LETTER TO THE EDITORS

A combined Smartwatch-Electrocardiogramme approach for atrial fibrillation detection in rural practice

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation,
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Atrial fibrillation (AF) is the most common type of arrhythmia, characterized by irregular ventricular responses due to chaotic electrical activity in the atria [1]. AF is relatively prevalent, observed in approximately 1–2% of the general adult population, especially the elderly [1]. It is known as a critical condition due to being a major cause of stroke and heart failure [2, 3]. Of note, the prevalence of AF is reported to be high at 2.05% among agricultural populations in rural mountainous areas [4]. However, residents of these areas are recognized to have less opportunity to receive full disease management because of restricted access to cardiac specialists, travel distance, insufficient testing opportunities, insufficient understanding of the disease, and inadequate self-management support [4–6]. There is a demand for a simple method to detect AF among such residents.

Detecting AF outside of medical facilities may be a solution. Smartwatches, which record a single-lead electrocardiogramme (ECG) in addition to detecting irregular pulse waves via photoplethysmography (PPG), are devices usable in daily life and could serve as a convenient tool for AF detection [7]. Separate from chronic AF, paroxysmal AF often is undetected during a brief 12-lead ECG testing, while smartwatches, capable of repeated, long-term monitoring, offer advantages. However, the diagnostic accuracy of smartwatches remains debated, with limited evidence available [8, 9]. Very recently, a systematic review and meta-analysis was published demonstrating that smartwatches possess comparatively high diagnostic accuracy for detecting AF [10], highlighting their potential value in rural practice.

The features of ECG in AF include the irregular R-R intervals (when atrioventricular conduction is present), absence of distinct P waves, and irregular atrial activities (also called fibrillation waves); a diagnosis thus requiring confirmation by ECG (12-lead, multi-lead, or single-lead) [11]. The guidelines state 'confirmation by ECG is recommended to establish the diagnosis of clinical AF, perform risk stratification, and initiate treatment' [12]. A precise diagnosis of AF requires 12-lead ECG or Holter monitoring, not PPG; smartwatches alone are insufficient [11, 12]. Therefore, the diagnosis of AF can be established through the combination of a PPG-smartwatch for continuous rhythm monitoring and an ECG for diagnostic waveform confirmation [10–12].

Bearing the evidence [10] in mind, in rural areas one may assume the idea as a possible approach to AF management in that screening is performed using smartwatches, with the diagnosis confirmed through ECG testing at medical facilities. Subsequent advances in telemedicine [13] now enable remote medication dispensing and electronic prescribing. This constitutes a framework for improving totally medical access. It is presumed to reduce travel expenses associated with round trips to distant specialist hospitals, time losses including work absences, and waiting costs, potentially improving cost-effectiveness. In Poland, a 'mail-in Holter service' via a private platform has begun [14]. This could provide a pathway where patients suspected of AF based on smartwatch monitoring bypass long waiting lists at public hospitals and use such private services to proceed quickly to a confirmed diagnosis [14]. This approach might be applicable to rural practice on AF.

On the other hand, challenges remain. For instance, the diagnostic accuracy of smartwatches still needs to be investigated. Smartwatch uptake among the residents may be limited in rural areas. If the number of residents with suspected AF increases, there may be an increased demand for more detailed confirmatory examinations. In a cost-effectiveness study, the combination of data of smartwatch and patch-type Holter ECG yielded the most cost-effective results [15]. Accordingly, in rural areas, a diagnostic pathway that uses smartwatches as the entry point and minimizes the need for detailed examinations is considered to be reasonable. Furthermore, a shift in physicians' mindset may be of importance. A survey of physicians identified several barriers: while being aware of the clinical utility of smartwatches, their concerns included the time constraints (the burden of reviewing and interpreting large volumes of smartwatch records within office hours, and integrating them into electronic medical records), limitations in insurance reimbursement, and inappropriate perceptions about the accuracy of single-lead ECGs [16]. In other words, promoting changes in physicians' awareness, knowledge, and behaviour will likely be necessary for future widespread adoption.

Detecting AF via smartwatches, confirming the diagnosis with resting 12-lead ECG or Holter monitoring, and

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Annals of Agricultural and Environmental Medicine

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integrating information-communication and medication-delivery systems may be the expected stage for AF management in rural areas. Progress is awaited in this field.

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