

670 Improved Interpretation of Atrial Dysrhythmias by a New Neural Network Electrocardiogram Interpretation Algorithm

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Background: Computer electrocardiogram (ECG) interpretation (Int) algorithms (Alg) aim to improve physician (MD) ECG Int, reduce medical error, and expedite patient care. Automated Int may be overread by the MD and changed if necessary, with both Int recorded. We sought to assess both 1) the accuracy of a neural network ECG Alg (CardioLogs®, [CL-Alg]) in Int of atrial dysrhythmias, and 2) the effect of incorrect automated Int on the accuracy of MD overread.

Methods: Consecutive 12 lead 500Hz ECGs over 6 months at one institution in 2016 were interpreted by 1) Veritas® Alg (V-Alg), 2) MDs, either emergency MDs or cardiologists, who overread V-Alg and recorded a final Int (V-Alg + MD), and 3) CL-Alg. We selected ECGs with diagnosis of atrial tachycardia, fibrillation, or flutter (AT-AF-AFL) according to V-Alg or CL-Alg. From these 858, 500 were randomly selected. Two blinded experts reviewed each ECG and classified it into either "AT-AF-AFL" or "other rhythm." For discrepancies, a third expert was tiebreaker. V-Alg, CL-Alg, and final overread (V-Alg+ MD) were compared. Statistics were by percentages (95% CI) and Chi Square.

Results: 400 of 500 had an expert classification of AT-AF-AFL; 100 had ≥ 1 false positive (FP) automated interpretation (70 were sinus rhythm). Sensitivity of both Alg was similar (97.5% for CL-Alg, 96.0% for both V-Alg and V-Alg +MD). Accuracy of CL-Alg vs. V-Alg was 92.6% (95%CI 90.0-94.6) vs. 80.0% (95% CI 76.3-83.3) ($p < 0.0001$); CL-Alg had significantly fewer FP than V-Alg (27 vs. 84). Accuracy of V-Alg+MD, at 89.8% (95%CI: 86.8-92.2), was not significantly lower than CL-Alg ($p = 0.11$). When V-Alg was correct, accuracy of V-Alg + MD was 97.5% (95%CI 96.1-98.9), but when V-Alg was incorrect, it was only 59.0% (95%CI 54.7-63.3) ($p < 0.0001$) and CL-Alg was 86.0% (95%CI 92.2-96.3) ($p < 0.0001$). V-Alg+MD was not different between EPs and Cardiologists.

Conclusion: V-Alg had many FP for AT-AF-AFL; only 59% of V-Alg errors were corrected by the MD. CL-Alg was more accurate than V-Alg, with fewer FP. Uncorrected CL-Alg Int were not significantly more accurate than V-Alg+MD final overread interpretations; however, when V-Alg was incorrect, CL-Alg Int were significantly more accurate than final V-Alg+MD overreads. Neural network ECG Int software can improve both automated and final Int of atrial dysrhythmias.