Cardiac Surveillance in the Digital Age

A Use Case Paper on the Role of the Corsano CardioWatch in Detecting Atrial Arrhythmias in the Geriatric Population

Corsano

abstract

Atrial arrhythmias in older adults present significant healthcare challenges. This paper evaluates the efficacy of Corsano CardioWatch, a remote patient monitoring (RPM) tool, in detecting atrial fibrillation. Comparing traditional episodic methods with CardioWatch's continuous monitoring, early findings indicate the superior sensitivity of the latter. For healthcare professionals, especially nurses, the device facilitates informed care delivery, enhancing patient interactions. With AI-driven analytics, the future looks promising for such RPM systems.

Keywords: atrial arrhythmias, Corsano CardioWatch, remote patient monitoring, continuous monitoring, AI-driven analytics

key results

6% AF detected

882 subjects

71 average age

8 weeks screening

introduction

Atrial arrhythmias, notably atrial fibrillation (AF), constitute a paramount concern in geriatric health, serving as a precursor for an array of complications such as stroke, heart failure, and enhanced mortality rates. Contemporary methodologies for detecting atrial arrhythmias, albeit efficacious, occasionally falter in terms of timeliness, continuous monitoring, and patient compliance.

background

Atrial fibrillation (AF), the predominant cardiac arrhythmia, currently affects approximately 37.574 million individuals worldwide, equivalent to 0.51% of the global population. In 2017 alone, there was a documented addition of 3.046 million new AF cases, reflecting an incidence rate 31% higher than that recorded in 1997. While nations with a high socio-demographic index bear a significant AF burden, the steepest increases have been observed in countries with a middle socio-demographic index.[1]

The repercussions of undetected or tardily diagnosed atrial arrhythmias are profound. These irregular heart rhythms, when left unchecked, augment the risk of cerebrovascular accidents or strokes, accounting for nearly one-third of all stroke-related hospitalizations in the elderly cohort. Moreover, untreated AF precipitates a five-fold surge in stroke risk, exacerbates the potential for heart failure, and can culminate in diminished quality of life owing to palpitations, fatigue, and dyspnea.[2]

Presently, standard practices for AF detection encompass electrocardiograms (ECGs), Holter monitors, and event recorders. While these modalities have demonstrated efficacy, they are not devoid of limitations. ECGs provide only a fleeting snapshot of cardiac activity and may not capture sporadic arrhythmic events. Holter monitors, despite their capability for extended monitoring, are constrained by their typical 24- to 48-hour recording window. Event recorders, though enabling longer durations of monitoring, are contingent on the patient's proactive involvement to record perceived irregularities. Additionally, the lack of real-time data transmission in many conventional devices renders timely interventions challenging. This diagnostic lacuna necessitates an exploration into innovative, technologically sophisticated alternatives capable of revolutionizing the landscape of atrial arrhythmia detection.

1 Lippi G, Sanchis-Gomar F, Cervellin G. Global epidemiology of atrial fibrillation: An increasing epidemic and public health challenge [published correction appears in Int J Stroke. 2020 Jan 28: 1747493020905964]. Int J Stroke. 2021;16(2):217-221.

2 Sanders GD, Lowenstern A, Borre E, et al. Stroke Prevention in Patients With Atrial Fibrillation: A Systematic Review Update. Rockville (MD): Agency for Healthcare Research and Quality (US); October 2018.

findings from a **landmark study**

The exploration into innovative atrial arrhythmia detection methodologies led to the initiation of the "Smartphone and Wearable Detected Atrial Arrhythmia in Older Adults Case Finding Study" (Smart in OAC—AFNET 9). This study combined modern consumer electronics with rigorous scientific analysis to assess the feasibility and efficacy of these tools within an older population.[3]

methodology

The study involved 882 individuals aged 65 and older from Germany, Poland, and Spain, a demographic traditionally at higher risk for atrial arrhythmias. These participants, who had no known history of atrial fibrillation and were not undergoing anticoagulation therapy, were enrolled digitally for an 8-week, fully remote study utilizing innovative data collection techniques. The enrollment leveraged media communications and direct contacts, with 53% of participants completing all procedures remotely, highlighting the growing trend toward digital health solutions.

Central to this study's data collection methodology was the use of the Corsano CardioWatch, a medically certified wearable with a photoplethysmography sensor. This device interfaces directly with smartphones, enabling detailed cardiac data acquisition. It continuously monitors up to 19 vital parameters, including pulse rate, heart rate variability, ECG, and SpO2. With an integrated real-time research platform, the CardioWatch facilitates direct access to raw data, suitable for artificial intelligence (AI) and machine learning (ML) analysis.

3 Fabritz L, Connolly DL, Czarnecki E, et al. Smartphone and wearable detected atrial arrhythmias in Older Adults: Results of a fully digital European Case finding study. Eur Heart J Digit Health. 2022;3(4):610-625. Published 2022 Nov 1.

results

The cohort comprised a total of 882 individuals, with an age distribution of 71 ± 5 years, ranging between 65 and 90 years. Out of these, 500 participants (57%) were female. Concerning health profiles, 414 participants (47%) reported a history of hypertension, and 97 (11%) indicated a diagnosis of diabetes.

882 subjects **71** average age **8** weeks screening

Participants were actively monitored over 8 weeks. During the initial 4 weeks, they transmitted photoplethysmography (PPG) signals for an aggregate of 533 out of a potential 696 hours, representing a robust 77% of the maximum possible monitoring time

Within the primary 4-week monitoring window, atrial arrhythmias lasting 6 minutes or more were identified in 44 participants, which constitutes 5% of the total sample.

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8

Notably, the highest detection rate was observed in the inaugural monitoring week, with incidence rates of 3.4% (with a 95% confidence interval of 2.4–4.9).

The subsequent weeks, from the 2nd to the 4th week, witnessed a detection rate of 0.55% (with a confidence interval of 0.33–0.93).[3]

Extending the monitoring timeframe to the full 8 weeks led to the detection of arrhythmias in 53 participants (6%).

Leveraging the Corsano CardioWatch offered a nuanced insight into the data. The device's capability to monitor various vital parameters provided a comprehensive profile of each participant's cardiac health, while the real-time transmission and storage of data on the secure health cloud facilitated instant access to results and trends. The CardioWatch's AI and ML compatibility enhanced the data's depth, providing refined analysis and potentially shedding light on preliminary markers or trends preceding the onset of arrhythmias. A direct comparative efficacy analysis between traditional methods and the CardioWatch remains a potential avenue for subsequent research.

3 Fabritz L, Connolly DL, Czarnecki E, et al. Smartphone and wearable detected atrial arrhythmias in Older Adults: Results of a fully digital European Case finding study. Eur Heart J Digit Health. 2022;3(4):610-625. Published 2022 Nov 1.

advantages of the Corsano CardioWatch

Building on the empirical insights gleaned from the aforementioned study, we now turn our focus to delineating the multifarious advantages offered by the Corsano CardioWatch in facilitating the early detection of atrial arrhythmias.

Continuous Patient Monitoring

Corsano CardioWatch stands out for its ability to offer uninterrupted surveillance of an array of vital parameters. Unlike episodic measurements, continuous monitoring provides a holistic view of a patient's health trajectory, allowing for the early detection of anomalies.

Real-time Research Platform for AI and ML

The device, underpinned by a real-time research platform, caters directly to the burgeoning domains of AI and ML. It paves the way for refined analyses, predictive modeling, and diagnostic precision by facilitating unobstructed access to raw data.

User-friendliness and Ergonomic Design

Prioritizing patient comfort, the CardioWatch sports an ergonomic design optimized for prolonged wear. Its intuitive interface, paired with a battery life ranging from 8 to 15 days, minimizes disruptions and ensures seamless data collection.

Validations and Certifications

Corsano CardioWatch has undergone rigorous validations, testifying to its accuracy across multiple parameters. With certifications like EU-MDR and ISO13485, it assures both clinicians and patients of its medical reliability.

Integration Capabilities

Recognizing the importance of integrated healthcare systems, the CardioWatch offers an API and SDK. These tools enable other remote patient monitoring platforms and researchers to effortlessly connect with Corsano CardioWatch, ensuring a synchronized and comprehensive patient monitoring network.

remote patience monitoring with Corsano

Remote patient monitoring (RPM) denotes the use of digital technologies to collect health data from patients in one location and electronically transmit it to healthcare providers in a different locale for assessment. As healthcare paradigms shift towards more patient-centric and preventive models, RPM has emerged as a critical tool, ensuring timely interventions and contextualized care plans.

The RPM system facilitated by Corsano offers a trifold array of benefits. Firstly, honing in on preventive strategies and early interventions can substantially decrease the patient's care costs. Secondly, it fosters enhanced patient mobility, largely due in part to its wearable design—in contrast to bulky monitoring machines that would necessitate a supine or sitting position for effective data gathering—thus encouraging a proactive approach to health management. Lastly, it substantially diminishes the likelihood of hospital readmissions, thereby mitigating the disruptions and financial burdens often associated with repeated hospital stays.

Older adults often grapple with challenges such as digital unfamiliarity, reduced manual dexterity, and cognitive barriers, potentially hindering their engagement with sophisticated RPM systems. Corsano's CardioWatch addresses these specific challenges by featuring an intuitive interface, clear visual feedback, and a user-friendly and ergonomic design tailored for the geriatric demographic. This attention to the user experience ensures that the elderly can confidently and comfortably utilize the device.[4]

4 Corsano Health B.V. Publications. Corsano. Accessed September 12, 2023. https://corsano.com/resources/publications/

clinical implications for nursing

Being frontline caregivers, nurses are central to translating the precise readings from the device into actionable insights, which facilitate the crafting of timely interventions. Such continuous data flow also refines patient-nurse dialogues, ensuring that conversations are data-driven and constructive. Most critically, the instant metrics afford nurses the flexibility to sculpt dynamic care plans, prioritizing immediate concerns and thus potentially averting further complications, resulting in an enhanced quality of personalized care.

discussion

Traditional detection methods, often episodic, occasionally overlook transient arrhythmias. In contrast, continuous monitoring tools, such as the Corsano CardioWatch, offer an expansive and detailed insight into cardiac activities. Preliminary research suggests that the continuous method possesses superior sensitivity in identifying irregularities; however, the promise of such technologies might be offset by barriers like costs, adherence issues, and the technological learning curve. Addressing these with solutions like patient education and financial subsidies can facilitate broader clinical implementation. As we look ahead, the potential of Corsano CardioWatch extends to varied patient demographics and cardiac conditions, and its synergy with AI analytics could revolutionize diagnostic accuracy.

conclusion

Corsano CardioWatch has positioned itself as a potent tool in the landscape of atrial arrhythmia detection, especially pertinent for older adults. As the nexus between healthcare and technology continues to strengthen, devices like CardioWatch symbolize the strides we're making toward superior patient outcomes, heralding a future where technology and human touch synergize for optimum care.

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