Competency in Electrocardiogram interpretation among sixth year undergraduate medical students at Maseno University, Kenya: Pre-test-Post-test Quasi Experimental study Design

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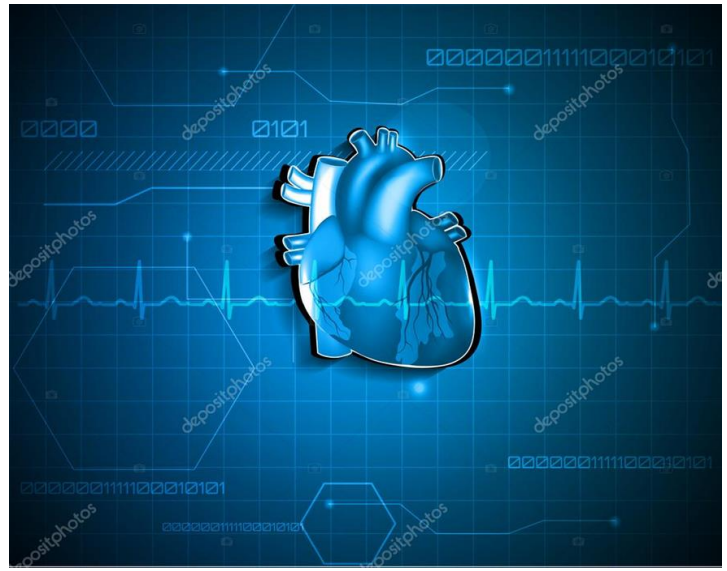

Introduction

- Electrocardiogram (ECG) examination is one of the most frequent administered diagnostic tests [1].
- Important test in diagnosing various cardiovascular abnormalities [1].
- Competency in accurate reading of an ECG can be lifesaving [2].
- Incorrect interpretation of ECG results in adverse patient outcomes [3].
- Competency in ECG interpretation is expected from graduating medical students

Study objective

- To evaluate the competency in ECG interpretation among sixth year undergraduate medical students at Maseno University, Kenya.

Methodology

- **Study design :**

This was a one-arm Pre-test-Post-test **quasi experimental study.**

Methods:

- 20 questions were administered focusing on the ability of the medical students to identify abnormal and normal ECG patterns.
- The patterns were for common conditions encountered in practice.
- These questions were administered to the medical students before and after they were taught ECG interpretation during cardiology lectures.
- The questions were shuffled during post-test evaluation.

Methodology

Data analysis

- Statistical Package for Social Sciences version 25 was used to analyze the results.

- Paired t-test and descriptive statistics was used in the data analysis

Results

- In this study, a total of 61 sixth year undergraduate medical students at Maseno University participated.

- Mean performance at **Pre-test was 58.11%** and **after the teaching was 74%.**

- The **ST elevation myocardial infarction** and **atrial flutter** were both **correctly interpreted** by the students scoring a mean of **90.2% at Pre-test** and **96.7% at Post-test**.

- The study observed a **decline in performance** with regards to interpretation of **left bundle branch block** where the students scored a mean of **27.9% at Pre-test** and **24.6% at Post-test**.

Results

- The paired samples had a positive correlation of **0.219** implying that students who scored very low in Pre-test tend to improve by scoring higher marks after the training in their Post-test evaluation.

- In the actual statistical test, it was observed that the mean difference was -15.902, with a 95% confidence interval of the mean difference -19.342 to -12.461. The t value was -9.246 and the degree of freedom was 60 and the P value **< 0.0001***

Results

ECG patterns	Pre-test % (n)	Post-test % (n)
• Normal ECG	85.3% (52)	100% (61)
• Atrial fibrillation	52.5% (32)	77.1% (47)
• ST elevation myocardial infarction	90.2% (55)	96.7% (59)
• Non ST elevation myocardial infarction	49.2% (30)	52.5% (32)
• Hyperkalemia	78.7% (48)	83.6% (51)
• Atrial flutter	90.2% (55)	95.1% (58)
• Left bundle branch block	27.9% (17)	24.6% (15)**
• Right bundle branch block	19.7% (12)	31.2% (19)
• Sinus bradycardia	88.5% (54)	96.7% (59)
• Third degree heart block	18.0% (11)	65.6% (40)

Results

ECG patterns	Pre-test % (n)	Post-test % (n)
• Sinus tachycardia	90.2% (55)	95.1% (58)
• First degree heart block	34.4% (21)	34.4% (21)
• Premature ventricular contractions	49.2% (30)	60.7% (37)
• Ventricular tachycardia	75.4% (46)	98.4% (60)
• Acute pericarditis	16.4% (10)	34.4% (21)
• Left ventricular hypertrophy	34.4% (21)	47.5% (29)
• Asystole	75.4% (46)	88.5% (54)
• Ventricular tachycardia	70.5% (43)	88.5% (54)
• Right ventricular hypertrophy	54.1% (33)	81.9% (50)
• Supraventricular tachycardia	73.8% (45)	96.7% (59)

Discussion

- The findings of this current study showed average performance at pre-test and good performance at post-test in ECG interpretation.

- The results of this study was inconsistent with several studies globally, regionally and locally [4, 5, & 6] that recorded suboptimal performance.

- Other studies [2, 7, & 8] have also demonstrated low overall levels of competency among junior doctors regardless of grade.

Discussion

- This present study attributes the good performance in ECG interpretation at Pre-test to emergency medicine teachings administered while in their fifth year.

- Our hypothetical reason for the good performance is consistent with a study [13,] that observed that competency in ECG interpretation significantly improves by increased exposure to ECG, instructional and occupational experience

Discussion

- In our study, summative approach was used in the assessment of competency in ECG interpretation among the students.

- **Studies [4, 9] have shown that it is not possible to recommend a specific teaching method over another because different strategies will be optimal for different learners, and there is no single medical pedagogy that is superior to another.**

- **Student centered learning** and **formative teaching** have poor outcomes when it comes to ECG interpretation skills [9].

Study limitation

- The study did not adopt a comparison or control group, hence these findings cannot authoritatively demonstrate that the teaching after the Pre-test had a reliable effect on the performance as demonstrated in the Post-test results

Conclusion

- There was a statistically significant improvement in the Electrocardiogram interpretation among sixth year undergraduate medical students at Maseno University, Kenya after formal teaching.

- Competency in ECG interpretation among medical students remains a critically important diagnostic tool in medicine since these diagnosis have serious implications for the patient care.

Recommendation

- Adopt a two-arm Pre-test-Post-test quasi experimental study design so that a reliable effect of teaching is established.

- To facilitate better ECG interpretation skills, undergraduate curriculum to consider having repeated teaching to enhance competency.

Thank you for your time and attention

Selected references used

Abdalla, A. A., & Khanra, D. (2022). Electrocardiography Interpretation Proficiency Among Medical Doctors of Different Grades in the United Kingdom. *Cureus*, *14*(9).

Al Mousa, A. M., Alhubail, F. M., Almulhim, M., AlBeladi, B. A., Almulhim, N. A., Almulhim, A. A., ... & Algouf, I. (2023). Electrocardiogram interpretation competency of medical interns in Saudi Arabia: a cross-sectional study. *Cureus*, *15*(4).

Breen, C. J., Kelly, G. P., & Kernohan, W. G. (2022). ECG interpretation skill acquisition: A review of learning, teaching and assessment. *Journal of electrocardiology*, *73*, 125-128.

Jablonover, R. S., Lundberg, E., Zhang, Y., & Stagnaro-Green, A. (2014). Competency in electrocardiogram interpretation among graduating medical students. *Teaching and learning in medicine*, *26*(3), 279-284.

Oluga Fredrick. (2019). Competencies in ECG interpretation among newly Graduated Medical students at University of Nairobi, School of Medicine. Mmed Thesis

Vishnevsky, G., Cohen, T., Elitzur, Y., & Reis, S. (2022). Competency and confidence in ECG interpretation among medical students. *International Journal of Medical Education*, *13*, 315.

Waechter, J., Reading, D., Lee, C. H., & Walker, M. (2019). Quantifying the medical student learning curve for ECG rhythm strip interpretation using deliberate practice. *GMS journal for medical education*, *36*(4).