

yet to be addressed: (i) Are the detected arrhythmias including sinus tachycardia and atrial fibrillation true incident events under the influence of alcohol? (ii) Would atrial fibrillation develop more frequently during follow up? and (iii) Is respiratory sinus arrhythmia an appropriate measure to assess the spectrum of heart rate variability?

To address these open research questions, follow-up investigations are underway. The investigations will prospectively enrol individually selected voluntary participants, rather than approaching possible candidates in public at a festival. With such increased privacy, it will be possible to survey detailed information on concomitant conditions and regular drinking behaviour. To expand ECG recording, all participants will be equipped with a 3-day Holter monitor enabling the detection of incident arrhythmias during follow-up and covering a sufficient time to consume alcohol and sober up afterwards. For assessment of heart rate variability, the participants will also be intermittently equipped with a high sampling rate ECG, permitting the analysis of various specific measures, including deceleration capacity and periodic repolarization dynamics.<sup>19,20</sup> Finally, the trajectory of alcohol breath concentrations will be monitored by repeated measures.

Motivated by the intention to better understand the circumstances, conditions, and triggers that individually cause atrial fibrillation, the authors are convinced that acute alcohol consumption plays a role. The promising results of the MunichBREW study clearly fostered this

understanding. With the described follow up investigations under way, the authors anticipate adding relevant new pieces to the puzzle.

Moritz F. Sinner, M.D., M.P.H.<sup>1,2</sup> & Stefan Brunner, M.D.<sup>1</sup>

<sup>1</sup>Department of Medicine I, University Hospital Munich, Ludwig-Maximilians University, Munich, Germany; and <sup>2</sup>German Centre for Cardiovascular Research (DZHK), partner site: Munich Heart Alliance, Munich, Germany

Address for correspondence:

Moritz F. Sinner MD MPH and Stefan Brunner MD,

University Hospital Munich,

Department of Medicine I,

Marchioninstr. 15,

81377 Munich, Germany.

Tel: +49-89-4400-76159

Fax: +49-89-4400-75251

Email: Stefan.Brunner@med.uni-muenchen.de

Moritz.Sinner@med.uni-muenchen.de

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## References

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# ESC Apps for Atrial Fibrillation

## Novel Smartphone and Tablet Apps for patients and healthcare professionals have been developed by the European Society of Cardiology based on the 2016 ESC Guidelines for Atrial Fibrillation

2016 saw the release of the new European Society of Cardiology (ESC) Guidelines on Atrial Fibrillation (AF), which highlighted the importance of patient-centred care within a multidisciplinary team in order to improve management of AF and reduce adverse clinical outcomes. The application of best-practice guidelines can be challenging in the clinical environment and mobile applications are a technological advance with the potential to aid clinicians and also educate and involve patients.

The ESC and the CATCH ME Consortium have created two applications (Apps) for use in smartphones and tablets. The patient App aims to enhance patient education, improve communication between patients and health care professionals and encourage active patient involvement in the management of their condition. The healthcare professional App is designed as an interactive management tool incorporating the 2016 ESC Practice Guidelines on AF and supported by the European Heart Rhythm Association (EHRA).

Both Apps are freely available now for Android and iOS devices through the Google Play, Amazon and Apple stores.

## Introduction

Applications (Apps) on smartphones and tablet computers are now almost universal as the proportion of the global population that have access to mobile devices continues to grow exponentially. For many people, smartphones and tablets are now the main tools used for communication and to access the internet. Health-related Apps are also becoming more common and offer education within a platform that can integrate complex clinical pathways. The European Society of Cardiology (ESC) already has a series of Apps based on the pocket treatment guidelines which are extremely successful (predicted to reach 1 million user sessions per year by the end of 2017). Developing interactive Apps that can guide clinicians through management choices based on individual patient characteristics has the potential for further clinical value and increased guideline adherence. Including patients within this digital framework would not only improve efficiency for consultations but also contribute to patient education, shared decision making and better compliance with treatment.

Atrial fibrillation (AF) is an ideal cardiovascular condition to further develop this concept, underpinned by the 2016 ESC Guidelines on AF.<sup>1</sup> AF continues to increase in incidence and prevalence with high rates of morbidity and mortality.<sup>2</sup> Adherence to clinical practice guidelines can improve prognosis in patients with AF<sup>3–5</sup> and integrated, patient-centred care can increase therapeutic benefit and reduce unnecessary hospitalization.<sup>6–8</sup> Apps in other health care areas have suggested a benefit from various types of intervention in selected populations.<sup>9</sup> In addition, digital formats have the potential to embed learning within routine clinical practice,<sup>10</sup> and Professional Standards across Europe highlight the importance of patient and physician education.<sup>11,12</sup> These provide a clear rationale to develop ESC-based interactive App.

We have designed two standalone Apps, one for patients and the second for health care providers (general and specialist doctors, AF nurses and others). These will then be linked in the near future to allow transfer of data securely between patients and their AF management team (and vice versa). Our overall aim is to facilitate best-practice management of AF and therefore to improve patient outcomes.

## Design

App design was led by representatives from the ESC Guidelines Task Force on AF, the CATCH ME Consortium (Characterizing Atrial fibrillation by Translating its Causes into Health Modifiers in the Elderly) and the European Heart Rhythm Association (EHRA). Börm Bruckmeier Publishing (Germany) was commissioned to produce the Apps. The Apps were developed in tandem with the writing of the 2016 ESC Guidelines on AF (2014–2016).

The main components and objectives of the App development programme are displayed in Figure 1.

Educational material in the patient App was edited by a team of patient representatives with AF, funded through a UK National Institute of Health Research grant on improving patient outcomes in AF.<sup>13</sup> Text and images were derived from the British Heart Foundation (<https://www.bhf.org.uk/>), the German National Network of Competence in Atrial Fibrillation (AFNET; <http://www.kompetenz-netz-vorhofflimmern.de/>) and a patient booklet on AF developed in the Netherlands.<sup>14</sup> The patient App will present information on individual stroke risk and provide a personal health record and symptom diary to facilitate consultation with their healthcare professional.

The health care professional App is a more complex tool, allowing both conventional viewing of guideline text, recommendations and flowcharts, as well as interactive treatment algorithms that will guide clinicians through the decision process.

Both Apps are scheduled for public release during the ESC Congress in Barcelona, August 2017. Connectivity between the Apps (via a secure cloud server) and CE certification will follow shortly afterwards.

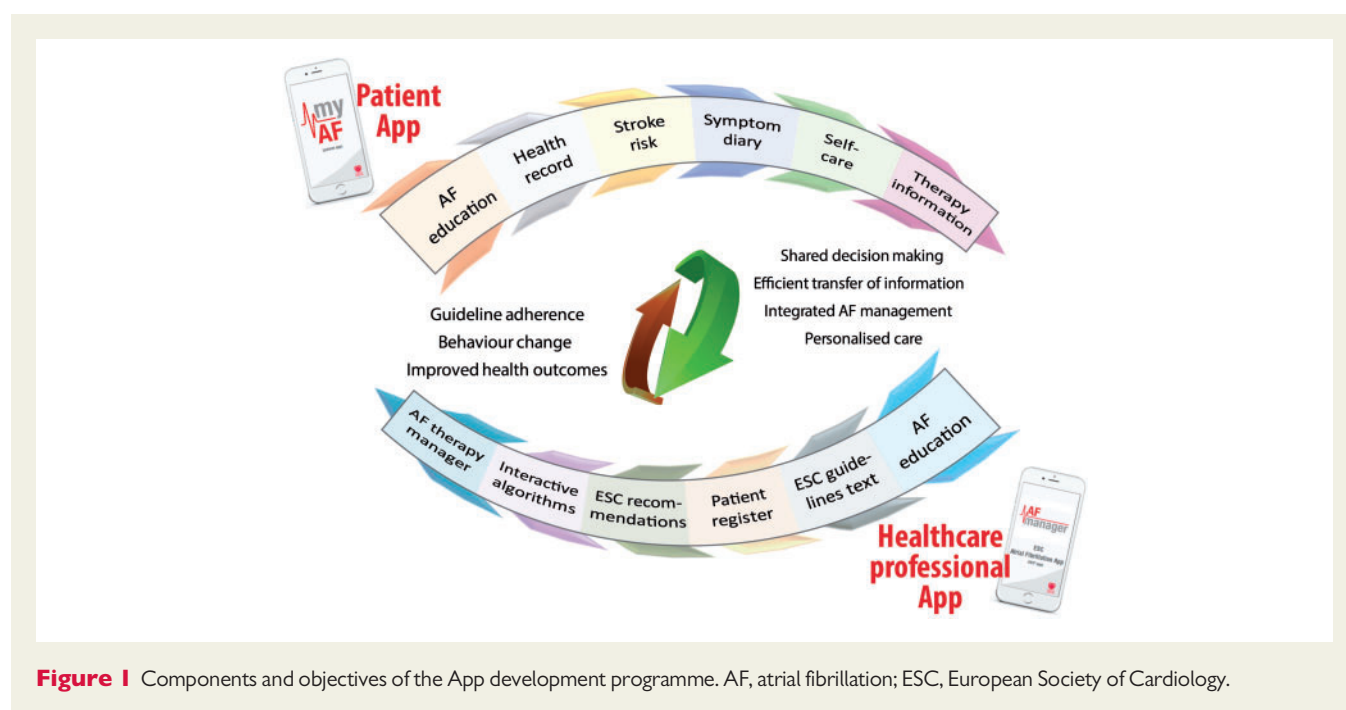
## Evaluation

The Apps have been extensively evaluated in multiple stages and ongoing feedback will drive further development of these tools.

The content was appraised by members of the ESC AF Guidelines Task Force, followed by internal and external beta-testing to ensure an optimal interface design, good use of technology and acceptability to users.<sup>15,16</sup> In total, there were 50 test versions of the Apps, with step-wise iterations leading to better functionality.

## Discussion

We live in an exciting (and confusing!) technological time with an unrelenting pace of advance in digital devices. The main challenge for



health care is stay up-to-date in this evolving field and provides tools which are clinically relevant and can improve patient care.

With the need for structured and integrated management, AF is a good test case for the development of interactive Apps, based on recommendations and treatment flowcharts from the 2016 ESC AF Guidelines.<sup>1</sup> Uniquely, we have also designed a companion patient App which can harness informed and autonomous patients, leading to better outcomes through shared decision making.<sup>6,17,18</sup>

Not all patients and health care professionals will have access to smartphones or tablets, however, even in older adults, internet use and mobile phones are increasing exponentially.<sup>19</sup> Barriers to smartphone use in older patients, such as familiarity and visual impairment,<sup>20</sup> were considered during the design phase of the Apps and addressed with the use of 'patient-friendly' information and a simple layout. The structure of the Apps will allow future modification in response to feedback, as well as the opportunity to collect anonymous data from patients who give consent and thereby assess challenges to guideline-adherence over time.

## Get your AF App now!

The Apps are freely available for Android and iOS devices through the Google Play, Amazon and Apple stores. Just scan the barcode images, or search for 'My AF' (patient App) or 'AF manager' (health care professional App) in the Appstore. You can find treatment guidelines for other cardiovascular conditions in the ESC Pocket Guidelines App (search for 'ESC').



Patient App (My AF)



Healthcare Professional App (AF Manager)



Dipak Kotecha MBChB PhD MRCP FESC FHEA  
University of Birmingham Institute  
of Cardiovascular Sciences  
Birmingham, UK,  
on behalf of, The ESC AF Guidelines Taskforce,  
The CATCH ME consortium and  
The European Heart Rhythm Association



Paulus Kirchhof MD  
University of Birmingham Institute  
of Cardiovascular Sciences  
Birmingham, UK,  
on behalf of, the ESC AF Guidelines Taskforce,  
The CATCH ME consortium and  
The European Heart Rhythm Association

Address for correspondence:

Dr Dipak Kotecha MBChB PhD MRCP FESC FHEA  
University of Birmingham Institute of Cardiovascular Sciences,  
The Medical School, Vincent Drive, Edgbaston,  
Birmingham, B15 2TT, United Kingdom.

d.kotecha@bham.ac.uk

Tel: +44 121 371 8122

Fax: +44 121 371 4175

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## References

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