

# Role of Wearable Rhythm Recordings in Clinical Decision Making— The wEHRables Project

Manning M, Kosiuk J, Zweiker D, et al. *Clin Cardiol.* 2020;43:1032-1039.

## Background



Over the last 5 years, an estimated 1 billion wearable devices for cardiac rhythm analysis have emerged onto the consumer health market

Wearable devices use 2 different methods of heart analysis:



Photoplethysmography (PPG), which is based on diodes receiving light emissions to sense changes in blood volume caused by peripheral pulsations



Use of single- or multiple-lead electrocardiography (ECG) that utilizes electrodes placed in a hand-held device, wristband, or smartwatch

## Objectives



The objectives of this survey were to evaluate physicians' awareness of cardiac rhythm devices and likelihood of recommending them, and to assess their impact on clinical decision-making, including initiation of formal diagnostic testing, medical therapy, and invasive procedures

## Methods



This online survey included 10 questions on types of cardiac rhythm devices, advantages and disadvantages of wearable devices, and 3 clinical scenarios of patients with arrhythmia including 1) a young patient with palpitations, 2) a patient with symptomatic atrial fibrillation (AF), and 3) a patient with asymptomatic AF

- Each clinical scenario is based on a 30-second ECG trace from an ECG and PPG device


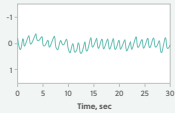
## Results

- A total of 417 physicians from 42 countries completed the survey, of which 404 were included in the analysis
- The median age of survey respondents was 37 years (IQR, 32–43 years) and the majority were electrophysiologists or cardiologists

**OBJECTIVE 1:** Evaluate the awareness of and likelihood of recommending an ECG device

- The best known and most recommended ECG devices were the Apple Watch and KardiaMobile monitor (**Figure 1**). The most commonly used and recommended PPG device was the Apple Watch
- Most physicians preferred the ECG recording to be transmitted to a specialized center (34%) rather than be sent directly to the attending physician (29%)
- However, only 9% of physicians would leave interpretation of the ECG trace to a third party

**FIGURE 1.** Used, Recommended, and Known ECG-Based and PPG-Based Device Types

	Device name	I use this device	I recommend this device to patients	I recommend this device to colleagues	I have not heard of this device
<b>ECG-based devices</b> 	Apple Watch Series 4-5	16.5%	31.4%	23.7%	6.2%
	Beurer mobile ECG device	5.1%	5.9%	3.8%	75.8%
	imPulse	0.3%	1.8%	0.4%	84.4%
	<b>KardiaMobile</b>	<b>20.4%</b>	<b>30.9%</b>	<b>26.9%</b>	<b>38.2%</b>
	<b>KardiaMobile 6L</b>	<b>7.8%</b>	<b>18.4%</b>	<b>15.9%</b>	<b>43.7%</b>
	My Diagnostick	4.2%	3.4%	2.9%	74.0%
	Zenacor-ECG	4.4%	4.9%	3.8%	72.6%
<b>PPG-based devices</b> 	Apple Watch	17.9%	21.4%	17.1%	10.1%
	CardioRhythm	2.0%	4.3%	2.8%	71.4%
	FibriCheck	4.1%	3.6%	2.8%	75.1%
	Fitbit	9.4%	5.8%	4.7%	44.6%
	HeartRate	1.8%	2.9%	2.1%	76.4%
	Oura Ring	0.3%	0.8%	1.0%	87.2%

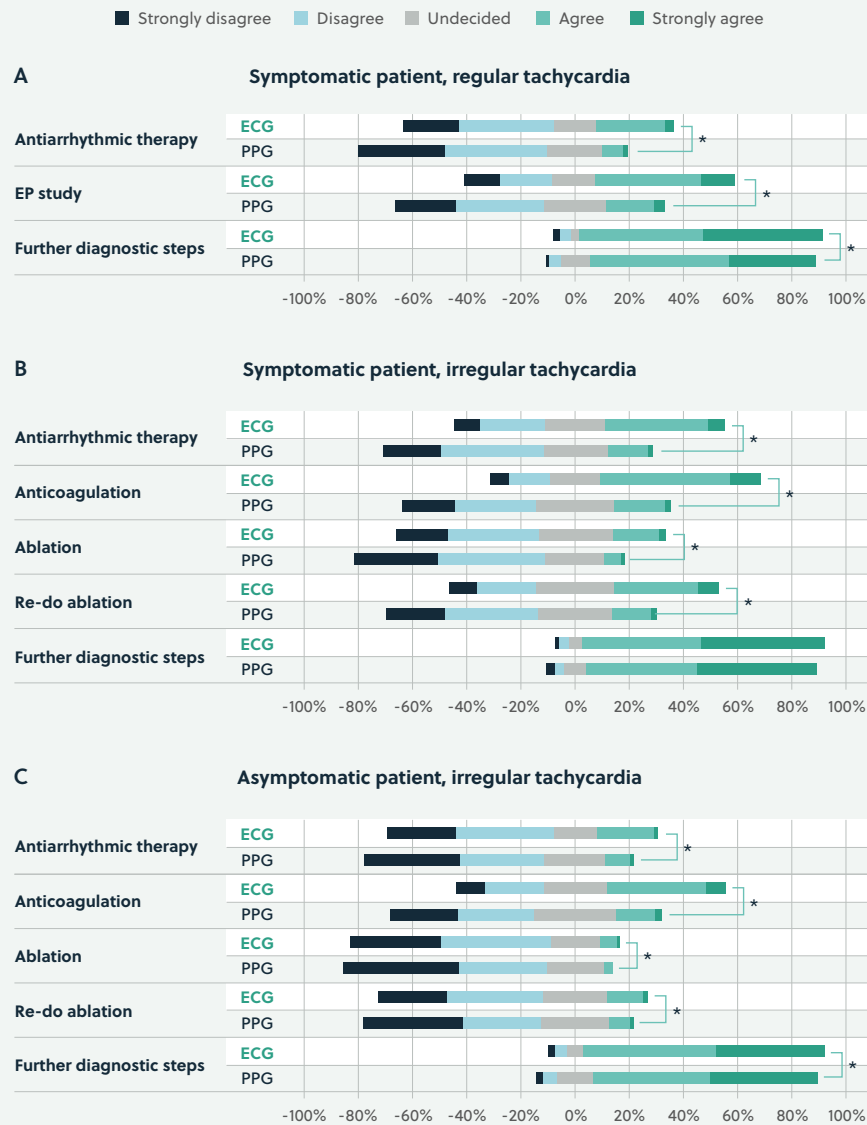
**OBJECTIVE 2:** Evaluate the impact of cardiac rhythm devices on clinical decision-making

- For the 3 clinical scenarios, participants would generally be more likely to initiate further diagnostic testing, initiate medical therapy, and take other clinical action based on a single-lead ECG than on a PPG recording for each groupwise comparison ( $P < 0.001$ ) except for taking "further diagnostic steps" in a symptomatic AF patient with irregular tachycardia ( $P = 0.08$ ) (**Figure 2**)

## Results (cont'd)

**FIGURE 2.** Evaluation of Clinical Decision-making Based on Different Cardiac Rhythm Devices in 3 Clinical Scenarios

Which steps would you consider in the following patients presenting with wearable device rhythm recordings?



\*Significant difference between ECG and PPG recordings ( $P < 0.001$ ).

- Most respondents reported that based on a 30-second ECG recording, they would most likely diagnose AF from a Holter monitor (95% very likely or likely), followed by high atrial rate episodes from an implanted device (83%) or a single-lead ECG (69%), while only 14% would diagnose AF based on a PPG tracing
- Potential advantages of cardiac rhythm devices included rapid diagnosis (67.7%), continuous monitoring (63.0%), patient involvement (61.1%), and arrhythmia screening facilitation (54.7%). The most frequently reported potential disadvantage was fear of data overload (68.5%)
- Most physicians expressed the need for a consensus document from a scientific society, ongoing clinical trial validation, and a review of validated devices to aid in clinical practice adoption

## Conclusions

Results from this online survey from over 400 physicians from more than 40 countries showed that physicians:



Are aware of, use, and recommend ECG recording devices, especially the Apple Watch and AliveCor KardiaMobile monitor



Are more likely to perform additional diagnostic tests than make clinical decisions based on these recordings



Preferred basing clinical decisions on ECG rather than PPG recordings



Identified rapid and continuous monitoring as advantages of ECG rhythm devices



Prefer guideline recommendations to facilitate uptake in clinical practice

## Importance to AliveCor



This study showed that physicians use and recommend ECG devices and PPG-based ECG devices.

The AliveCor KardiaMobile monitor is the most commonly used wearable ECG device and the most highly recommended to patients. Physicians are more likely to take clinical actions based on ECG than PPG recordings



Most physicians appreciate that cardiac rhythm devices may help facilitate the screening and diagnosis of AF and would like guidance on how best to incorporate them into clinical practice