The feasibility and outcome of atrial fibrillation screening using intermittent electrocardiogram in a primary health care setting: A cross-sectional study

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Abstract

Background

Atrial fibrillation (AF) is a major risk of ischemic stroke unless treated with anticoagulant. Detection of AF can be difficult because AF is often paroxysmal and asymptomatic. The aim of this study is to develop a screening model for detecting AF in a primary health care setting and to start oral anticoagulant therapy in high risk patients to prevent stroke.

Methods and Findings

A cross-sectional study. All of 70- to 74-year-old individuals registered at a single primary health care centre in Stockholm were invited to AF screening upon visiting the centre during a ten-month period. Those who did not have contact with the centre during this period were invited to participate by letter. Intermittent ECG recording, 30 seconds twice a day, using a hand-held Zenicor device over a 2-week period, was offered to participants without AF. Oral anticoagulant therapy was offered to patients with newly detected AF.

A total number of 324 (78.1%) out of 415 identified persons participated in the study. The mean age of the participants was 72 years, 52.2% were female and the median CHA2DS2-VASc was 3. Previously diagnosed AF was found in 34 (8.2%) persons in the target population. Among participants without previously known AF, 16 (5.5%) cases of new AF were detected. The final AF prevalence in the target population was 12%. Initiation of oral anticoagulant therapy was successful 88% of patients with newly detected AF.

Conclusions

The AF screening project showed a high participation rate and yielded a high rate of newly discovered AF of which 88% were able to be treated with oral anticoagulant.

Citation: Faris Ghazal The feasibility and outcome of atrial fibrillation screening using intermittent electrocardiogram in a primary health care setting: A cross-sectional study. **protocols.io**

dx.doi.org/10.17504/protocols.io.m2fc8bn

Published: 03 Feb 2018

Protocol

Design and Selection

Step 1.

Design: Cross sectional screening study.

Study population: All individuals born 1941 to 1945 and who were registered at Högdalen Primary Health Care Centre in Stockholm during 2015.

Inclusion criteria: All individuals in the target population who agreed to participate in the study.

Screening period: From February, 2015 to February, 2016.

Ethics approvals: This study was performed in accordance with the Helsinki declaration. The study has been approved by the Ethics Committee of Stockholm (DNR 2014/2061–31 and 2017/129-32).

Screening procedure

Step 2.

1-Individuals with previously known AF were invited for routine physician visit in the PHCC for follow up according to national recommendations. Anticoagulant therapy was suggested to individuals with previously known AF but who did not received such treatment.

2-Individuals without previously known AF and who visited the PHCC for health consultations during the inclusion period were invited to participate in the screening program. The remaining individuals who did not visit the PHCC during the first 10 months of the inclusion period received two written invitations to participate.

3-Participants received written and oral information about the study. All participants gave their informed consent to participate by signing and submitting forms before entering the study.

4-The responsible physician in the PHCC took participants' medical histories including their current medications and performed a general medical examination on them that included taking blood pressure measurement and fasting plasma glucose level.

5-Participants without previously known AF were examined with a 12-lead electrocardiogram (ECG).

6-When ECG did not show AF, intermittent ECG recordings were performed for 30 seconds twice a day

and in case of palpitations for at least two weeks. Prolonged recording was used in cases of infrequent recording as well as in cases of suspected arrhythmia. A Zenicor handheld ECG with an integrated mobile transmitter was used.

7-When handheld ECG findings showed AF or any other suspected pathological finding, the ECG was re-examined by an experienced cardiologist in order to confirm the diagnosis. Individuals with unclear or uninterpretable ECG were further investigated with Holter.

8-Oral anticoagulant (OAC) was offered to those patients with newly detected AF.

Definition of the variables

Step 3.

1-Atrial fibrillation was defined, according to ESC guidelines as 30-second recording with absolutely irregular rhythm without distinct p-waves.

2-The CHA2DS2-VASc score was used to assess risk for systemic thromboembolism. Patients' medical records were used to evaluate cardiovascular morbidities among non-participants. Both medical history and patients' medical records were used to detect cardiovascular and other non-cardiovascular morbidities among participants.

3-CHF was defined according to guidelines of ESC as typical symptoms (e.g. breathlessness, ankle swelling and fatigue) caused by a structural and/or functional cardiac abnormality. Plasma NT-proBNP test and echocardiography were used for diagnosis of unclear cases.

4-For diagnosis of hypertension, ESC guidelines were used as brachial artery resting systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg at least on two different occasions. Bilateral digital blood pressure measurement at rest in the sitting position was used.

5-For diagnosis of diabetes mellitus, fasting plasma glucose ≥7.0 mmol/L at two different occasions was used according to recommendations from the World Health Organization

6-Alcohol consumption was assessed as number of consumed standard alcohol glasses per week, where standard alcohol glass contains 12 grams of pure alcohol.

7-EQ visual analogue scale, a standardized measure of health status developed by the EuroQol Group,

was used as a quantitative measure of participants' self-health assessment.

Statistical analyses

Step 4.

1-Descriptive statistics: Categorical data were summarized by counts and percentages whereas continuous data were described by mean (with standard deviation) or median (with interquartile range).

2-Analyses: The Fisher's exact test was used to analyse categorical variables. Student`s *t*-test or Mann-Whitney test were used to compare continuous variables between two groups. Analysis of variance or Kruskal-Wallis test were used to compare continuous variables among three groups. And if these tests show statistically significant results then Bonferroni or Dunn test respectively were used as post hoc test.

3-Odds ratio with 95% confidence interval was used to test the association between AF and risk factors. For all tests, a probability value ≤ 0.05 was considered statistically significant. These analyses were performed using Stata statistic program version 10.