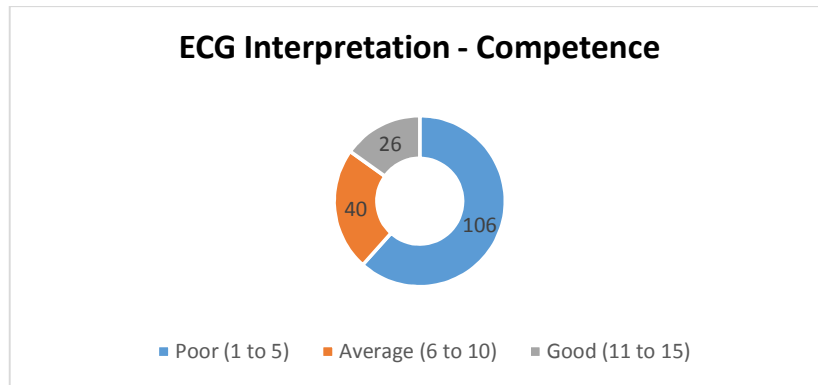


Fig.1. ECG Interpretation –Competence
 The mean individual score obtained was **5.48** out of 15 with Standard Deviation of **4.4**.

Table 3. Responses to Bradyarrhythmias

Bradyarrhythmias	
Rhythm	Number of correct responses (In Percentage)
Sinus Bradycardia	72 (41.86%)
2 nd Degree Heart Block Type I	35 (20.34)
2 nd Degree Heart Block Type II	61 (35.46%)
3 rd Degree Heart Block	46 (26.6%)

Table 4. Responses to Tachyarrhythmias

Tachyarrhythmias	
Rhythm	Number of correct responses (In Percentage)
Atrial Flutter	89 (51.4) %
Monomorphic Ventricular Tachycardia	76 (43.9%)
Supraventricular Tachycardia	80 (46.2 %)

4. DISCUSSION

Emergency Medical Professional's (EMP) are expected to be highly competent in terms of the ECG interpretation. ECG is one of the earliest diagnostic tools utilized during a cardiac emergency. Conditions like cardiac arrest and rhythm abnormalities like bradyarrhythmia and tachyarrhythmia can be immediately detected. Inability to correctly interpret the ECG can cause undue delay in initiating emergency care. This can significantly impact the mortality rate in cardiac emergencies in the Emergency Room.

In the present study, the average score of 5.48 out of 15 obtained by EMP's is dismal. The incorrect interpretation was found across all three categories of ECG i.e. cardiac arrest, bradyarrhythmia and tachyarrhythmia. The lowest result was obtained for the interpretation of 2nd Degree Heart Block Type 1.

The poor score could be attributed to two key reasons; one being lack of focus on ECG interpretation in the Undergraduate academic curriculum and the other being that more than 15% of the respondents had a work experience of less than one year and hence, might have had less exposure to ECG's in their work routine. The findings in the study assume great significance in light of the consequence of incorrect interpretation leading to wrong course of treatment being adopted, thereby increasing the morbidity and mortality in cardiac emergencies.

ECG is a simple, affordable, non-invasive and rapid diagnostic modality, used ubiquitously in emergencies. Hence, greater emphasis should be placed on ECG interpretation competence in the Under Graduate academic curriculum. ECG interpretation should be included in formative and summative assessment, during the UG courses. Medical knowledge being both vast and volatile requires regular re-inforcement. This can be

ensured with the help of regular workshops and seminars which include competence assessment. EMP's should also utilize clinical opportunities offered in the workplace to revise their ECG concepts. They should utilize the experience of their seniors to improve their interpretation.

4. CONCLUSION

The present study highlights the poor ECG competence amongst EMP's. The study is limited by its small sample size and interpretation of only three kinds of cardiac rhythms. Larger sample size studies with more diverse rhythms can be conducted to more accurately assess competence. Yet the study offers, insight on the current gaps in competence and offers simple solutions to improve the scenario.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

Informed consent was taken from the participants prior to the administration of the questionnaire.

ETHICAL APPROVAL

Hat was obtained from Independent Ethics Committee, SIU

COMPETING INTERESTS

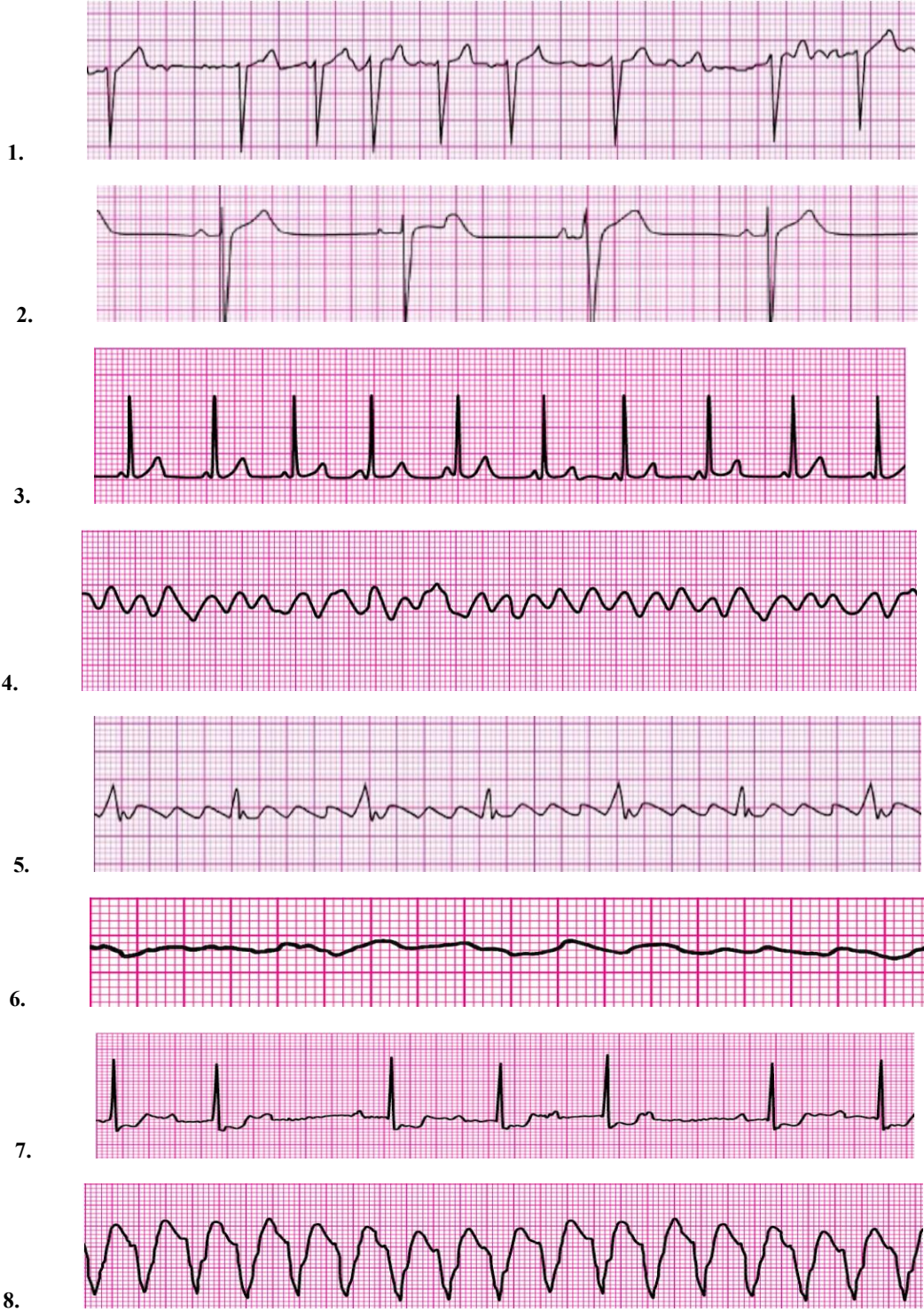
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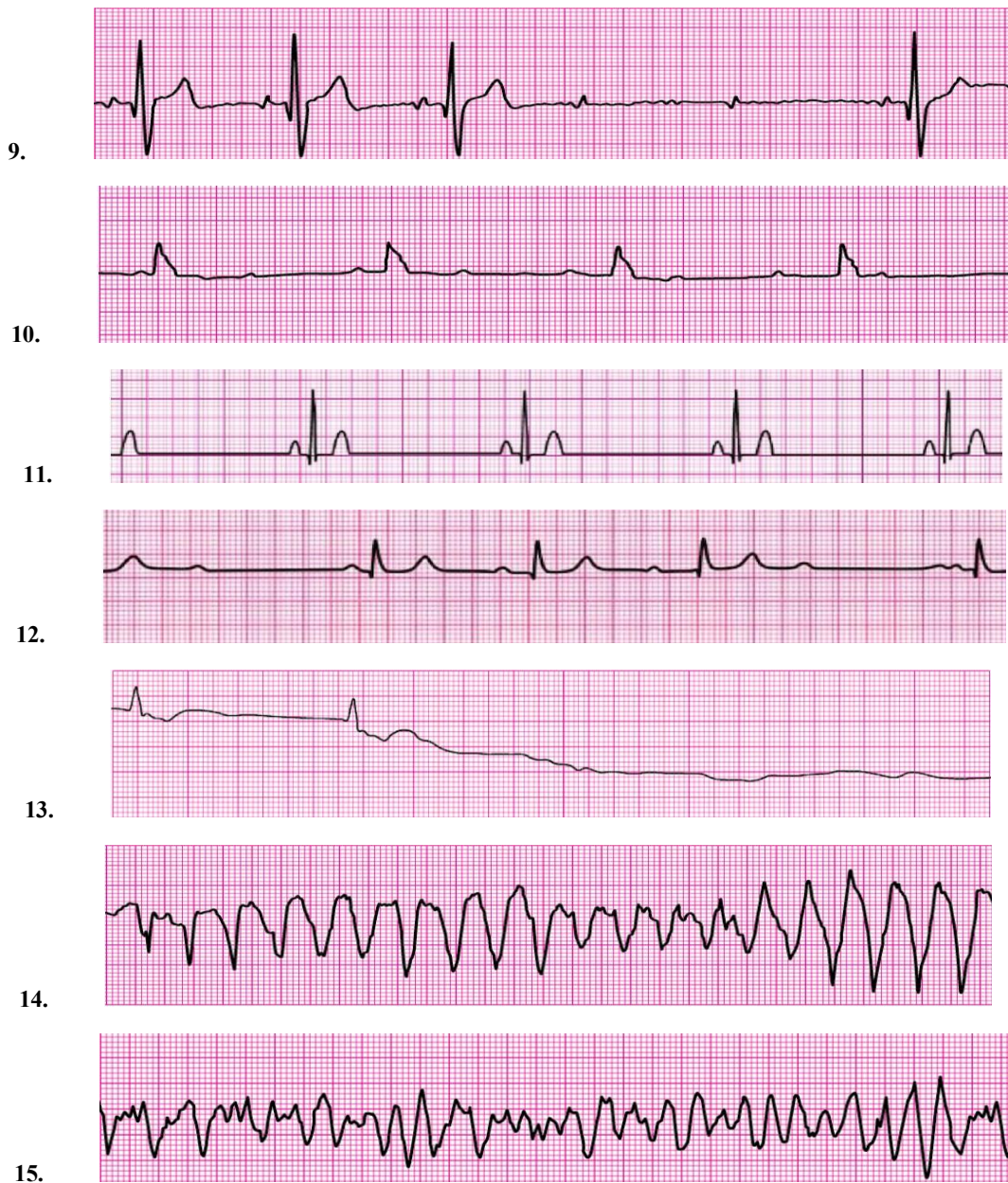
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APPENDIX A

ECG strips below depict rhythms of cardiac arrest, bradycardia and tachycardia





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