Assessment of Remote Heart Rhythm Sampling Using the AliveCor Heart Monitor to Screen for Atrial Fibrillation: The REHEARSE-AF Study

Halcox JPJ, et al. *Circulation*. 2017;136:1784-1794.

Background

Atrial fibrillation (AF) is the most common arrhythmia in clinical practice, affecting approximately 33 million people globally

AF is associated with an approximately 5-fold increased risk of stroke, which may serve as the initial clinical manifestation of undiagnosed AF

Stroke in patients with AF is associated with an increased risk of neurologic and medical complications, worse clinical prognosis, and higher in-hospital mortality compared with patients without AF

Annual costs attributed to strokes in the United States are $103.5 billion

Oral anticoagulant therapy (eg, warfarin) has been shown to reduce the risk of stroke in patients with AF by approximately 60% and death by 25% compared with no antithrombotic therapy, highlighting the need for early identification, risk stratification, and treatment initiation

Conventional electrocardiogram (ECG) and ambulatory devices can only capture episodes of AF over a limited period of time, delaying diagnosis and potentially prolonging time in AF and increasing the risk of complications

Objectives

This 1-year, prospective, single-center, randomized controlled trial compared twice-weekly ECG screening using the AliveCor KardiaMobile (KM) device versus standard of care (SoC) in patients >65 years of age with at least 1 additional risk factor for stroke on:

- Primary endpoint: time to diagnosis of AF
- Other endpoints: clinical events, patient compliance and experience, and overall cost per diagnosis

Methods

- Study population: 1001 individuals >65 years of age with a CHADS-VASc score of ≥2, no history of AF, and no implanted permanent cardiac pacing device
- Randomized 1:1 to either use the KM device (n=500) or receive SoC (n=501)
- Patients in the intervention group were instructed to record and transmit a 30-second ECG twice weekly (and additional traces if the patient was symptomatic) over the 1-year study period. Patients in the control group were followed and managed by their general practitioner
- ECGs in the intervention group were analyzed by the AliveCor automated software and off-site by an ECG reading service. Abnormal ECGs were overread by a cardiologist

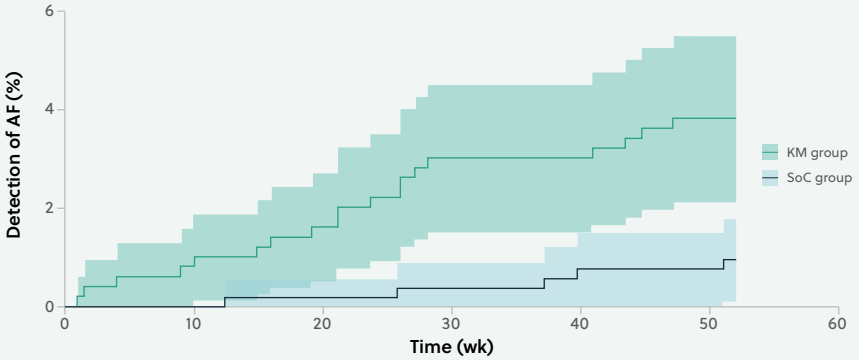
Results

- There were no significant differences in baseline characteristics between groups (mean age = 72.6 years; mean CHADS-VASc score = 3) and all randomized patients were in normal sinus rhythm at baseline
  - After a multivariate analysis, only baseline CHADS-VASc score of ≥4 was independently associated with a significantly increased risk of being diagnosed with AF (*P*=0.04)

PRIMARY ENDPOINT: Compare Time to Diagnosis of AF in the Intervention and Control Groups

- At the end of the 1-year study period, nearly 4 times as many patients in the intervention group were diagnosed with AF (3.8%, n=19/500) compared with the control group (1%, n=5/501) (*P*=0.007) (**Figure 1**)

FIGURE 1. Kaplan-Meier Curves Showing the Estimated Detection Probabilities for AF Over the 52-Week Trial



Shaded areas represent 95% confidence regions. AF, atrial fibrillation; KM, KardiaMobile; SoC, standard of care. Log-rank *P*=0.004 (Cox-Mantel test).
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- In the intervention group, 42% (n=8/19) of patients diagnosed with AF were asymptomatic
- In the control group, all patients diagnosed with AF (n=5) experienced symptoms at the time of diagnosis
- All patients diagnosed with AF in the intervention group were started promptly on anticoagulation therapy (53% with non–vitamin K antagonist oral anticoagulant therapy)

Results (cont'd)

OTHER ENDPOINTS: Compare Clinical Events, Patient Compliance and Experience, and Overall Cost per AF Diagnosis Between the KM and SoC Groups

CLINICAL EVENTS

- No significant difference in the number of serious adverse clinical events
- No significant difference in the number of strokes or transient ischemic attacks in the intervention and control groups

PATIENT COMPLIANCE AND EXPERIENCE

- 74% of participants did not miss a single week of ECG submissions over the course of the study
- Approximately 80% of KM participants submitted at least 1 weekly ECG during ≥90% of the weeks and at least 2 ECGs during ≥75% of the study weeks (**Figure 2**)
- The majority of patients found the AliveCor KM device easy to use without restricting activity or causing anxiety, and reported overall satisfaction with the AliveCor KM device as "extremely or very satisfied" at 1-year follow-up (**Figure 3**)

FIGURE 2. ECG Submission Using the AliveCor KM Monitor as a Proxy for Patient Compliance: Percentage of Weeks that KM Users Submitted an ECG on at Least 1 Day per Week (left panel) or at Least 2 Days per Week (right panel)

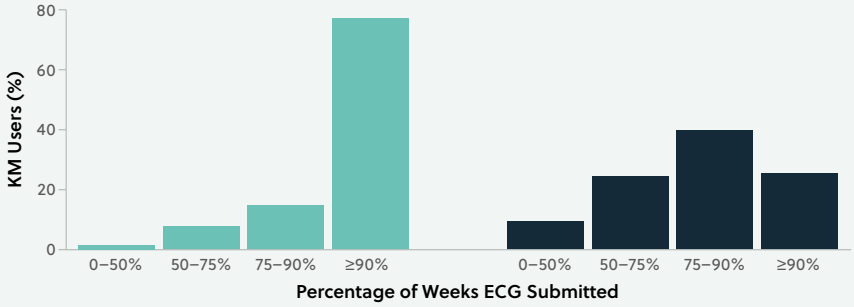

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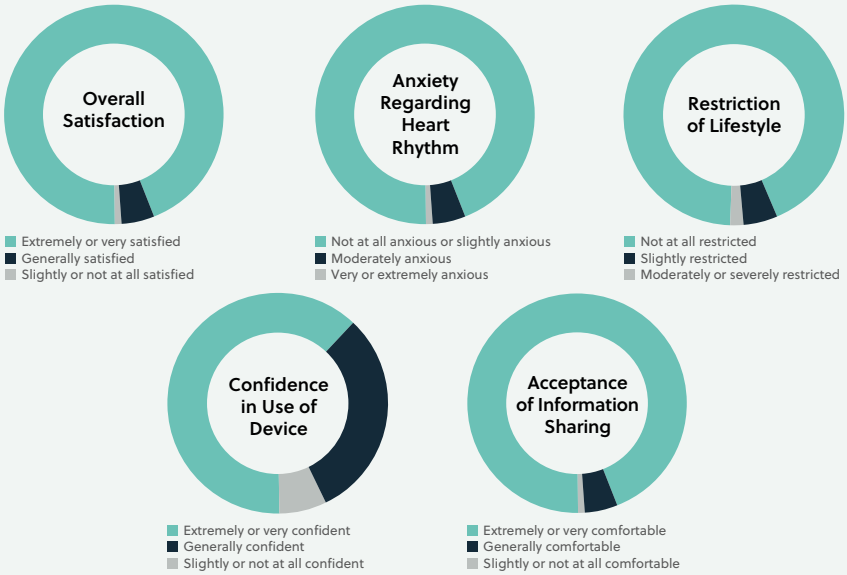
FIGURE 3. Patient Experience With the AliveCor KM Device Based on Participant Questionnaire



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COST ANALYSIS

- In the intervention group, 19 cases of AF were detected at a cost of $10,780 (£8255) per AF diagnosis

Conclusions

Long-term AF screening use of the AliveCor KM ECG monitor in patients at increased risk of stroke resulted in an approximately 4-fold increase in AF detection over the 1-year study compared with routine care

The cost per AF diagnosis using KM was $10,780 (£8255)

Though the differences were not statistically significant, there were fewer strokes and transient ischemic attacks in the KM group compared with routine care

Over 40% of the AF patients in the KM group were asymptomatic upon diagnosis

Diagnosis of AF in the KM group resulted in prompt initiation of oral anticoagulant therapy

Importance to AliveCor

Extended screening in patients >65 years of age at increased risk of AF and stroke using the AliveCor KM monitor resulted in an approximately 4-fold increase in the diagnosis of AF compared with routine care. Patient compliance and satisfaction with the AliveCor KM monitor were high over the course of the study