Reliable detection of atrial fibrillation with a medical wearable under inpatient conditions (CoMMoD-A-fib)

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Background: Atrial fibrillation (A-fib) is the most common arrhythmia; however, detection of A-fib is a challenge due to irregular occurrence.
Purpose: Evaluating feasibility and performance of a non-invasive medical wearable for detection of A-fib.
Methods: In the CoMMoD-A-fib trial admitted patients with a high risk for A-fib carried the wearable and an ECG Holter (control) in parallel over a period of 24 hours under not physically restricted conditions. The wearable with a tight-fit upper arm band employs a photoplethysmography (PPG) technology enabling a high sampling rate. Different algorithms (including a deep neural network) were applied to 5 min PPG datasets for detection of A-fib. Proportion of monitoring time automatically interpretable by algorithms (= interpretable time) was analyzed for influencing factors.
Results: In 102 inpatients (age 71.0±11.9 years; 52% male) 2306 hours of parallel recording time could be obtained; 1781 hours (77.2%) of these were automatically interpretable by an algorithm analyzing PPG derived intervals. Detection of A-Fib was possible with a sensitivity of 92.7% and specificity of 92.4% (AUC 0.96). Also during physical activity, detection of A-fib was sufficiently possible (sensitivity 90.1% and specificity 91.2%). Usage of the deep neural network improved detection of A-fib further (sensitivity 95.4% and specificity 96.2%). A higher prevalence of heart failure with reduced ejection fraction was observed in patients with a low interpretable time (p=0.080).
Conclusion: Detection of A-fib by means of an upper arm non-invasive medical wearable with a high resolution is reliably possible under inpatient conditions.