

Competency in Clinical Interpretation of EKGs among 4th Year Medical Students



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INTRODUCTION

- Current literature on EKG diagnoses and patient outcomes have shown a gap in the ability of many healthcare providers to provide accurate EKG interpretations.
 - Some sources have suggested that up to a third of EKG readings have an error, with ~11% of these misreadings causing inappropriate treatment.¹
- Researchers are looking towards graduating medical students and new residents as a target for EKG competency studies and training. Yet, these studies have found even worse competency rates.
 - George Washington University School of Medicine (GWUSOM) found alarmingly that graduating 4th-year students had on average, a rate of ~37% correctly diagnosing an EKG strip and an average rate of ~56% in diagnosing life-threatening rhythms.²
- Studies have revealed that changes in undergraduate and postgraduate medical education in teaching EKG interpretation can have better downstream effects on patient care.³
- Overall, has Wayne State University School of Medicine (WSUSOM) provided an adequate education in teaching its graduating students to accurately interpret a 12-lead EKG tracing?

METHODS

- With IRB approval, 4th Year medical students at WSUSOM who had Completed both their Internal medicine and Emergency Medicine clinical rotations were selected and emailed an online survey tool.
- Referencing a study from GWUSOM (Jablonover, et. al), a list of 22 common EKG diagnoses and corresponding 12-lead EKGs were selected from the website ECG Wave-Maven (an Internet-based ECG self-assessment program for students and clinicians).⁴ The EKGs were selected to only contain the major diagnoses of interest with little to no other findings. This list and their corresponding EKGs were sent to five clerkship directors at Wayne State University School of Medicine to assess if they “expect a graduating WSUSOM student to recognize the EKG, and if the selected 12-lead EKG is an appropriate example of the diagnoses.” Based on the feedback received, 19 of the 22 EKGs were considered for the final online survey tool (Figure #1).
- Of the 19 EKGs, six of them represented life-threatening cardiac rhythms, which require immediate identification and intervention. (Highlighted Yellow in Figure #1)
- The final online study tool was created, consisting of three parts:
 - 11 questions that utilized Likert, multiple-choice, or a free response format. These questions asked the participants about their confidence to interpret common and critical EKG rhythms, the perceived adequacy of training in EKG interpretation during medical school, the desire for additional EKG training, how they were taught EKG interpretation during medical school, medical specialty they wish to pursue, importance of the ability to accurately interpret EKGs for their future career, and the estimated number of times each participant was asked to interpret an EKG during medical school.
 - 8 multiple choice questions about EKG basics. These questions pertained to the general aspects of EKG strip, such as seconds represented by a small and large boxes and the characteristics of normal sinus rhythm including normal HR, P-waves, P-R interval, QRS complex, T-wave, and the QTc interval.
 - A section of 19 EKGs consisting of a free response asking, “What is your main diagnosis?”. The survey also asked students a Yes or No multiple-choice question if the rhythm is immediately life threatening?
 - Free Responses were machine graded on Qualtrics with all incorrect answers being double-checked by hand.

SURVEY TOOL

Figure #1: List of EKGs used for Survey Tool

- Ventricular Fibrillation – Immediately life-threatening
- Anterior Ischemia – Immediately life-threatening
- Atrial Fibrillation
- Atrial Flutter
- STEMI - Immediately life-threatening
- Sinus Arrhythmia/ Respiratory sinus arrhythmia
- Sinus Tachycardia
- SVT/PSVT
- Torsades de Pointes - Immediately life-threatening
- Premature Atrial Complexes
- PVCs
- Ventricular Tachycardia - Immediately life-threatening
- Right Bundle Branch Block
- First Degree Heart Block
- Complete Heart Block - Immediately life-threatening
- Hyperkalemia
- Left Bundle Branch Block
- Left Ventricular Hypertrophy
- Long QT

Figure #2: Example of question on Survey Tool

Using the image below, please answer the following questions.

What is your main diagnosis?

Is this rhythm immediately life threatening?

Yes
 No

OUTCOMES

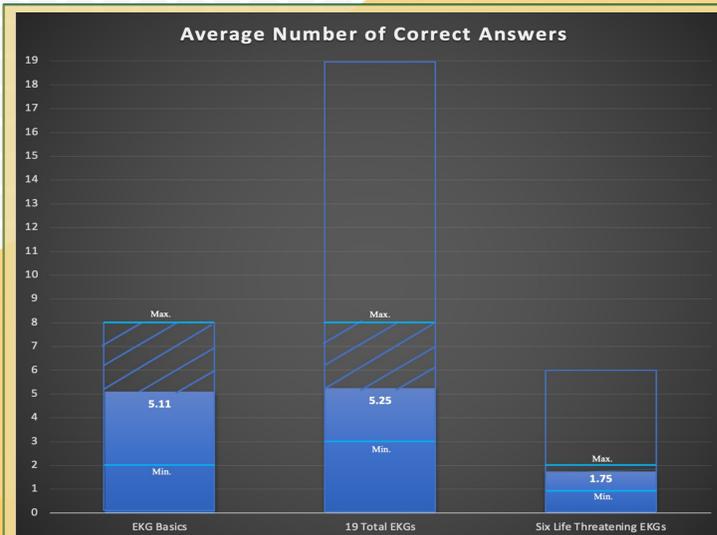
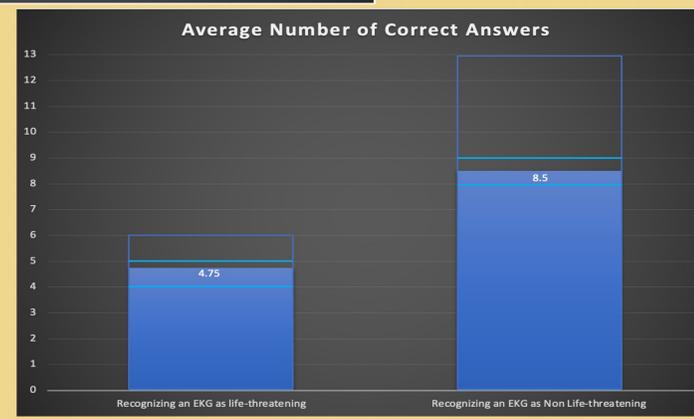


Figure #3: Mean number of correct answers on the EKG basics section (n=9) and diagnosing EKG sections of the survey tool (n=5).

Figure #4: Mean number of correct answers in recognizing a life-threatening EKG and recognizing a non-life-threatening EKG (n=5).



RESULTS

- Nine 4th year WSUSOM Medical Students responded to the emailed survey. 4 students did not complete the EKG diagnoses portion of the survey tool.
- The specialties that students reported on planning to practice were Anesthesiology (n=3), Emergency Medicine (n=2), General Surgery (n=1), Cardiology (n=1), Internal Medicine (n=1), and Radiology (n=1).
 - Most of the students were confident in their ability to interpret a 12-lead EKG rhythm strip, rating it 7.78/10 on a Likert scale.
 - Students found it important to be able to accurately interpret EKG's their future work as attending physicians in their field, rating it on average 8.67/10 on a Likert scale.
 - There was no major difference in specialty of interest and corresponding number of correct answers in the survey. (p >.05)
- There was a wide distribution in the reported number of EKGs interpreted by students during their time in med school ranging from (1-5) to (51-60).
 - There was no major difference in reported number of EKGs interpreted and the corresponding number of correct answers in the survey. (p >.05)
- The most common methods that students reported learning interpretation of EKGs was from lectures and while on rounds during their clerkships.
- All students reported interest in receiving more training in EKG interpretation during medical school

DISCUSSION

- The major finding of this study thus far, is that 4th Year medical students here at WSUSOM have a less than desirable ability to interpret common and critical 12-lead EKG rhythms. Similar to other rates reported across the country.
- While the specific diagnoses of EKG rhythms may be poor, 4th year students are mostly competent in being able to tell if a rhythm is life-threatening. However, they may be more prone to over-diagnose an EKG as life-threatening.
- 4th year students here at WSUSOM find the EKG to be an important diagnostic tool and are receptive to receiving more training with it during their time in school.
- The biggest flaw of this study, is the number of participants that took part and fully completed the survey. Overall, as more WSUSOM students complete their Emergency Medicine rotation this year, this study will gain more participants improving the overall quality and power of data collected.
- All in all, increased training in the interpretation of 12-lead EKGs should be considered by WSUSOM for their curriculum to enhance students' abilities.

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