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EKG Technology: It Is Time For A Change!

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EKG Technology: It Is Time For A Change!

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Other authors/contributors involved in project: Ryan Centanni, Ashley Sherman, Jessica Kline, DO, Christopher W. Follansbee, MD

IRB Number: STUDY00001907

Describe role of Submitting/Presenting Trainee in this project (limit 150 words): I assisted in data collection and analysis of the completed EKG readings. After summarizing our results with the help of our statistician, I composed the abstract to submit for review.

Background, Objectives/Goal, Methods/Design, Results, Conclusions limited to 500 words

Background: Technology for obtaining pediatric EKGs has not changed in over 70 years. Current guidelines recommend a 12-lead EKG, which takes approximately 7 minutes to complete. Newer adult technology utilizes between 1-6 leads for EKG analysis. There has not been a study in pediatrics to assess the minimum number of leads required to attain diagnostic accuracy.

Objectives/Goal: To determine the appropriate number of leads needed to read pediatric EKGs safely and accurately.

Methods/Design: This is a single center systematic review that included randomly selected EKGs from our hospital database (2017-2020) read by two independent pediatric electrophysiologists. Standard 12-lead EKGs were reviewed; then utilizing an overlay technique, 8 lead (limb + V1/V6) and 6 lead (limb only) variations were reviewed. EKGs with missing leads were excluded.

Results: We reviewed a total of 600 pediatric EKGs, 200 of each lead type (age range 2 weeks-21 years old). When comparing the 12-lead to 6 and 8-lead, there was almost perfect agreement with regard to rhythm identification (97.5-100%, K 0.85-1) and substantial agreement when measuring specific intervals (97.5-100%, K 0.66-1). The 8-lead compared to the 12-lead EKG showed substantial agreement when identifying certain EKG patterns including atrial enlargement, axis deviation, bundle branch block and left ventricular hypertrophy (97.5-100%, K 0.66-1), with moderate agreement for right ventricular hypertrophy and ST elevation (98-98.5%, K -0.49-0.57).

Specific EKG patterns (including ventricular hypertrophy, right bundle branch block, and prominent mid precordial voltages) were not detected on the 6-lead EKG, likely due to the exclusion of precordial leads. There was a high percent agreement (92.5-100%) amongst the two reading pediatric electrophysiologists.

Conclusions: An 8-lead EKG (limb + V1/V6) has almost perfect rhythm identification, substantial interval measurement and EKG pattern agreement when compared to a 12-lead EKG. The 6-lead EKG (limb only) was not deemed sufficient to maintain diagnostic accuracy in pediatrics as it was not able to detect specific and critical EKG patterns. We are hopeful this information can lead to future advancements in EKG technology in pediatrics, improving efficiency without compromising accuracy.