Evaluating smartphone based photoplethysmography as a screening solution for atrial fibrillation: A digital tool to detect AF?

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Atrial Fibrillation (AF) is the most common heart rhythm disorder with a prevalence of 1-2%, with many health consequences, such as stroke and heart failure.

Screening initiatives have been world wide employed to detect atrial fibrillation
Screening is based on using hardware tools based on electrocardiographical recordings
Recently camera based photoplethysmography shows promising application in the area of ease of use, ubiquitous and scalable applications for heart rate and heart rhythm analysis

To compare the performance between photoplethysmography (PPG) and single lead ECG based smartphone applications during a national incentivized screening initiative

A screening event was organised in a multi-center context where participants presented themselves
Screening was done using a:
• Single lead ECG device (Alivecor, 30 sec) measured between both hands
• Camera based photoplethysmography (FibriCheck, 60 sec) using the finger tip on the smartphone camera

Demographic and background questionnaires were obtained
If one of the devices indicated an irregularity a 12-lead ECG was taken and revised by a cardiologist on site

The use of a smartphone application based on PPG in a screening setting resulted in good results compared to a single lead ECG device. This opens the perspective for future work and applications to employ camera based systems in the context of screening and monitoring of atrial fibrillation

Introduction

Objective

To compare the performance between photoplethysmography (PPG) and single lead ECG based smartphone applications during a national incentivized screening initiative

Methods

Results

Conclusion

Baseline demographics

<table>
<thead>
<tr>
<th># of participants</th>
<th>n=1056</th>
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<tr>
<td>Sex (male)</td>
<td>433 (41%)</td>
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<tr>
<td>Age</td>
<td>59±15 years</td>
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<tr>
<td>BMI</td>
<td>26±10</td>
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AF-cases detected | 8
Regular rhythms | 1026
Irregular rhythms | 22
CHADS2Vasc2 AF cases | 3±1.25

Baseline demographics (n=1056)

1056 patients were screened, 41% was male. The overall mean age was 59 ±15 years
In total 8 AF cases were identified, 1026 regular sinus rhythms, 22 irregular rhythms (i.e. bigeminy, ectopic beats, ...)

Q1: Quality performance between smartphone based screening devices
(100% data)
Sens/Spec/Acc 100%/99.6%/99.8%
Q2: Diagnostic capability of the automated algorithm for AF discrimination
(89% data)
Sens/Spec/Acc 100%/99.6%/99.8%

Q3: Diagnostic capability of the entire application
(100% data)
Sens/Spec/Acc 100%/99.8%/98.6%

Q4: Diagnostic capability for automated irregular rhythm detection (event recording)
(94% data)
Sens/Spec/Acc 66%/93.1%/79.5%

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