ESOC 2025

11th European Stroke Organisation Conference

21–23 May 2025, Helsinki, Finland

THE VOICE OF STROKE IN EUROPE

Abstract Number: 373

Abstract Title: PHOTOPLETHYSMOGRAPHY-BASED MONITORING VERSUS INSERTABLE CARDIAC MONITORS: DETECTING ATRIAL FIBRILLATION IN CRYPTOGENIC STROKE PATIENTS

Abstract Category: 04.00 - DIAGNOSIS / ETIOLOGY - 04.10 - ESUS/CRYPTOGENIC STROKE

Preferred Presentation Type: Oral or Poster Presentation

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Background and Aims: Long-term cardiac monitoring is essential for detecting atrial fibrillation (AF) in cryptogenic stroke patients, enabling timely initiation of oral anticoagulation therapy. However, the performance of spot-check and semi-continuous photoplethysmography (PPG)-based monitoring using smartphones/smartwatches compared to insertable cardiac monitors (ICMs) is unknown in this setting. This study aims to assess the performance of PPG-based rhythm monitoring with smartphones/smartwatches for AF detection (>1h) in cryptogenic stroke patients.

Methods: This prospective, multicenter, double-blinded trial compared the use of PPG-based monitoring using smartphone or smartwatch with ICMs. Patients were randomized 1:1 to use smartphone (two one-minute spot-checks daily) or smartwatch (semi-continuous measurements every nine minutes) for six months.

Results: Among 185 patients, both ICMs and PPG-based monitoring detected AF>1h in 4.3% of patients. The digital follow-up strategy to detect AF>1h with at least 4 consecutive AF-positive measurements yielded a sensitivity of 66.7% (9.4%-99.2%) and specificity of 100% (96.3%-100%) for smartphone-based monitoring with one false-negative patient. Smartwatch-based monitoring demonstrated a sensitivity of 100% (47.8%-100%) and specificity of 98.7% (93.2%-99.96%) with one false-positive patient.

On measurement-level, smartphone-based monitoring sensitivity and specificity were 100% (80.5%–100%) and 99.7% (99.6%–99.7%), respectively. Smartwatch-based monitoring sensitivity was 71.0% (58.1%–81.8%) and specificity was 99.6% (99.6%–99.6%).

Conclusion: Prolonged cardiac monitoring using a PPG-based smartphone or smartwatch approach demonstrated high specificity and sensitivity for detecting AF>1h, comparable to ICM performance.

Tool	Smartphone		Smartwatch	
Level	**Spot-check** (n = 27,322)	**Patient** (n = 101)	**Semi-continuous** (n = 1,903,930)	**Patient** (n = 84)
Sensitivity	100 (80.5 - 100)	66.7 (9.4 - 99.2)	71.0 (58.1 - 81.8)	100 (47.8 - 100)
Specificity	99.7 (99.6 - 99.7)	100 (96.3 - 100)	99.6 (99.6 - 99.6)	98.7 (93.2 - 100)
Accuracy	99.7 (99.6 - 99.7)	99.0 (94.6 - 100)	99.6 (99.6 - 99.6)	98.8 (93.5 - 100)
PPV	16.8 (10.1 - 25.6)	100 (15.8 - 100)	0.9 (0.7 - 1.2)	83.3 (35.9 - 99.6)
NPV	100 (99.9 - 100)	99.0 (94.5 - 100)	99.9 (99.9 - 99.9)	100 (95.4 - 100)

Data presented as percentage (95% CI) on measurement level (either spot-check or semi-continuous) and on patient-level using the digital follow-up strategy to detect AF episodes ≥1h with at least 4 consecutive AF-positive measurements.

Disclosures: nothing to disclose
Travel Grant Application: No
Young Investigator Award Application: No