

## Are We Ready for Mass Screening to Detect Atrial Fibrillation?

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Atrial fibrillation (AF) is the most common cardiac arrhythmia<sup>1</sup> and a leading cause of stroke.<sup>2</sup> AF-related strokes are associated with significant morbidity, mortality, and healthcare costs,<sup>2-5</sup> yet they are highly preventable.<sup>6,7</sup> Unfortunately, AF is often undiagnosed or untreated when stroke occurs.<sup>8</sup> Given the availability of effective oral anticoagulant (OAC) medications and evidence-based guidelines for their use,<sup>9-11</sup> population-based AF screening has the potential to become an important public health program.

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There is considerable interest in developing AF screening programs for 3 reasons: (1) The prevalence of AF is increasing as a result of our aging population; (2) new OAC medications offer safe, effective, and convenient therapy for patients once AF is identified; and (3) a variety of portable, wearable, and implantable technologies have been developed to detect AF, which may facilitate AF screening in a variety of clinical settings.<sup>12-14</sup> Although there is great optimism for AF screening, high-quality studies examining optimal AF screening methods, settings, and target populations are only starting to emerge.<sup>12,13,15</sup>

In this issue of *Circulation*, Svennberg and colleagues<sup>16</sup> report the results of the STROKESTOP study, a prospective, population-based study of systematic AF screening with intermittent ambulatory ECG recordings among those 75 and 76 years of age in Stockholm County and the Halland region in Sweden. Of the 14 387 individuals invited, an impressive 54% (7173) participated and transmitted 30-second, single-lead ECG recordings (average, 26.4 per participant) over a 2-week period.<sup>16</sup> AF incidence was 3.0%, which is higher than the 1.4% observed in a systematic review of studies using single-time-point screening in a range of populations, some of which included patients as young as 18 years of age.<sup>15</sup> An earlier study by this group, which had a 5.2% rate of incident AF, also found that only 25% of incident cases were diagnosed with the baseline 12-lead ECG, with the remainder detected during 2 weeks of twice-daily home ECG monitoring.<sup>17</sup> Compared with single-time-point screening, which typically detects permanent or persistent AF, the use of multiple ECG

transmissions over time facilitates the detection of paroxysmal AF, thereby increasing the rate of AF detection. This is consistent with prior studies of prolonged AF monitoring in other high-risk populations.<sup>18,19</sup>

In the STROKESTOP study, 9.3% of patients screened reported a previous diagnosis of AF, and 77.6% of these patients were receiving OAC therapy at the time of screening.<sup>16</sup> This represents a much higher background rate of OAC use among AF patients than has previously been reported in real-world settings,<sup>20,21</sup> possibly reflecting better guideline adherence and patient acceptance of OAC than elsewhere. Among the participants in the STROKESTOP study with newly diagnosed AF, OAC therapy was started in 93%, with almost three quarters receiving a new OAC medication.<sup>16</sup> Among patients with known but untreated AF, OAC therapy was started in 47% of patients after identification of AF on screening. Of patients who did not start OAC, only 14% had contraindications; the main reasons for not starting an OAC medication were patient or physician preference.<sup>16</sup>

In STROKESTOP,<sup>16</sup> the very high rates of subject participation and acceptance of OAC allow the authors to draw very accurate conclusions about the true prevalence of undiagnosed AF in this population and the potential to increase the uptake of OAC therapy. However, these study features also make it difficult to extrapolate the findings of STROKESTOP to other settings and countries. The effectiveness of AF screening in other regions will depend on the prevalence of AF, which is influenced by ethnic heterogeneity and differences in mean population age. There is also likely to be regional differences in the feasibility of conducting screening and the ability of local systems to effectively deliver OAC therapy if AF is detected. For example, in an Australian study of 1000 pharmacy customers >65 years of age, pharmacists performed a manual pulse check and an iPhone single-lead ECG.<sup>13</sup> This study found incident AF in 1.5% of individuals, of whom 60% started OAC therapy. Although this experience demonstrated a lower use of OAC than in STROKESTOP, it did demonstrate that screening was both feasible and cost-effective.<sup>13</sup>

The STROKESTOP screening program estimated a cost of €4164 per quality-adjusted life-year in this 75- and 76-year-old population.<sup>16</sup> A similar value was calculated in an earlier study that conducted a modeled cost-effective analysis, extending a pharmacy-based iPhone ECG screening program to the general community in those 65 to 84 years of age.<sup>13</sup> This earlier study estimated an incremental cost-effectiveness ratio of €3142 per quality-adjusted life-year with warfarin and €6267 per quality-adjusted life-year with new OAC therapy.<sup>13</sup> In both studies, the precise cost-effectiveness ratio was sensitive to the rate of participation in screening and the proportion of affected individuals who started and were maintained on OAC.

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The success and cost-effectiveness of a particular AF screening program will depend not only on the population and screening method but also on the setting of the program. One strength of screening in a pharmacy or family practice setting is that it capitalizes on existing healthcare infrastructure that may allow more sustainability over the long term. Furthermore, AF screening can be combined with existing cardiovascular screening initiatives such as the diagnosis and treatment of hypertension and diabetes mellitus. This may not only save time and increase patient acceptance but also facilitate the delivery of synergistic stroke-prevention therapies such as blood pressure lowering and OAC.

There is little doubt that available screening tools can diagnose AF. However, for large-scale screening to succeed, screening must detect AF and ultimately prevent stroke in a cost-effective fashion. This means screening only populations with sufficient risk of AF and in a setting where screening can be performed accurately and efficiently, preferably in concert with other screening programs. The STROKESTOP study has shown us what is possible under ideal circumstances. More research is needed to determine how well other strategies will work in other settings.

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