Universal ECG™: The Cardionics/Louvaine ECG Algorithm

Note: The information in this document applies to the Universal ECG and Office Medic with Cardionics ECG Narrative Interpretation 2.0 and higher.

History

The narrative ECG interpretation algorithm available with the QRS Universal ECG was developed in the early 1990s by Cardionics, S.A. of Brussels, Belgium, in conjunction with the University of Louvaine Medical School. The developers sought to add patient-centered features to the interpretive algorithm. By building various patient demographic attributes into the decision tree within the algorithm it was able to weight quantitative scalar parameters, wave amplitudes and durations, with clinical data (sex, age, height and weight).

Research

In 1991, clinical researchers evaluated nine popular ECG algorithms compared to eight cardiologists relative to a standardized database of ECG tracings.[1] The results in the table below show that the original Louvaine algorithm had the best total accuracy of all the algorithms (77.3%). It also was the best in correctly diagnosing Myocardial Infarction (82.1%) and the second best in diagnosing Ventricular Hypertrophy, which were both better than the respective combined scores of the eight cardiologists.

	Control Patients N=382	Ventricular Hypertrophy N=291	Myocardial Infarction N=547	Total Accuracy N=1220
	percent correct diagnosis			
Padova	89.8	61.3	47.1	62.0
Nagoya-Fukuda	89.3	42.6	63.7	65.6
IBM Medis	91.3	49.4	62.5	67.6
HP (Agilent)	93.5	51.0	64.5	69.3
Glasgow	94.0	51.0	67.7	69.7
GE (Marquette)	86.3	61.1	69.7	69.7
Means	97.1	42.5	67.2	69.8
Hannover	86.6	72.1	79.0	75.8
Louvaine (Louven)	91.5	67.0	82.1	77.3
8 Cardiologists Combined Scores	97.1	60.4	80.3	79.2

Ranking
1st **Highest Percent Correct**
2nd **Highest Percent Correct**
3rd **Highest Percent Correct**

Peer Review of the Cardionics Program

In 1994, clinical researchers evaluated the New Cardionics algorithm using the same methodology as the clinical study above.[2] The following results were compared to the other eleven programs tested (Louvaine VCG, Marquette ECG, Hewlett-Packard ECG, Medis IBM ECG, Nagoya-Fukuda ECG, Lyon VCG, Glasgow ECG, Porto VCG, Padova ECG, Means VCG and Means ECG). The New Cardionics program had:

- The highest score of total and partial accuracy at 73%.
- The second highest rating for distinguishing between normal and abnormal patients 94.8%.
- The highest sensitivity to AMI (Anterior Myocardial Infarction) at 81.8% with only 3.6% false positives for non-AMI cases.
- The second highest sensitivity to detection of IMI (Inferior Myocardial Infarction at 73.4%.

[1]Willems, J.L., et al., "The Diagnostic Performance of Computer Programs for the Interpretation of Electrocardiograms", New England Journal of Medicine (1991); 325:1767-1773.

[2]Li, G.P., et al., "The New Cardionics ECG Program and Its Comparison with Other Programs", Japanese Heart Journal (1994); 35 (Supplement):257-258.

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