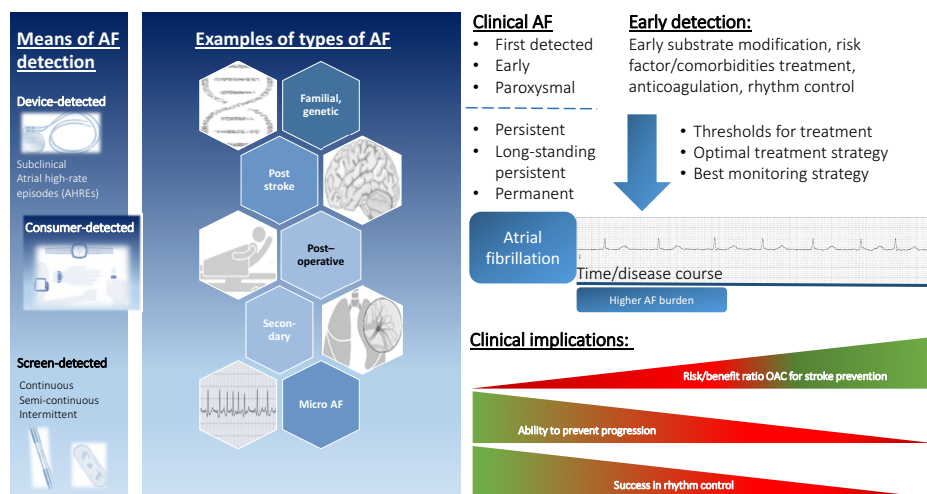


# Early detection of atrial fibrillation in the digital era, risk factors, treatment options, and the need for new definitions

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## Graphical abstract



With the advances in digital technology and increasing awareness of the lifetime disease atrial fibrillation (AF) a better characterization and new understanding of the arrhythmia has emerged. The view of AF as a dichotomous disease and the largely artificial categorization into

paroxysmal, persistent, and permanent require rethinking based on pathophysiology and clinical research in order to find a meaningful intersection with clinical medicine and management decisions.

Atrial fibrillation remains a major predictor of stroke.<sup>1</sup> An earlier diagnosis of the often asymptomatic arrhythmia holds the promise to reduce the risk of debilitating stroke, potentially by lifestyle interventions, or therapies aimed at reducing or preventing atrial myopathy. Early detection

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efforts have focused on the reduction of thromboembolic events in older individuals who have a higher stroke risk. For years, many attempts to improve AF identification in the form of distinct screening approaches have been ongoing. The goal of the EU-funded AFFECT-EU (digital, risk-based screening for AF in the European community) project has been to bring together ongoing studies and existing evidence world-wide to facilitate coordinated research and meta-analyses.<sup>2,3</sup> A main purpose was the refinement of screening for AF to target high-risk populations and render AF screening beneficial and efficient in respective of plausible implementation approaches in different settings and regions, with particular emphasis on stroke prevention.

The first randomized outcome trials on systematic AF screening, the Swedish STROKESTOP<sup>4</sup> and the Danish LOOP<sup>5</sup> studies showed a clear trend towards stroke risk reduction without reaching the statistical significance threshold, which was significant in a meta-analysis<sup>3</sup> of both trials. The STROKESTOP investigators used a strategy of community screening in individuals aged 75 years with a twice daily handheld ECG registration and detected 3% new AF. Screening reduced the combined endpoint of ischaemic or haemorrhagic stroke, systemic embolism, bleeding leading to hospitalization, and all-cause mortality. The Danish LOOP study randomized patients at increased risk of stroke to implantable loop recorders and detected AF in 31.8% participants in the intervention arm. It failed to show a statistically significant reduction in stroke and systemic arterial embolism, although more severe strokes may be prevented in individuals without prior stroke.<sup>6</sup> The large SAFER trial is ongoing and will provide data on 100 000 individuals.<sup>6</sup> All of these trials have focused on older people with a high stroke risk related to AF.

The meta-analysis of the ARTESIA<sup>7</sup> and NOAH-AFNET 6<sup>8</sup> trials that examined direct oral anticoagulant therapy in device-detected AF (DDAF) captured by implantable devices indicates that there may be a small, but less than expected benefit of stroke risk reduction at the cost of higher bleeding rates.<sup>9</sup> The stroke risk for untreated DDAF in those trials was less than anticipated.

Device-detected AF permits a virtually continuous monitoring of AF over very long periods. Very short and sometimes single episodes are captured.<sup>10</sup> Although DDAF carries an increased risk of stroke,<sup>11</sup> rare bouts of AF that are registered may only marginally be associated with thromboembolism. AF burden, though still lacking a validated definition, may help to conceptualize risk of adverse events in DDAF and guide treatment decisions.

An additional important observation across these recent trials and observational studies is that, independent of sex overall stroke rates have declined over recent years.<sup>1,12</sup> Besides stroke, there remains a high morbidity and mortality risk in AF patients. Treatment goals have slightly shifted from stroke prevention to diversified risk reduction of heart failure, cognitive decline, dementia, and AF-related mortality.

While systematic assessment of refined screening approaches and AF detection in high-risk populations is ongoing, these studies will become increasingly bypassed by consumer-led AF detection. Algorithms for AF detection by photoplethysmographic devices have gained high accuracy.<sup>13</sup> Whereas the majority of current users of wearables do not

belong to the target group for AF screening, digital technology adoption by older individuals and patients with high AF risk is rising. It offers opportunities for self-screening, but also healthcare-initiated approaches such as an algorithm integrated in the local physician software that identifies the subpopulations of high-risk patients in the physician practices from electronic health record data. That would also have the advantage of a readily accessible pathway for care once AF is detected, which can be problematic for consumer-led screening.

With the emerging possibilities for AF detection, it will be crucial to characterize distinct types of AF to support clinical decision-making (*Graphical Abstract*). Whereas it is not yet clear whether screen-detected AF and AF detected very early in the disease course require immediate oral anticoagulation, earlier diagnosis of AF permits intensified risk factor management, monitoring for clinical AF and, possibly, substrate modifying treatment.

The close cooperation of international experts over the last years has addressed these topics and advanced the field significantly. Based on the emerging evidence, this issue will focus on the relevance, prediction, and early diagnosis of this increasingly common arrhythmia. It will provide an update on early types of AF such as micro AF and DDAF, related risk factors and mechanisms of AF and atrial cardiomyopathy. The evidence on the two specific scenarios of postoperative AF and screening in primary care will be summarized. The impact on society and social determinants in AF management including thorough value-based cost-effectiveness considerations is examined in detail. Furthermore, the role of catheter ablation of the arrhythmia to improve outcomes will be outlined. The supplement issue will thus cover the current evidence on the fast moving field of AF risk assessment, screening, and risk-based treatment of earlier detected AF.

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## Data availability

No new data were generated or analysed in support of this editorial.

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