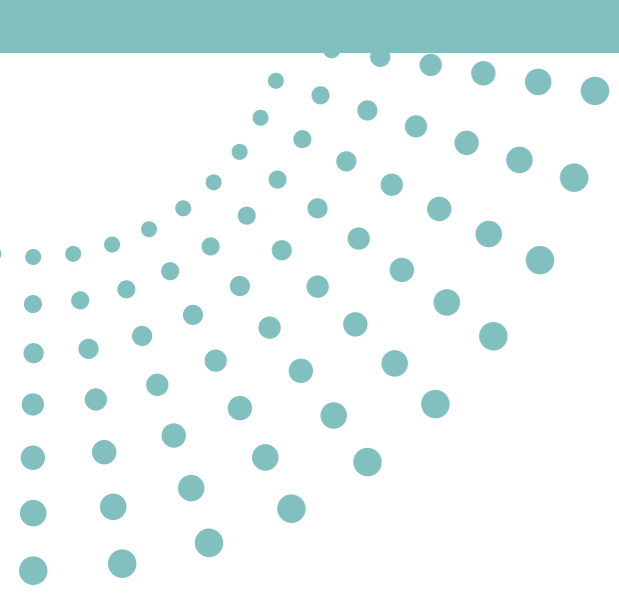


# White Paper on inequalities and unmet needs in the detection of atrial fibrillation (AF) and use of therapies to prevent AF-related stroke in Europe

**November 2018**

This report was developed by The Health Policy Partnership in collaboration with a group of expert contributors, with funding from the BMS-Pfizer Alliance. For full details see page 2.



## Authorship and expert contributions

Research, coordination, drafting and design of the White Paper were led by The Health Policy Partnership.

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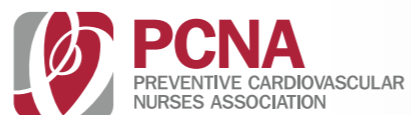
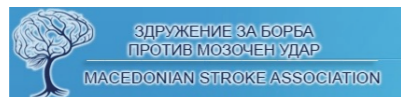
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The following organisations have endorsed this White Paper:



MACEDONIAN NEUROLOGY SOCIETY



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# Call to action

## We need to act now to prevent AF-related stroke.

A quarter of middle-aged adults will develop AF in their lifetime<sup>1</sup>



Atrial fibrillation (AF) is the most common sustained heart rhythm disturbance (arrhythmia).<sup>2</sup> People with AF are three to five times more likely to suffer a devastating, debilitating, disabling and often fatal stroke than people without AF. Yet it is widely under-recognised by the general public and policymakers.

## Preventing stroke offers policymakers the potential to lower the cost of stroke care,<sup>3</sup> contributing to more sustainable healthcare systems.

Stroke costs an estimated €38 billion across EU countries each year<sup>4</sup> – and AF-related strokes are more expensive to manage than non-AF-related strokes.<sup>5</sup>




AF-related strokes cause unacceptably high levels of death and disability, and the scale of the problem across Europe is increasing as our populations age. By 2035 the number of strokes is projected to rise by 34%, to over 800,000 events.<sup>3</sup> At the same time, the number of people with AF is increasing and, by 2060, it is estimated that nearly 18 million adults over the age of 55 will have AF.<sup>6</sup>

With early detection, access to appropriate therapies and ongoing care and support, many AF-related strokes can be prevented. Appropriate stroke-prevention therapies have been shown to save lives and prevent disability in people with AF.<sup>1</sup> They also reduce AF-related hospital admissions, length of stay, outpatient visits<sup>7,8</sup> and healthcare costs.<sup>9-12</sup>

## People face significant inequalities and unmet needs in AF-related stroke.

Consistent gaps and inequalities persist both in terms of rate of detection, and access and uptake of first-line therapies and ongoing care for the prevention of AF-related stroke. This White Paper highlights these inequalities and unmet needs and offers solutions to enable stakeholders at all levels to address this serious public health issue:

 **Recommendation 1: Build awareness and understanding of AF.** Public awareness of AF as a cause of stroke is worryingly low and comes at a high price. We need population-wide information campaigns with simple, targeted messages to address this. This should cover AF as a common cardiac condition, the link between heart conditions such as AF and stroke, and the importance of effective therapy in dramatically reducing stroke risk in people with AF. People diagnosed with AF should receive therapeutic education to build their knowledge of the condition and be involved in shared decision-making with healthcare professionals.



**Recommendation 2: Increase opportunistic detection of AF among high-risk groups.** Too many cases of AF are undetected, and all too often AF is diagnosed too late, for example following a stroke. Pulse rhythm checks are recommended by European Society of Cardiology guidelines as a quick, affordable and proven method to test for AF when followed by an electrocardiogram for confirmation. Pulse rhythm checks can be performed opportunistically (e.g. during a routine health check), as well as in almost any community or social setting. Yet it is rare for them to be recommended by national guidelines, and adoption in everyday practice is highly variable.



**Recommendation 3: Increase knowledge and skills of healthcare professionals.** Awareness of AF as a stroke risk factor and effective knowledge of first-line therapies for stroke prevention in AF are often inadequate outside of specialist cardiology settings. A wider range of healthcare professionals (e.g. GPs) must therefore be ready to play a key role in identifying AF and overseeing AF-related stroke prevention. To help achieve this, we must develop tailored guidelines for non-specialists, such as GPs, internists and nurses, and embed simple practices in everyday care.



**Recommendation 4: Ensure policy leadership to drive equitable access to best practice.** We must ensure local and national policies are in place to tackle the structural barriers behind persistent inequalities in the detection of AF and access to first-line therapies for AF-related stroke. To achieve this, we must also raise awareness and understanding of AF among decision-makers at all levels of the health system including administrators, managers and payers.

## We therefore call on central governments to express a formal strategy or position on AF-related stroke.

AF-related stroke is a clear challenge to the future sustainability of healthcare systems and demands high-level attention in every nation in Europe. This should align to the Action Plan for Stroke in Europe 2018–2030 and should include, at a minimum:

- an assessment of the current human and economic burden of AF as a cause of stroke
- an estimate of undiagnosed AF in the general population; and, for those with a diagnosis, an estimate of the current access to and uptake of first-line therapy to prevent AF-related stroke
- an assessment of systemic and structural strengths and weaknesses to explain current performance
- future projections of AF prevalence and their implications for the burden of stroke, with scenario modelling for guideline-based efforts to reduce AF-related stroke
- clear and measurable targets to prevent AF-related stroke, and the identification of best-value investments to achieve them
- adequate resources to ensure key actions can be implemented effectively.

This call to action is endorsed by: Professor John Camm; Sotiris Antoniou; Professor Anita Arsovska; Professor Valeria Caso; Dr Wolfram Doehner; Jean-Luc Eiselé; Dr Johan Engdahl; Sue Koob; Trudie Lobban MBE; Professor Lis Neubeck; Professor Marten Rosenqvist; Dr Geert Vanhooren.

## About this White Paper: Why AF, and why now

### **This White Paper is the culmination of a consultative and consensus-driven process.**

It begins by placing AF and AF-related stroke within the policy context, then focuses on four areas that are recognised by experts as critical to driving meaningful change for patients. In each of these areas, recommendations are made for how AF can be prioritised to improve outcomes and maximise benefits for both patients and the wider healthcare system.

### **This White Paper arrives at a critical moment for strategic health policymaking.**

Non-communicable diseases (NCDs) are currently a major focus at the European level, with increasing attention being given to stroke. Recent developments include a European Union Joint Action on chronic diseases<sup>13</sup> and a World Health Organization (WHO) European Region action plan for NCDs.<sup>14</sup> This has created an opportunity to advance AF-related stroke prevention at all levels. However, AF – and the link between AF and stroke – has so far been absent from these European-level discussions.

### **Gaining a deeper understanding of inequalities in access to AF detection, care and management presents a significant opportunity to reduce the burden of AF-related stroke in Europe.**

As such, an evidence-based consensus on the current state of play, leading implementation models, and key system barriers and opportunities faced by decision-makers as they seek to drive improvements into mainstream healthcare is vital.

With this aim in mind, Bristol-Myers Squibb (BMS) and Pfizer (the BMS–Pfizer Alliance) commissioned a programme of work starting in 2017 with a literature review to provide greater insight into the inequalities in AF detection and stroke-prevention therapies. This was followed by two expert meetings where leading figures working in AF and stroke were convened to better understand these inequalities, the underlying system and policy drivers responsible for them, and the possible actions that could be taken to address them. The Health Policy Partnership has been working with the BMS–Pfizer Alliance to coordinate research and drafting of the White Paper under the guidance of expert contributors.

**This White Paper sets out a clear call to action**, highlighting areas where gaps exist and the changes that we need to put in place to address them. There are four key areas where action is required:

- 1 Supporting patient education**
- 2 Adapting clinical practice to enhance AF detection**
- 3 Strengthening clinical and professional training in AF**
- 4 Promoting awareness and accountability among decision-makers for effective AF-related stroke policies**

This report will consider the current situation in each of these areas, and recommend actions for advocates, healthcare professionals and decision-makers to improve outcomes in the management of AF and prevention of AF-related stroke.

# Introduction: What AF is, and why it matters

## AF is a major risk factor for stroke

AF is a heart rhythm disorder that is an important risk factor for stroke,<sup>1</sup> being associated with at least one in every five strokes<sup>2</sup> (see **Box 1**). AF-related strokes have also been found to have twice the mortality rate,<sup>5</sup> cause more severe symptoms,<sup>15</sup> have a higher chance of recurrence,<sup>16</sup> lead to longer hospital stays<sup>15</sup> and lead to more permanent disability than non-AF related strokes.<sup>15,17</sup> Evidence is also accumulating that AF increases the risk for dementia.<sup>18</sup>

Effective therapies reduce the risk of AF-related stroke. There are, however, significant inequalities both in their use and in the successful detection of AF.<sup>19</sup>

*One in four middle-aged adults in Europe will develop AF in their lifetime.<sup>1</sup>*



### Box 1

#### What is AF, why does it occur, and how does it cause strokes?

- AF is the most common sustained heart rhythm disturbance (arrhythmia).<sup>2</sup> AF occurs when abnormal electrical impulses take place in the upper chambers of the heart (atria), resulting in a highly irregular pulse rhythm.<sup>20</sup>
- While the cause of AF is not fully understood, it is more common in older people and in people with other conditions including high blood pressure (hypertension), coronary artery disease, obesity, diabetes, chronic kidney disease or heart failure, which is the most common cause of death and hospital readmission among patients with AF.<sup>21</sup>
- By disrupting blood flow through the heart, AF increases the risk of blood clots forming,<sup>20</sup> making people with AF three to five times<sup>3</sup> more likely to suffer a devastating, debilitating and often fatal stroke than people without AF.<sup>5</sup>

## There has been a shift in understanding of AF as a cause of strokes and in therapies to address risk.

**The medical understanding of the risks associated with AF is a relatively recent development.** As recently as the 1970s, AF was thought to be a benign condition, and it was not until the 1980s that attempts were made to fully understand the association between AF and stroke.<sup>22</sup>

**Over the past decade, there has been a rapid development of evidence regarding the role of therapies to prevent AF-related stroke.** This is reflected in frequent updates in European Society of Cardiology (ESC) guidelines for the management of AF. The most recent edition, published in 2016, provides an update on AF-related stroke prevention in the era of non-vitamin K antagonist oral anticoagulant (NOAC) therapy; it recommends NOACs as a first-line therapy for people with AF who are at a medium or high risk of stroke, and puts greater emphasis on the early detection of AF before an AF-related stroke occurs.<sup>1</sup>

## Stroke is a major contributor to non-communicable diseases.

**Europe's healthcare systems are under increasing pressure from ageing populations and a rise in non-communicable diseases (NCDs).** Data suggest the number of people over the age of 65 is expected to rise from around 97 million in 2015 to more than 125 million by 2030.<sup>23-25</sup>

**Stroke is an important contributor to the NCD burden.** In 2013, stroke was responsible for 433,000 deaths in Europe (9% of all deaths), and was the cause of a significant proportion of disability.<sup>26</sup>

**The number of strokes across Europe – and the number of people living with the long-term effects of stroke – is predicted to rise.** Stroke Alliance for Europe (SAFE) estimates that between 2015 and 2035, the number of new strokes will increase by 34%.<sup>3</sup>

# Action focus 1: Supporting patient education

## Key messages

- Poor understanding of AF among newly diagnosed AF patients is common, and may affect their care and increase their risk of AF-related stroke.
- Healthcare professionals and patient organisations are best placed to educate patients.
- Simple messages targeting different patient groups should be available across clinical settings.

## What is the issue?

**AF patients have been found to have gaps in knowledge of their condition, impacting both their health and their experience of care.**

This is, in part, a reflection of low levels of awareness and knowledge of AF across society more broadly.<sup>27</sup> Some key areas where knowledge gaps exist include understanding of AF and the increased risk of stroke that AF brings (see Box 2). This lack of understanding is likely to be important in explaining low persistence with anticoagulants.<sup>28</sup>

### Box 2 Low patient understanding of AF<sup>29</sup>

A survey conducted in 11 countries found that at least one in four patients felt unable to explain AF to another person. Only 57% of patients surveyed felt that the information provided by their doctor was easy to understand. Furthermore, more than one third of patients reported being worried or fearful about AF.

## Why is this happening?

**Gaps in access to helpful information exist in some countries.**

There are compelling models which provide information and support, including online tools, patient discussion forums and helplines for AF patients through patient advocacy groups and foundations in some countries.<sup>30-32</sup> However, these resources and activities are not consistently available across Europe.

**Healthcare professionals often underuse educational tools.**

A range of educational materials has been developed by patient organisations and professional societies. However, healthcare professionals often do not pass these on to patients, creating significant information gaps. For example:

- A recent study by the ESC found that, when discussing therapies with patients, only one third of clinicians used informational brochures and even fewer referred patients to educational websites.<sup>33</sup>
- In another study, only an average 14% of AF patients reported being informed of the potential side effects of their medication.<sup>34</sup>

**Messages about AF and the risk of AF-related stroke may be difficult for patients to digest – particularly if they are being treated for multiple chronic conditions or if they are only diagnosed after they have had a stroke.**

Many patients with AF have multiple chronic conditions which are managed by a range of specialists.<sup>1 35</sup> Clinical guidelines are often disease-specific and do not adequately support healthcare professionals who manage complex patients with multiple conditions.<sup>36</sup> Patients may be overwhelmed by the amount of advice they receive on their conditions,<sup>37</sup> and find it difficult to understand the association between AF, AF-related stroke and their other conditions.

Crucially, AF is often diagnosed only after a person has had a serious complication such as an AF-related stroke.<sup>38</sup> This means patients are often trying to learn about the condition, and the complexities of its management, at a difficult time when they are simultaneously dealing with many other challenges.

## How can patient education be better supported?

### Recommendation 1

- **Build awareness and understanding of AF** among patients and the wider population, through campaigns with simple, tailored messages implemented in a way that builds knowledge and supports shared decision-making between patients and healthcare professionals.



### We can do this by...

#### ✓ Developing simple, targeted messages for patients in a range of clinical settings

**Accessible information about AF is urgently needed in a range of clinical settings. These materials should be available in local languages and be easily understandable to people with different levels of health literacy.** Simple, targeted messages are needed to address the priorities of different groups, including patients, covering key elements of AF:

- AF as a condition – to encourage those at risk to get detected
- AF's role as a risk factor for stroke
- Benefits and risks associated with anticoagulation to prevent AF-related stroke
- The importance of continuing with the medication.

#### ✓ Embedding shared decision-making across all settings of care

**Healthcare professionals can play a key role in empowering patients and supporting them to take a more active role in their own care, through shared decision-making.**<sup>3 39</sup>

This can be achieved through:

- close collaboration between patient organisations and healthcare professionals in developing accurate information and resources that address patients' needs
- active healthcare professional engagement to help build patients' skills, confidence and ultimate engagement in their care
- fostering development of tools to aid patient-clinician communication (see **Box 3**).

#### Box 3 AF stroke risk calculators<sup>40</sup>

AF stroke risk calculators were developed to help physicians calculate their patients' risk of AF-related stroke – but they also provide patients with a comprehensive assessment of their risk of stroke, coupled with critical information. The calculators run through a series of questions aligned with ESC guidelines to determine stroke risk. They provide patients with printable results and information on therapy options, which they can use to initiate discussion with their GP, cardiologist or neurologist. A number of AF stroke risk calculators are available, including one from the AF Association: <http://www.preventaf-strokecrisis.org/calculator>

## Action focus 2: Adapting clinical practice to enhance AF detection

### Key messages

- AF is often detected only after the person has had an AF-related stroke.
- Opportunistic screening for AF is recommended by the ESC, but many national guidelines do not include this recommendation.
- Opportunistic pulse rhythm checks are a simple way of detecting AF and should be introduced as standard practice across a range of care settings.

## What is the issue?

**The timely detection and diagnosis of AF is critical in the prevention of AF-related stroke, but many patients are diagnosed only after they have had an AF-related stroke.** There is a detection gap (in terms of the number of people who have AF but in whom it is undetected) of approximately 10–45%, depending on the setting.<sup>19 41–44</sup>

In **England**, around 425,000 people – or 30% of those with AF – are thought to have undiagnosed AF.<sup>42</sup>



In **Spain**, 31% of people with AF who are over 60 years old have not had a diagnosis.<sup>45</sup>



**Detection of AF can be challenging as it often does not present with any obvious symptoms.**<sup>46</sup> In some patients, AF may have intermittent or even no symptoms, making detection difficult.

**The 2016 ESC guidelines recommend opportunistic pulse checks in people over 65 and an electrocardiogram (ECG) for confirmation of AF.** These guidelines also recommend the systematic screening of high-risk patients (who have had an ischaemic stroke or transient ischaemic attack (TIA)), as well as the consideration of systematic ECG screening in patients aged 75 and over, or those at high risk of stroke.<sup>1</sup>

**Regular checks for AF, however, are not common practice.** A survey of 550 GPs in 11 European countries found that, in 10 of the countries, fewer than 20% of patients over 65 were checked for AF during routine GP appointments, despite this age group being at increased risk of AF (see [Table 1](#)).<sup>47</sup>

**Table 1. Percentage of GPs who check patients for AF during routine appointments<sup>47</sup>**

Country	Percentage
Belgium	12%
France	15%
Germany	13%
Italy	17%
Netherlands	5%
Norway	18%
Russia	42%
Spain	12%
Sweden	19%
Turkey	13%
United Kingdom	8%

## Why is this happening?

### The evidence base on AF detection is evolving rapidly.

The case for opportunistic screening is well articulated in ESC guidelines, but the evidence on whether opportunistic and systematic screening for AF leads to reductions in AF-related stroke is still evolving. This evidence gap has influenced decisions by policymakers against the introduction of AF screening programmes in the UK<sup>48</sup> and Sweden.<sup>49</sup> Research is currently underway in both of these countries, however, to determine whether systematically screening patients for AF can reduce rates of AF-related stroke.<sup>50,51</sup>

### Access to diagnostic services for AF is inconsistent.

Variable access to diagnostic services restricts the ability of healthcare professionals to identify people with AF.

In **Scotland**, there is variation in access to 12-lead ECGs; some National Health Service regions provide machines in all GP practices, while in others they are only available in hospitals. Waiting times of up to nine weeks for access to diagnostic services have been highlighted, which is problematic for patients who are unable to begin anticoagulation until their AF has been confirmed.<sup>52</sup>



### Uptake of new screening tools has been limited.

Innovative screening tools that facilitate AF detection are a key aspect of the growing evidence base, but their adoption into routine medical practice has been limited. Handheld single-lead ECG devices, for example, can provide a simplified, accurate and potentially cost-effective way of screening for AF in high-risk populations.<sup>54,55</sup> However, expert commentators have highlighted how financial constraints on healthcare systems may affect the uptake of this technology in medical practice.<sup>52</sup>

### National guidelines often do not include recommendations for opportunistic screening of over-65s.

Few national guidelines recommend opportunistic checks for AF. This is despite national cardiac society endorsement of the 2016 ESC guidelines in many countries,<sup>1</sup> and evidence that opportunistic screening leads to a statistically significant absolute increase in the proportion of people diagnosed with AF.<sup>56</sup>

National guidelines in **England**<sup>57</sup> and **France**<sup>58</sup> do not include opportunistic tests for AF.



Even where opportunities for detection do exist, they may not be accessible by people who do not utilise health services due to cultural and linguistic barriers.<sup>53</sup>

Pulse rhythm checks are not integrated into routine care in many settings. Despite lobbying by patient organisations and professional societies in a number of countries – and the fact that pulse checks are a simple, quick and affordable tool to detect AF – decision-makers have seldom chosen to include pulse rhythm checks as part of routine practice.

## How can clinical practice be adapted to improve AF detection?

### Recommendation 2

- **Introduce opportunistic detection of AF among high-risk groups** through pulse rhythm checks across a range of clinical and non-clinical settings.



### We can do this by...

#### ✓ Introducing opportunistic pulse rhythm checks as standard practice

##### Opportunistic pulse rhythm checks are appropriate for a range of care settings.

Annual flu clinics in primary care using traditional<sup>59</sup> or handheld ECGs,<sup>60</sup> routine GP consultations<sup>61,62</sup> and specialist clinics (such as for podiatry)<sup>63</sup> have all been used to successfully detect AF.

In **Italy**, GP guidelines recommend the opportunistic testing of patients for AF using pulse rhythm checks followed by an ECG confirmation.<sup>64</sup>



**Routine hospital care can be adapted to include opportunistic checks for AF.** Simple adaptations could be made to routine checks in the hospital, such as bedside checks on vital signs conducted by nurses or healthcare assistants. Training staff to record arrhythmia during these checks could provide a relatively low-cost addition to normal care.

**For this practice to be effective, patient-focused pathways must be in place and health systems must be ready and resourced to manage higher numbers of AF patients.** The development of programmes for opportunistic screening will likely lead to more cases of AF being identified. Robust referral pathways are essential to ensure patients are supported along the whole pathway, from detection to initiation of anticoagulation therapies, and access to therapies and ongoing care.<sup>65</sup>

## ✓ Improving efforts to detect AF in non-clinical and community settings

Pulse rhythm checks in the community could be expanded to meet the needs of patient groups who may not access traditional health services. Innovative approaches are needed to identify 'missing' groups and develop appropriate activities to engage them. Community-based screening – led by pharmacists who are able to speak the communities' languages, for example – has been shown to be successful (see Box 4).<sup>66</sup>

**Robust referral pathways and access to ECG confirmation, therapies and ongoing care must be available, regardless of the setting in which the suspected AF is detected.** Clear referral pathways ensure people with suspected AF identified in the community have timely access to an ECG for accurate confirmation.<sup>65</sup>

In **England**, a pathway is being trialled which allows community pharmacists in London to refer people with an abnormal heart rhythm to a one-stop AF clinic, after first testing them using a handheld device.<sup>67</sup> This has resulted in quick diagnosis of AF and access to appropriate anticoagulant therapy within two to three weeks, compared with the national average of 12 weeks.



### Box 4 Detecting AF in community pharmacies<sup>66</sup>

The International Pharmacist for Anticoagulation Care Taskforce (iPACT) partnered with the Atrial Fibrillation Association (AF Association) to set up an initiative in 10 countries to actively involve community pharmacists in opportunistic screening for AF. Pharmacists took people's pulse manually, and assessed symptoms and risk factors. People with an abnormal heart rate or rhythm were referred to a physician and, in some countries, pharmacists additionally confirmed the manual pulse check using a mobile single-lead ECG. A total of 2,573 patients were included in the final analysis, with an irregular pulse detected in 212 patients (8.3%) and AF confirmed in 35 individuals, corresponding to a detection rate of 1.4%.

### Expanding training in the use of mobile ECG devices broadens access to accurate AF detection in the community.

Professionals outside of healthcare could be trained to check 'hard-to-reach' groups for AF; for example, training fire and rescue personnel to use mobile ECG devices during Health and Safety Assessment visits with people over 65 has been shown to effectively target this high-risk group.<sup>68</sup>

## ✓ Supporting stronger collaboration and communication between healthcare professionals

**Improving communication channels between healthcare professionals is crucial to the successful adaptation of clinical practice for AF detection.** Poor coordination of care has been highlighted as a key concern for AF patients, with clinicians and other healthcare professionals not systematically sharing information.<sup>19</sup> Centralised records of patient information can facilitate dialogue between different healthcare professionals, and should be investigated further. Building a shared understanding of diagnosis and clinical decision-making among specialisms is also needed. This can be achieved through stronger interdisciplinary collaboration among healthcare professional societies, an area which is explored further in **Action focus 4**.

## ✓ Improving screening for AF by optimising the use of new technology

### Innovations in technology may offer opportunities to make AF screening more comprehensive and cost-effective.

Increased availability of mobile, single-lead ECGs may mitigate many of the issues associated with identifying AF, such as patient discomfort and long waiting times.<sup>69</sup>

### Technologies such as ECG patches can significantly improve the detection of AF.

A study in the United States found that immediate monitoring using self-applied continuous ECG monitoring patches at home for up to four weeks – compared with delaying ECG monitoring for four months – led to a significantly higher rate of AF diagnosis at four months, and greater initiation of anticoagulants in monitored individuals compared with those who were not monitored.<sup>70</sup>

### Smartphone apps and smart watches can facilitate population screening and help uncover asymptomatic AF.

A major study examining the feasibility of mass screening for AF has found promising results, although more evidence is needed to enable these technological solutions to be implemented on a mass scale (see Box 5).

### Box 5 Using a mobile app to detect AF in Belgium<sup>71 72</sup>

An app which has been registered in Europe as a medical diagnostic device is being trialled in Belgium. The app uses a smartphone camera to detect irregular pulse and has been used in two different ways:

- Prescribed by GPs who monitor the patient and coordinate follow-up testing and care
- At a population level, through publishing an access code in a local newspaper. Within 48 hours, 12,328 adults enrolled in the study, 136 of whom were identified with AF. Of these individuals, 40 were newly identified with AF and, among those, 21 went on to have their AF confirmed by their GP.

**New technologies must be fully integrated into the care pathway in the same way that AF is detected in clinical or community settings, to ensure that people with suspected AF receive adequate follow-up care.** In the case of smartphone apps, for example, key aspects of the pathway would include prescription of the app, effective monitoring and analysis of the data, referral for ECG testing if appropriate, and access to anticoagulation.

## Action focus 3:

# Strengthening clinical and professional training in AF

### Key messages

- Limited professional understanding of AF has a negative impact on patient care.
- Appropriate training materials are required to support the different needs of healthcare professionals along the whole patient pathway.



## What is the issue?

**Many healthcare professionals lack adequate awareness and understanding of AF.**<sup>33</sup> A recent ESC educational needs assessment of European clinicians treating patients with AF highlighted a range of gaps, including:<sup>33</sup>

- uncertainty over how to deal with anticoagulant therapy, particularly in complex patients
- problems in using and interpreting risk assessment scores
- difficulties in AF detection associated with the complexity of symptoms.

**These gaps lead to suboptimal management of patients with AF.** Evidence suggests that clinicians often underestimate the risk of AF-related stroke and overestimate the risk of bleeding, resulting in patients not receiving appropriate anticoagulation therapy.<sup>73</sup> Patients who do receive anticoagulation therapy are not always given adequate information on its benefits or the risks of discontinuing therapies, which likely contributes to low adherence.<sup>74</sup>

## Why is this happening?

### Management of AF is complex owing to variable symptoms and the presence of other chronic conditions.

Symptoms vary not only from one patient to another, but also for the same individual at different time points.<sup>46</sup> AF is more common in people with conditions such as diabetes and has a close association with heart failure,<sup>1,35</sup> which further complicates care. Primary care professionals, who may lack knowledge of AF, often deal with high numbers of patients with a wide range of conditions. Given their limited contact time with patients, professionals may, understandably, prioritise managing AF's more immediate symptoms such as heart palpitations, dizziness, syncope (temporary loss of consciousness) and fatigue.

**Decisions over appropriate therapies to prevent AF-related stroke add further complexity.** The decision to use any given oral anticoagulant therapy, for example, requires a careful balance of the potential benefits (stroke prevention) and risks (increased risk of bleeding) for each patient, as well as taking into account the patient's preferences and values.<sup>34,75,76</sup>

### Healthcare professionals' educational needs are not well supported.

**Professional educational needs relating to AF-related stroke prevention in non-cardiac settings are not well supported, despite many AF patients being cared for in primary care, emergency medicine and geriatrics.**

There is a lack of AF-related stroke prevention guidelines for non-cardiac specialists, despite notable exceptions such as for GPs in Ireland<sup>77</sup> and Italy.<sup>64</sup> Usually, the only available guidelines on the prevention of AF-related stroke are for cardiologists, which may be too detailed and complex for non-cardiac settings. This is compounded by the continuing historical misconception of AF as benign.<sup>78</sup>

**It is not clear whether the educational tools that do exist are being optimally used.** Tools currently available include online decision-support tools,<sup>79</sup> the GRASP-AF tool developed to support GPs in the UK,<sup>80</sup> and the ESC's 'pocket guidelines' and CATCH ME mobile app.<sup>81</sup> It is not clear, however, whether these tools are being used by healthcare professionals to support optimal patient care.

**Language barriers may inhibit the uptake of guideline recommendations.** ESC guidelines are available in a limited number of languages,<sup>82</sup> which may hinder their effective use by cardiologists across Europe, especially in areas where English is less widely understood.

**There is a lack of guidance on referral pathways.** The 2016 ESC guidelines, for example, do not include information on where and when AF patients should be referred, although they stress the need for a team approach to the management of AF patients.<sup>1</sup>

## How can clinical and professional training in AF be strengthened?

### Recommendation 3

- **Increase knowledge and skills of healthcare professionals** by developing tailored guidelines and tools, and ensuring existing tools are more widely used, where available.



### We can do this by...

#### ✓ Developing user-friendly guidelines and practical decision-making tools for healthcare professionals

**Accessible, tailored guidelines that include recommendations on referral pathways would support comprehensive implementation of ESC recommendations.** GPs, for example, should be helped to define what care they should provide and for which patients, while also identifying patients with complex needs who should be referred to specialist care. Bespoke guidelines for pharmacists could help to carve a broader role for these professionals in both the detection of AF and anticoagulation medication management, taking advantage of their unique position in the health system.

**Existing guidelines, such as those for stroke, could be updated to include information on AF and anticoagulation therapy.** The ESC, along with national cardiology organisations, should take a leading role in developing subsets of guidelines, and reaching out to national organisations for other disciplines to develop guidelines collaboratively.

**Decision-making tools would support the management of patients with AF.** Educational tools to support the assessment of AF-related stroke risk, and aid in the selection of the most appropriate anticoagulation therapy for each patient, could be particularly beneficial. The CHA<sub>2</sub>DS<sub>2</sub>-VASc risk assessment tool has led to more accurate and appropriate assessment of risk and decisions on anticoagulation by cardiologists,<sup>83</sup> and this needs to be incorporated into primary care IT systems to enable seamless implementation and support GPs in the decision-making process.<sup>84</sup>

**Guidelines and decision-making tools must be made available in multiple languages to ensure access across Europe.** The ESC could take the lead in working with national cardiology societies to ensure that at least the basic recommendations from the guidelines are translated into all European languages.

**Better use must also be made of existing tools.** Stronger collaboration between national cardiology societies and other professional medical organisations, as well as with healthcare providers and patient organisations, could help to raise the profile of these tools and aid in their incorporation into clinical practice.<sup>85</sup>

### ✓ Maximising peer-learning opportunities and training courses

**AF should be integrated into professional development programmes that meet healthcare professionals' continuing professional development (CPD) responsibilities.** Practical, short courses on AF care should be developed and tailored to the specific needs of different professionals and care settings, addressing common problems at various points of AF care. Training courses could also facilitate innovative changes to normal care, such as the adaptations to clinical practice described in [Action focus 2](#). Collaboration among all stakeholders including healthcare professionals, patient organisations and policymakers is needed to develop and effectively roll-out training courses.

In the **UK**, local cardiac and stroke networks that link patients, GPs, commissioners and providers for improved patient outcomes have been used to provide targeted training to non-cardiac specialists.<sup>86</sup> This has included training for primary care staff who run INR (international normalised ratio) clinics, where awareness of opportunistic pulse checks has been raised.



#### **Publication in national clinical journals can also support professional learning.**

As such journals are usually written in local languages, they may be more accessible to clinicians than international scientific journals published in English.

**Web-based platforms offer further learning opportunities.** For example, the Heart of AF programme, developed by the AF Association,<sup>87</sup> provides healthcare professionals globally with resources to develop the skills and knowledge to better diagnose, treat and manage AF patients.

## Action focus 4:

# Promoting awareness and accountability among decision-makers for effective AF-related stroke policies

### Key messages

- AF-related stroke is under-represented in policy, which contributes to inequalities in access to AF detection and first-line therapies to prevent AF-related stroke.
- Better articulation of the case for investment is needed, emphasising the cost of inaction.
- Population-based registries and national health databases related to AF are necessary to increase the level of nationally and regionally relevant data.
- Decision-makers must be accountable for implementing changes to prevent AF-related stroke; the Action Plan for Stroke in Europe 2018–2030 presents an opportunity to achieve this.
- Strong collaboration between a range of disciplines is needed to advocate for change.



## What is the issue?

### AF-related stroke is severely under-represented in policy, performance and improvement efforts.

There seems to be a lack of awareness among decision-makers as to how AF links to wider policy goals such as the prevention of NCDs, healthy ageing and healthcare sustainability. Very few countries in Europe have a national plan targeting the prevention of AF-related stroke.<sup>19</sup>

### This situation has allowed significant inequalities to endure unchallenged.

There is, for example, variation across Europe in access to AF detection services: between 10% and 45% of people with AF remain undetected, depending on the setting.<sup>19,41</sup> In addition, despite evidence on the cost-effectiveness of using NOACs to prevent AF-related stroke, access varies greatly from country to country.<sup>42-44</sup> For example, in many Eastern European countries, health service budget constraints mean NOACs are often limited to patients who have had a previous stroke or those with poor control on other therapies.<sup>88-91</sup> This means many patients can access NOACs only if they cover the cost themselves, potentially limiting the use and duration of these therapies.

Unlike other countries in Western Europe, **Spanish** guidelines do not align to the 2016 ESC guidelines and restrict the use of NOACs to a second-line therapy in most cases.<sup>92</sup> This is despite the fact that 40% of people with AF<sup>93</sup> – which amounts to over 300,000<sup>41</sup> patients – are inadequately controlled using vitamin K antagonists (VKAs).



In **Italy**, NOACs can be prescribed only if monitoring on other therapies is difficult, and only by authorised specialists.<sup>94,95</sup>



## Why is this happening?

### Awareness and understanding of AF is low.

Although AF is widespread, poor public awareness of the condition and its associated stroke risk continues to be a major hurdle,<sup>27</sup> and is reflected in low knowledge among policymakers and decision-makers at all levels. In a series of interviews with different stakeholders from across Europe, respondents reported that policymakers' understanding of AF is low, and that AF is often viewed as a medical issue rather than a public health issue.<sup>78</sup>

### The risk of AF-related stroke has not been well articulated.

The significant stroke risk resulting from AF has not been well articulated either at the public or policy level, which has led to AF being neglected in stroke policy. AF is not mentioned, for example, in the WHO's *Atlas of Heart Disease and Stroke*, even though this resource aims to guide the development and implementation of appropriate policies on stroke, and despite AF fitting its three criteria for a major established risk factor for stroke.<sup>96</sup>

### Implementation of national strategies at the regional or local level is variable.

Even where national AF and AF-related stroke strategies exist, the differing priorities of sub-national decision-makers result in regional differences in their implementation.

In **Spain**, different policies are in place at the level of the autonomous regions, leading to wide variation in access to NOACs for the prevention of AF-related stroke. In fact, in 2015, only 10 of the 18 autonomous regions applied national recommendations on access to NOACs, with the remaining eight applying additional access barriers.<sup>93</sup>



In **England**, National Institute for Health and Care Excellence (NICE) guidelines recommend NOACs as an equal first-line option to VKAs.<sup>90</sup> Some local clinical commissioning groups, however, appear to interpret this as meaning NOACs are a second-line option, with VKAs as first-line.<sup>90</sup> This may contribute to considerable variation in NOAC uptake between regions, ranging from approximately 4% to nearly 70% of all oral anticoagulant use in a 2015 survey.<sup>97</sup>



### National collaboration among key AF stakeholders is inadequate.

A lack of collaboration between key stakeholders contributes to AF's low visibility on the policy agenda. There is, for example, not usually a strong relationship between cardiology and neurology at the national level in most countries. The absence of collaboration may reduce the efficacy of key messages on AF and AF-related stroke, and the impact of advocacy efforts.

## How can we promote awareness and greater accountability among decision-makers?

### Recommendation 4

- **Ensure policy leadership to drive equitable access to best practice.** This can be achieved by building awareness and understanding of AF among policymakers and decision-makers at all levels of the health system.



### We can do this by...

#### ✓ Better articulating the case for investment at national and sub-national levels

**Policymakers and payers may be receptive to arguments focusing on the cost of inaction (e.g. the opportunity cost associated with not using NOACs) and return on investment.** There is, for example, a growing body of 'real-world' evidence on the benefits of anticoagulation for reducing stroke (*see Box 6*). There is also a growing evidence base on the cost-effectiveness of NOACs compared with VKAs, despite their higher cost, which is at least in part due to the fact that, unlike VKAs, they do not require regular monitoring.<sup>9 11 12</sup> In addition, there is increasing evidence on the case for investment in opportunistic screening, with research suggesting that screening of people aged 65 and over is likely to be cost-effective.<sup>61</sup>

**However, arguments aimed at the sub-national level must take into account the complexities and pressures affecting local decision-makers.** The potential impact of economic evaluation will depend on whether cost-effectiveness has become an explicit criterion to set health priorities at the local level.<sup>99</sup> In Spain, this has occurred for some regions to guide recommendations on the use of new pharmaceuticals,<sup>99</sup> while local-level decisions in the UK are usually based on broader criteria, such as evidence of clinical benefit and budget impact.<sup>100</sup>

**These messages should be articulated via innovative methods.** Educational events aimed at politicians, for example, have been shown to be an effective way of engaging with high-level decision-makers on AF (*see Box 7*).

#### Box 6 UK data highlight a strong association between anticoagulation and stroke prevention<sup>98</sup>

Data from the UK found that changes in clinical practice between 2006 and 2016 led to higher rates of anticoagulation and that this was associated with a decrease in the number of strokes. The study estimates that a 1% increase in the use of anticoagulant therapy was associated with a decrease of 0.8% in the number of AF-related strokes per week. The authors of this study estimate that more than 4,000 AF-related strokes were prevented in 2015–16 due to higher rates of anticoagulation compared with 2009.

#### Box 7 Engaging and educating policymakers on AF

The Arrhythmia Alliance and AF Association regularly host 'Know Your Pulse' events in parliaments in locations including England,<sup>101</sup> Scotland,<sup>102</sup> Australia<sup>103</sup> and at the European Parliament in Brussels,<sup>104</sup> among others. During these events, politicians are offered a simple pulse rhythm check. Engaging with politicians – and identifying those with previously unknown AF – raises awareness while helping to influence policymakers and leading to action at the highest level.

## ✓ Collecting relevant data to aid national and regional decision-making

**Population-based AF registries and national health databases provide the data needed to understand inequalities and gaps in care, and missed opportunities to prevent strokes. These, however, do not exist in many countries.** Currently, only Germany, Estonia and Latvia have invested in dedicated registries for AF, and only Denmark and Sweden have national patient registries that cover all conditions from which data on AF may be extracted.<sup>19</sup> The value of these data can be seen in Denmark, for example, where the establishment of the Danish Stroke Registry has correlated with improved anticoagulation rates.<sup>105</sup>

The **Danish** Stroke Registry was established to monitor and improve the quality of care among all patients with acute stroke and TIA treated at Danish hospitals.<sup>105</sup> Reporting is mandatory and an audit of the data is published annually and includes recommendations on improving quality of care.<sup>105</sup>



Since the publication of data on the percentage of stroke patients with AF who are receiving anticoagulation therapy within 14 days of a stroke, anticoagulation rates have increased and the gap between anticoagulation rates in the capital and the rest of the country has closed.<sup>106</sup>

**Regional-level data should be made available to local decision-makers.** This would enable them to monitor performance and facilitate service development.

The Sentinel Stroke National Audit Programme (SSNAP) is the single source of stroke data in **England, Wales and Northern Ireland**. The SSNAP aids commissioners by providing them with region-specific data every four months on a number of measures, such as the proportion of patients with AF on anticoagulation admitted to hospital for stroke. The programme also provides consistent benchmarking and regional breakdowns, allowing decision-makers to compare their service performance with other regions.<sup>107</sup>



## ✓ Harnessing data to hardwire accountability at the policy level

**Policymakers must be accountable for implementing changes to prevent AF-related stroke and ensuring that sufficient resources are committed to address inequalities in care.** Accountability mechanisms should be developed to monitor, review and propose remedial action to ensure progress towards the agreed goals and targets.<sup>108</sup> Impact assessments, for example, could contribute to the transparency of decision-making, and allow the participation of stakeholders in public health, civil society groups and communities to increase accountability.<sup>109</sup> Dashboards charting the progress made in implementing agreed policies and actions could be a useful tool to ensure commitment and accountability.<sup>108</sup>

## ✓ Leveraging European and international work to gain momentum

**The Action Plan for Stroke in Europe 2018–2030<sup>110</sup> presents a tangible opportunity to engage decision-makers and advance accountability around AF-related stroke prevention (see Box 8).** At the national and regional level, the Action Plan can serve as a model for countries to develop their own AF policies and update their national NCD action plans. The World Heart Federation's Roadmap for Nonvalvular Atrial Fibrillation is another such opportunity, as it focuses on topics aligned with WHO's Global Action Plan targets for NCDs.<sup>111</sup>

### Box 8

### Action Plan for Stroke in Europe 2018–2030<sup>110</sup>

The Action Plan for Stroke in Europe 2018–2030 presents a tangible opportunity to engage decision-makers and advance AF-related stroke prevention.

It was developed jointly by the European Stroke Organisation (ESO) and SAFE in 2018. It aims to: reduce the absolute number of strokes in Europe by 10%; treat 90% or more of all patients with stroke in a stroke unit as the first level of care; have national plans for stroke encompassing the entire chain of care, from primary prevention to rehabilitation and life after stroke; and fully implement national strategies for multi-sectoral public health interventions.

The Action Plan aligns to global and European targets on NCDs and could be used to engage with the European Commission and/or the European Council Presidency to drive progress in AF-related stroke.

## ✓ Fostering strong cross-stakeholder collaboration

**Effective collaboration between healthcare professionals is crucial, such as that facilitated at the European level by the ESC Council on Stroke.** The Council establishes links with 'sister' societies which aim to support and encourage collaboration and dialogue between disciplines. The Council helps contribute to the development and implementation of ESC Clinical Practice Guidelines, along with position papers and consensus documents. It also brings together its varied membership of healthcare professionals for interdisciplinary workshops and educational activities.<sup>112</sup> The ESO also supports multidisciplinary collaboration through its range of committees.<sup>113</sup>

**This collaboration needs to be replicated with similar efforts at the national level, bringing clarity and consensus to political decision-making.** Better collaboration between professional societies could help drive the changes outlined in the Action Plan for Stroke in Europe 2018–2030 by facilitating interdisciplinary dialogue and a stronger shared understanding of patient needs.

**Patient organisations' potential to achieve recognition and policy commitment may be enhanced through multidisciplinary collaboration, such as with scientific professional and public health organisations.** For example, the AF Association, Arrhythmia Alliance, AntiCoagulation Europe and SAFE have released a joint action plan on supporting the prevention of AF-related stroke.<sup>114</sup> In the UK, an All-Party Parliamentary Group on AF has been established to provide a constructive forum for patient organisations to collaborate alongside healthcare professionals and members of parliament.<sup>101</sup>

## Conclusion

**AF-related strokes are not only devastating for individuals and their families, they also place significant pressure on health services.** Populations across Europe are ageing and, unless we take urgent action, the number of AF-related strokes will rise significantly, impacting on the sustainability of our health systems.

**We already have the tools we need to deliver effective care for patients with AF, but unacceptable inequalities exist in access, meaning huge opportunities to prevent AF-related stroke are being missed.** The proportion of AF patients who are undiagnosed and therefore missing out on essential care for the prevention of AF-related stroke varies greatly between countries. Similarly, barriers to accessing cost-effective, first-line therapies for the prevention of AF-related stroke among already-diagnosed patients is highly uneven between – and even within – countries.

**This White Paper has outlined four critical areas where change is urgently required.** By working together, patient organisations, healthcare professionals and policymakers can drive these changes and ensure that all patients have access to the care they need.



## References

1. Kirchhof P, Benussi S, Kotecha D, *et al.* 2016. 2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS. *Europace* 18(11): 1609-78
2. Camm AJ, Kirchhof P, Lip GY, *et al.* 2010. Guidelines for the management of atrial fibrillation: the Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology (ESC). *Eur Heart J* 31(19): 2369-429
3. Stroke Alliance for Europe. 2017. *The burden of stroke in Europe*. London: Stroke Alliance for Europe
4. Nichols M, Townsend N, Luengo-Fernandez R, *et al.* 2012. *European Cardiovascular Disease Statistics 2012*. Brussels: European Society of Cardiology
5. Ali DAN, Abdelhafiz DA. 2016. Clinical and Economic Implications of AF Related Stroke. *J Atr Fibrillation* 8(5): 8
6. Krijthe BP, Kunst A, Benjamin EJ, *et al.* 2013. Projections on the number of individuals with atrial fibrillation in the European Union, from 2000 to 2060. *Eur Heart J* 34(35): 2746-51
7. Laliberte F, Cloutier M, Crivera C, *et al.* 2015. Effects of rivaroxaban versus warfarin on hospitalization days and other health care resource utilization in patients with nonvalvular atrial fibrillation: an observational study from a cohort of matched users. *Clin Ther* 37(3): 554-62
8. Connolly SJ, Eikelboom J, Joyner C, *et al.* 2011. Apixaban in Patients with Atrial Fibrillation. *New Engl J Med* 364(9): 806-17
9. Wisloff T, Hagen G, Klemp M. 2014. Economic evaluation of warfarin, dabigatran, rivaroxaban, and apixaban for stroke prevention in atrial fibrillation. *Pharmacoeconomics* 32(6): 601-12
10. Lee S, Mullin R, Blazawski J, *et al.* 2012. Cost-effectiveness of apixaban compared with warfarin for stroke prevention in atrial fibrillation. *PLoS ONE* 7(10): e47473
11. Zheng Y, Sorensen SV, Gonschior A-K, *et al.* 2014. Comparison of the Cost-effectiveness of New Oral Anticoagulants for the Prevention of Stroke and Systemic Embolism in Atrial Fibrillation in a UK Setting. *Clinical Therapeutics* 36(12): 2015-28.e2
12. Kourlaba G, Maniadakis N, Andrikopoulos G, *et al.* 2014. Economic evaluation of rivaroxaban in stroke prevention for patients with atrial fibrillation in Greece. *Cost Eff Resour Alloc* 12(1): 5
13. CHRODIS PLUS. Available from: <http://chrodis.eu/about-us/> [Accessed 15 July 2018]
14. WHO Europe. 2016. *Action plan for the prevention and control of noncommunicable diseases in the WHO European Region*. Copenhagen: WHO Regional Office for Europe
15. Jorgensen HS, Nakayama H, Reith J, *et al.* 1996. Acute stroke with atrial fibrillation. The Copenhagen Stroke Study. *Stroke* 27(10): 1765-9
16. Marini C, De Santis F, Sacco S, *et al.* 2005. Contribution of atrial fibrillation to incidence and outcome of ischemic stroke: results from a population-based study. *Stroke* 36(6): 1115-9
17. Lamassa M, Di Carlo A, Pracucci G, *et al.* 2001. Characteristics, outcome, and care of stroke associated with atrial fibrillation in Europe: data from a multicenter multinational hospital-based registry (The European Community Stroke Project). *Stroke* 32(2): 392-8
18. Diener H-C. 2017. Does atrial fibrillation lead to cognitive decline and dementia? *Eur Heart J* 38(34): 2619-20
19. Camm J, Lobban T, Knight E, *et al.* 2014. The Route Map for Change & the European Atlas on the Prevention of AF-related Stroke. Available from: [http://www.heartrhythmalliance.org/files/files/aa/for-clinicians/141127-FINAL-Interactive\\_Route\\_Map\\_for\\_Change.pdf](http://www.heartrhythmalliance.org/files/files/aa/for-clinicians/141127-FINAL-Interactive_Route_Map_for_Change.pdf) [Accessed 25 October 2018]
20. Stroke Association. 2017. *Atrial fibrillation (AF) and stroke*. London: Stroke Association
21. Proietti M, Laroche C, Opolski G, *et al.* 2017. 'Real-world' atrial fibrillation management in Europe: observations from the 2-year follow-up of the EURObservational Research Programme-Atrial Fibrillation General Registry Pilot Phase. *Europace* 19(5): 722-33
22. Passman R, Bernstein RA. 2016. New Appraisal of Atrial Fibrillation Burden and Stroke Prevention. *Stroke* 47(2): 570-6
23. Eurostat. 2015. Figure 2: Population, by broad age group, EU-28, 2016-2080 (% of total population). Available from: [https://ec.europa.eu/eurostat/statistics-explained/index.php/People\\_in\\_the\\_EU\\_-\\_population\\_projections](https://ec.europa.eu/eurostat/statistics-explained/index.php/People_in_the_EU_-_population_projections) [Accessed 25 October 2018]
24. Eurostat. 2018. Population on 1st January by age, sex and type of projection. Available from: [http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj\\_15npms&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_15npms&lang=en) [Accessed 25 October 2018]
25. Eurostat. 2018. Population on 1 January, persons. Available from: <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tps00001&plugin=1> [Accessed 25 October 2018]
26. OECD/European Union. 2016. *Health at a Glance: Europe 2016 – State of Health in the EU Cycle*. Paris: OECD Publishing
27. Wendelboe AM, Raskob GE, Angchaisuksiri P, *et al.* 2018. Global public awareness about atrial fibrillation. *Res Pract Thromb Haemost* 2(1): 49-57
28. Hess PL, Mirro MJ, Diener HC, *et al.* 2014. Addressing barriers to optimal oral anticoagulation use and persistence among patients with atrial fibrillation: Proceedings, Washington, DC, December 3-4, 2012. *Am Heart J* 168(3): 239-47 e1
29. Aliot E, Breithardt G, Brugada J, *et al.* 2010. An international survey of physician and patient understanding, perception, and attitudes to atrial fibrillation and its contribution to cardiovascular disease morbidity and mortality. *Europace* 12(5): 626-33
30. Arrhythmia Alliance Group. Landing page. Available from: <http://www.heartrhythmalliance.org/> [Accessed 26 October 18]
31. ALICe - Federazione delle Associazioni per la Lotta all'Ictus Cerebrale in Italia. ALICe - Federazione delle Associazioni per la Lotta all'Ictus Cerebrale in Italia. Available from: <https://www.aliceitalia.org/> [Accessed 20 September 2018]
32. Federacion Espanola de Asociaciones de Anticoagulados. Federacion Espanola de Asociaciones de Anticoagulados. Available from: <http://anticoagulados.info/> [Accessed 25 October 2018]
33. Heidbuchel H, Dagues N, Antz M, *et al.* 2018. Major knowledge gaps and system barriers to guideline implementation among European physicians treating patients with atrial fibrillation: a European Society of Cardiology international educational needs assessment. *Europace* doi: 10.1093/europace/euy039

34. Bakhai A, Sandberg A, Mittendorf T, *et al.* 2013. Patient perspective on the management of atrial fibrillation in five European countries. *BMC Cardiovasc Disord* 13: 108
35. Zoni-Berisso M, Lercari F, Carazza T, *et al.* 2014. Epidemiology of atrial fibrillation: European perspective. *Clin Epidemiol* 6: 213-20
36. Guthrie B, Payne K, Alderson P, *et al.* 2012. Adapting clinical guidelines to take account of multimorbidity. *BMJ* 345: 3
37. Liddy C, Blazkho V, Mill K. 2014. Challenges of self-management when living with multiple chronic conditions: Systematic review of the qualitative literature. *Can Fam Physician* 60: 11
38. Jaakkola J, Mustonen P, Kiviniemi T, *et al.* 2016. Stroke as the First Manifestation of Atrial Fibrillation. *PLoS ONE* 11(12): e0168010
39. Hibbard J, Gilbert H. 2014. *Supporting people to manage their health: An introduction to patient activation*. London: The King's Fund
40. Atrial Fibrillation Association. AF-related stroke-risk calculator Available from: <http://www.preventaf-strokecrisis.org/calculator> [Accessed 9 July 2018]
41. Gomez-Doblas JJ, Muniz J, Martin JJ, *et al.* 2014. Prevalence of atrial fibrillation in Spain. OFRECE study results. *Rev Esp Cardiol (Engl Ed)* 67(4): 259-69
42. Public Health England. 2017. *Atrial fibrillation prevalence estimates in England: Application of recent population estimates of AF in Sweden*. London: Public Health England
43. Tveit A, Abdelnoor M, Enger S, *et al.* 2008. Atrial Fibrillation and Antithrombotic Therapy in a 75-Year-Old Population. *Cardiology* 109: 5
44. Svennberg E, Engdahl J, Al-Khalili F, *et al.* 2015. Mass Screening for Untreated Atrial Fibrillation: The STROKESTOP Study. *Circulation* 131(25): 2176-84
45. Panisello-Tafalla A, Clua-Espuny JL, Gil-Guillen VF, *et al.* 2015. Results from the Registry of Atrial Fibrillation (AFABE): Gap between Undiagnosed and Registered Atrial Fibrillation in Adults--Ineffectiveness of Oral Anticoagulation Treatment with VKA. *Biomed Res Int* 2015: 134756
46. Rienstra M, Lubitz SA, Mahida S, *et al.* 2012. Symptoms and functional status of patients with atrial fibrillation: state of the art and future research opportunities. *Circulation* 125(23): 2933-43
47. Karnad A, Pannelay A, Boshnakova A, *et al.* 2018. Stroke prevention in Europe: how are 11 European countries progressing toward the European Society of Cardiology (ESC) recommendations? *Risk Manag Healthc Policy* 11: 117-25
48. Public Health England. 2014. The UK NSC recommendation on Atrial Fibrillation screening in adults. Available from: <https://legacyscreening.phe.org.uk/atrialfibrillation> [Accessed 9 July 2018]
49. Socialstyrelsen. 2017. Screening för förmaksflimmer i syfte att förebygga stroke – Rekommendation och bedömningsunderlag. Socialstyrelsen
50. National Institute for Health Research. 2018. NIHR awards £3m for new research to investigate screening to prevent one in ten strokes. Available from: <https://www.nihr.ac.uk/news/nihr-awards-3m-for-new-research-to-investigate-screening-to-prevent-one-in-ten-strokes/8491> [Accessed 25 June 2018]
51. StrokeStop2. Patient information. Available from: <http://strokestop2.se/patient-information-in-english/> [Accessed 25 June 2018]
52. Bruce J *et al.* 2018. *A Focus on Atrial Fibrillation in Scotland: A report by the Cross-Party Group on Heart Disease and Stroke*. Edinburgh: Cross-Party Group on Heart Disease and Stroke
53. Yeo S. 2004. Language barriers and access to care. *Annu Rev Nurs Res* 22: 59-73
54. Desteghe L, Raymaekers Z, Lutin M, *et al.* 2017. Performance of handheld electrocardiogram devices to detect atrial fibrillation in a cardiology and geriatric ward setting. *Europace* 19(1): 29-39
55. Tassie E, Scotland G, Neilson AR. 2015. *A model based cost-effectiveness analysis of opportunistic screening for identifying atrial fibrillation with a single lead handheld electrocardiogram monitor in general practices in Scotland*. Aberdeen: Health Economics Research Unit
56. Hobbs FD, Fitzmaurice DA, Mant J, *et al.* 2005. A randomised controlled trial and cost-effectiveness study of systematic screening (targeted and total population screening) versus routine practice for the detection of atrial fibrillation in people aged 65 and over. The SAFE study. *Health Technol Assess* 9(40): iii-iv, ix-x, 1-74
57. National Institute for Health and Care Excellence. 2014. *Atrial Fibrillation: Management*. London: NICE
58. Haute Autorité de Santé (HAS). 2014. Guide parcours de soins: Fibrillation atriale. HAS
59. Rhys GC, Azhar MF, Foster A. 2013. Screening for atrial fibrillation in patients aged 65 years or over attending annual flu vaccination clinics at a single general practice. *Qual Prim Care* 21(2): 131-40
60. Kaasenbrood F, Hollander M, Rutten FH, *et al.* 2016. Yield of screening for atrial fibrillation in primary care with a hand-held, single-lead electrocardiogram device during influenza vaccination. *Europace* 18(10): 1514-20
61. Moran PS, Teljeur C, Harrington P, *et al.* 2016. Cost-Effectiveness of a National Opportunistic Screening Program for Atrial Fibrillation in Ireland. *Value Health* 19(8): 985-95
62. Smyth B, Marsden P, Corcoran R, *et al.* 2016. Opportunistic screening for atrial fibrillation in a rural area. *QJM* 109(8): 539-43
63. College of Podiatry. 2018. *Diabetes Podiatry & Atrial Fibrillation Save a Life, Stop a Stroke*. London: College of Podiatry
64. Battigelli D, Brignoli O, Ermini G, *et al.* 2013. Fibrillazione Atriale in Medicina Generale. Società Italiana di Medicina Generale
65. Freedman B, Camm J, Calkins H, *et al.* 2017. Screening for Atrial Fibrillation: A Report of the AF-SCREEN International Collaboration. *Circulation* 135(19): 1851-67
66. Alves da Costa F, Antoniou S, Papastergiou J, *et al.* 2017. Pharmacists' contribution to early detection of Atrial Fibrillation (AF) – A proof of concept in ten countries. In: AF Association, ed. *AF Association Healthcare Pioneers Report: showcasing best practice in AF 2018*. Chipping Norton: AF Association: 11
67. Care City. 2017. Launching our life-saving Atrial Fibrillation Pathway at EXPO2017. Available from: <https://www.carecity.london/news/updates/426-launching-our-life-saving-atrial-fibrillation-pathway-at-expo2017> [Accessed 10 September 2018]

68. O'Connor M, Alcock E, Onyia I, *et al.* 2018. Public health transformation: an innovative partnership between Halton Clinical Commissioning Group, Halton Local Authority Public Health and Cheshire Fire and rescue Service to help identify people aged over 65 years of age at risk from Atrial Fibrillation (AF) through fire and rescue service Safe and Well visits. In: AF Association, ed. *AF Association Healthcare Pioneers Report: showcasing best practice in AF 2018*. Chipping Norton: AF Association: 15
69. Neubeck L, Orchard J, Lowres N, *et al.* 2017. To Screen or Not to Screen? Examining the Arguments Against Screening for Atrial Fibrillation. *Heart Lung Circ* 26(9): 880-86
70. Steinhubl SR, Waalen J, Edwards AM, *et al.* 2018. Effect of a home-based wearable continuous ECG monitoring patch on detection of undiagnosed atrial fibrillation: The mSToPS randomized clinical trial. *JAMA* 320(2): 146-55
71. Fibrichck. n.d. Smart health: Fibrichck delivers a medical diagnosis at your fingertips. Belgium: IMEC
72. European Society of Cardiology. 2018. A smartphone application can help in screening for atrial fibrillation. Available from: <https://www.escardio.org/The-ESC/Press-Office/Press-releases/a-smartphone-application-can-help-in-screening-for-atrial-fibrillation> [Accessed 10 September 2018]
73. Bungard TJ, Ghali WA, McAlister FA, *et al.* 2001. Physicians' perceptions of the benefits and risks of warfarin for patients with nonvalvular atrial fibrillation. *CMAJ* 165(3): 301-02
74. Manzoor BS, Lee TA, Sharp LK, *et al.* 2017. Real-World Adherence and Persistence with Direct Oral Anticoagulants in Adults with Atrial Fibrillation. *Pharmacotherapy* 37(10): 1221-30
75. MacLean S, Mulla S, Akl EA, *et al.* 2012. Patient values and preferences in decision making for antithrombotic therapy: a systematic review: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. *Chest* 141(2 Suppl): e1S-e23S
76. Steffel J, Verhamme P, Potpara TS, *et al.* 2018. The 2018 European Heart Rhythm Association Practical Guide on the use of non-vitamin K antagonist oral anticoagulants in patients with atrial fibrillation. *Eur Heart J* 39(16): 1330-93
77. Smyth B, Marsden P, Corcoran R, *et al.* 2015. Atrial Fibrillation Screening in General Practice. Dublin: Health Service Executive
78. Lichten CA, Castle-Clarke S, Manville C, *et al.* 2015. The future of anticoagulation management in atrial fibrillation in Europe: An assessment of today's challenges with recommendations for the future. *Rand Health Q* 5(2): 2
79. Keele University. 2016. Decision Support. Anticoagulation therapy for the prevention of stroke and systemic embolism in atrial fibrillation. Available from: <https://www. anticoagulation-dst.co.uk/> [Accessed 11 July 2018]
80. University of Nottingham. GRASP-AF. Available from: <https://www.nottingham.ac.uk/primis/tools-audits/tools-audits/grasp-af.aspx> [Accessed 23 September 2018]
81. European Society of Cardiology. CATCH ME tools in the ESC Pocket Guidelines App State-of-the-art tools to better manage AFib patients. Available from: <https://www.escardio.org/Research/Research-Funding/catch-me-tools-in-the-esc-pocket-guidelines-app> [Accessed 23 July 2018]
82. European Society of Cardiology. ESC Science In Your Language. Available from: <https://www.escardio.org/Education/Practice-Tools/esc-science-in-your-language> [Accessed 27 September 2018]
83. Olesen JB, Lip GYH, Hansen ML, *et al.* 2011. Validation of risk stratification schemes for predicting stroke and thromboembolism in patients with atrial fibrillation: nationwide cohort study. *BMJ* 342: d124
84. Shantsila E, Wolff A, Lip GY, *et al.* 2015. Optimising stroke prevention in patients with atrial fibrillation: application of the GRASP-AF audit tool in a UK general practice cohort. *Br J Gen Pract* 65(630): e16-23
85. Lobban TCA, Camm AJ. 2011. Patient associations as stakeholders: a valuable partner for facilitating access to therapy. *EP Europace* 13(suppl\_2): ii21-ii24
86. All-Party Parliamentary Group on Atrial Fibrillation. n.d. *Pulse Checks in the NHS. Ideas Worth Spreading*. Chipping Norton: AF Association
87. Atrial Fibrillation Association. The Heart of AF. Available from: <http://www.heartrhythmalliance.org/afa/uk/heart-of-af> [Accessed 9 July 2018]
88. GARFIELD-AF Registry. Geographic differences. Available from: <http://af.garfieldregistry.org/key-findings/geographic-differences> [Accessed 2 October 2018]
89. Ten Cate V, Ten Cate H, Verheugt FW. 2016. The Global Anticoagulant Registry in the FIELD-Atrial Fibrillation (GARFIELD-AF) : Exploring the changes in anticoagulant practice in patients with non-valvular atrial fibrillation in the Netherlands. *Neth Heart J* 24(10): 574-80
90. Camm AJ, Pinto FJ, Hankey GJ, *et al.* 2015. Non-vitamin K antagonist oral anticoagulants and atrial fibrillation guidelines in practice: barriers to and strategies for optimal implementation. *Europace* 17(7): 1007-17
91. Lenti L, Brainin M, Titianova E, *et al.* 2013. Stroke care in Central Eastern Europe: current problems and call for action. *Int J Stroke* 8(5): 365-71
92. Agencia Española de Medicamentos y Productos Sanitarios. 2016. Informe de posicionamiento terapéutico ut\_ACOD/V5/21112016. Criterios y recomendaciones generales para el uso de los anticoagulantes orales directos (ACOD) en la prevención del ictus y la embolia sistémica en pacientes con fibrilación auricular no valvular. Ministerio De Sanidad SSyl
93. Luis Segú J. 2016. Acceso a los anticoagulantes de acción directa en España. *Rev Esp Cardiol* 16(Supl.A): 55-59
94. Raviere - AIAC *et al.* 2013. Linee guida AIAC per la gestione ed il trattamento della FA. Aggiornamento 2013.
95. Nardi F, Massimo Gulizia M, Colivicchi F, *et al.* 2016. Position paper ANMCO: I nuovi anticoagulanti orali nella prevenzione del tromboembolismo nella fibrillazione atriale: scenari clinici e prospettive future. *G Ital Cardiol* 17(9 Suppl 1): 3S-28S
96. Mackay J, Mensah G, Mendis S, *et al.* 2004. *The Atlas of Heart Disease and Stroke*. Geneva: World Health Organization
97. Association of the British Pharmaceutical Industry, Stroke in Atrial Fibrillation Initiative. 2016. *One year on. Why are patients still having unnecessary AF-related strokes?* London: Association of the British Pharmaceutical Industry

98. Cowan JC, Wu J, Hall M, *et al.* 2018. A 10 year study of hospitalized atrial fibrillation-related stroke in England and its association with uptake of oral anticoagulation. *Eur Heart J*: ehy411-ehy11
99. Corbacho B, Pinto-Prades JL. 2012. Health economic decision-making: a comparison between UK and Spain. *Br Med Bull* 103(1): 5-20
100. Williams IP, Bryan S. 2007. Cost-effectiveness analysis and formulary decision making in England: findings from research. *Soc Sci Med* 65(10): 2116-29
101. AF Association. Campaigns. Available from: <http://www.heartrhythmalliance.org/afa/uk/westminster> [Accessed 2 October 2018]
102. Arrhythmia Alliance. Know your pulse – Scottish Parliament. Available from: <http://www.heartrhythmalliance.org/aa/uk/know-your-pulse-scottish-parliament-22nd-february-2017> [Accessed 2 October 2018]
103. Arrhythmia Alliance. 2014. *Know Your Pulse – MPs find their rhythm at Parliament House*. Chipping Norton: Arrhythmia Alliance
104. Arrhythmia Alliance. European Parliament. Available from: <http://www.heartrhythmalliance.org/afa/uk/european-parliament> [Accessed 2 October 2018]
105. Johnsen SP, Ingeman A, Hundborg HH, *et al.* 2016. The Danish Stroke Registry. *Clin Epidemiol* 8: 697-702
106. Epidemiologisk Biostatistik (KCEB-) Nord. 2017. Dansk Apopleksiregister, Årsrapport 2016, 1. januar - 31. december 2016. Endelig udgave.
107. King's College London. Sentinel stroke national audit programme. Available from: <https://www.strokeaudit.org/Home.aspx> [Accessed 24 September 2018]
108. Tolley H, Snowdon W, Wate J, *et al.* 2016. Monitoring and accountability for the Pacific response to the non-communicable diseases crisis. *BMC Public Health* 16(1): 958
109. World Health Organization. 2014. *Media's role in ensuring accountability for health. Promoting the use of impact assessments for decision making*. Kobe: WHO Centre for Health Development
110. Norrving B, Barrick J, Davalos A, *et al.* 2018. Action Plan for Stroke in Europe 2018–2030. *Eur Stroke J* doi: 10.1177/2396987318808719
111. Murphy A, Banerjee A, Breithardt G, *et al.* 2017. The World Heart Federation Roadmap for Nonvalvular Atrial Fibrillation. *Glob Heart* 12(4): 273-84
112. European Society of Cardiology. ESC Council on Stroke. Available from: <https://www.escardio.org/Councils/Council-on-Stroke/About> [Accessed 2 October 2018]
113. European Stroke Organisation. ESO Committees. Available from: <https://eso-stroke.org/eso-committees/> [Accessed 10 October 2018]
114. Atrial Fibrillation Association, Arrhythmia Alliance, AntiCoagulation Europe, *et al.* n.d. Take Action Now: Supporting the prevention of AF-related stroke. [http://www.heartrhythmalliance.org/files/files/aa/for-clinicians/121212-FINAL-Take\\_Action\\_Now-Action\\_Plan.pdf](http://www.heartrhythmalliance.org/files/files/aa/for-clinicians/121212-FINAL-Take_Action_Now-Action_Plan.pdf) [Accessed 25 October 2018]

