

Screening for atrial fibrillation using only a smartphone application: a new tool to unlock digital screening?

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Objectives:

Opportunistic screening for Atrial Fibrillation (AF) is proven to be important and effective in identifying cases of untreated, frequently asymptomatic AF. This work focuses on the performance evaluation of using a smartphone application FibriCheck as a screening tool during the week of the heart rhythm (WHR).

Methods

Participants presented themselves voluntarily at the screening sites (AZ Delta, Roeselare or Ziekenhuis Oost-Limburg, Genk) during the WHR. Screening was done using sequential measurements a single lead ECG device (Alivecor, 30 seconds) and a software only smartphone application based on photoplethysmography (PPG) (FibriCheck, 60 seconds). Alivecor measurements were performed by placing both hands on two electrodes while the FibriCheck requires to place the finger on the smartphone camera. Additionally, demographic and background questionnaires were obtained. If one of the screening technologies indicated an irregular rhythm a 12-lead ECG was taken for verification by the cardiologist on site.

Results

In total 1056 participants were screened, 41% was male. The overall mean age was 59 ± 15 years with a mean BMI of 26 ± 10 . In total 31% had no risk factors for AF, 34% had 1 risk factor, 19% had 2 risk factors and 16% had two or more risk factors. The screening resulted in the identification of 8 AF cases, 1026 regular sinus rhythms and 22 irregular rhythms (bigeminy, trigeminy, supraventricular arrhythmia). The AF cases had a CHADS₂-VASc score of 3 ± 1.18 . The Alivecor application had a sensitivity of 100% and specificity of 99.6% for the detection of atrial fibrillation, while the FibriCheck application had a sensitivity of 100% and a specificity of 95.8% for the detection of atrial fibrillation. Overall quality of the FibriCheck and Alivecor measurements was automatically determined and was unreadable/unusable in 2.9% and 3.8% of the cases respectively. These cases required an additional measurement to obtain a diagnosis. No correlation was found between the cases with bad quality measurements for both measurement techniques.

Conclusion

The obtained results indicate that detection of pulse intervals based on PPG is a sensitive and accurate screening tool for the detection of atrial fibrillation and has a high level of agreement with the results obtained using the single lead ECG. The use of a smartphone-only application could unlock the potential of digital screening and support case finding of atrial fibrillation in selected population at risk for atrial fibrillation.