Device-based discriminators to improve performance of arrhythmia detections in an insertable cardiac monitor

Fujian Qu
Fady Dawoud
Benjamin Coppola
Joanna Urbanski
Neha Malhotra
John Gill
Pritika Toutam
Kyungmoo Ryu
Avi Fischer

Introduction: Insertable cardiac monitors (ICMs) are being increasingly used to diagnose arrhythmias. An enhancement in arrhythmia diagnostic algorithms in Confirm Rx™ ICM was sought to improve the detection of arrhythmias while maintaining sensitivity. The objective of this study was to develop and validate new discriminators to reduce the incidence of inappropriate detections of bradycardia, pause, and atrial fibrillation (AF) episodes.

Methods: Stored electrograms (SEGMs) of episodes detected by Confirm Rx ICM were adjudicated and the root cause of inappropriate detections characterized. One set of SEGMs (training set) was used to develop new discriminators. A second set of SEGMs (validation set) was used to validate the new discriminators by applying the discriminators to existing detections of pause/bradycardia/AF episodes. The percentage of reduction in false positives and true positives by the discriminators was determined.

Result: For the training set, 3,804 bradycardia, 3,164 pause, and 59 AF detections were used from 53, 87, and 14 patients, respectively. The training set revealed that undersensing of low amplitude signals was the primary reason for inappropriate pause/bradycardia detection. Sinus rhythm with irregular R-R intervals, frequent ventricular premature contractions, and inaccurate R wave sensing contributed to inappropriate AF detection. The validation set consisted of 1,411 bradycardia, 2,265 pause, and 136 AF detections from 790, 928, and 35 patients, respectively. The new discriminators reduced inappropriate bradycardia, pause, and AF episodes by 99%, 99%, and 61%, respectively, with minimal reduction in sensitivity (100%, 98%, and 99% retained, respectively).

Conclusion: These results demonstrate that discriminators substantially reduce inappropriate Confirm Rx ICM detection with minimal effect on sensitivity. Implementation of these new algorithms may lead to reduced episode review burden, improved clinic workflow, and improved patient management.