Pratico Rythmo

Le séminaire de rythmologie pratique dédié aux cardiologues

mHealth/ eCardiologie: impact sur notre pratique

Lyon 18 Octobre 2023

Dr. JT Metzger

Clinique des Grangettes Genève

HIRSLANDEN

Scope

1) Cas Cliniques
2) Généralités
3) IA
4) Objets connectées

   Apple Watch ®

5) Conclusions

Rythmologie (fa, Stimulation….etc.)
Insuffisance cardiaque / Maladie coronarienne
Hypertension
Cardiologie préventive
Teaching

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Monsieur D.G 1966

Mars 2022	Hospitalisé DRS et insuffisance rénale aigue inaugural (HTA)
	Hypertension sévère, Hypercholestolémie sévère
	Rhumatisme psoriasique
	SAOS appareillé.
Bilan	ECG ESV isolées, BBD
	Echo: HVG ++ 22 mm asymétrique
	IRM stress Pas d'ischémie. Hypertrophie asymétrique,
	Fibrose +++ inféro, basal et septal. Fabry exclu
	AF négative Pas de SCD
Diagnostic retenu	CMH sacomérique
Stratification risque	Moniteur sous cutané Mai 2023

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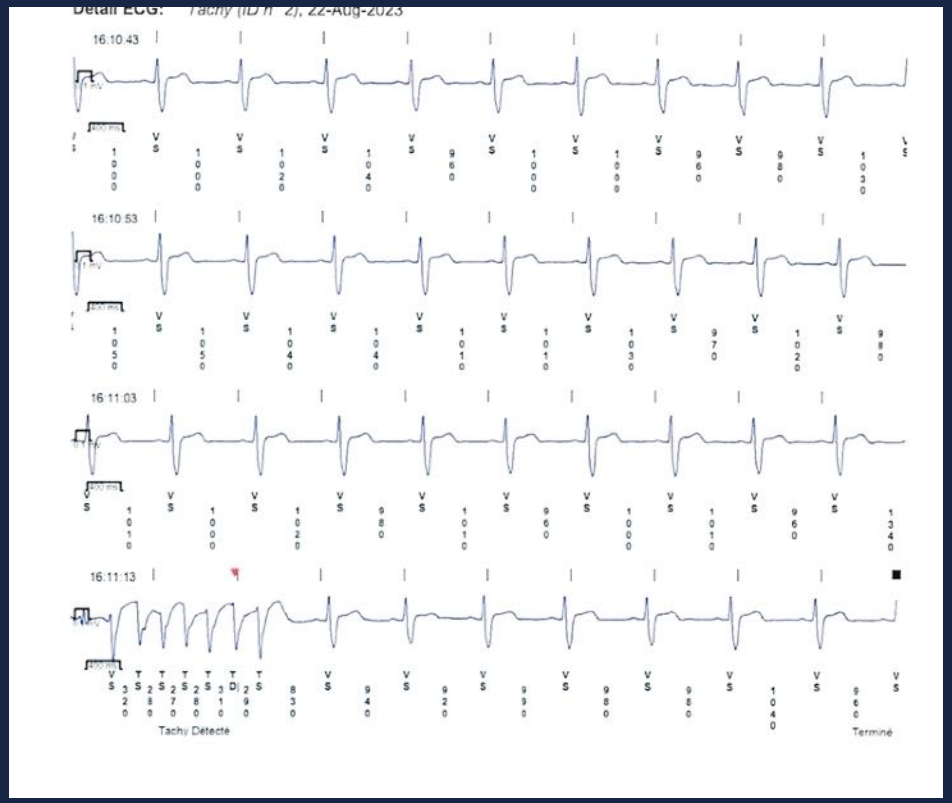
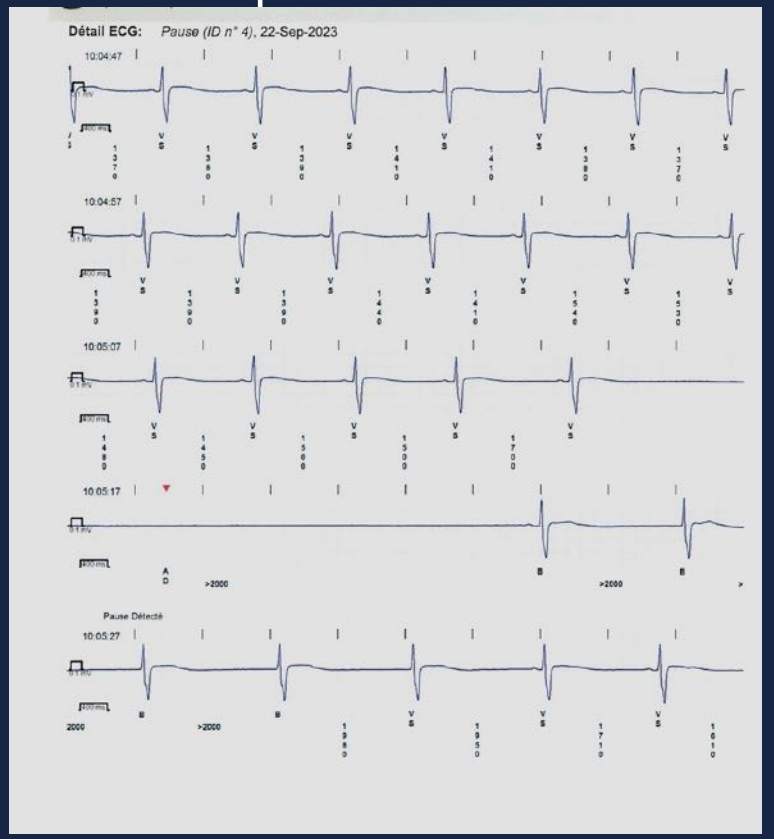
Aout 2023



Septembre 2023



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M. L N 1971

Spondylarthrite psoriasique

Pilote de ligne

Avril 2023 Dyspnée, trouble visuel Pré-syncope Palpitations rapides

Urgences Adulte: asymétrie faciale, ralentissement psycho moteur

Stroke center HUGE Bilan négatif (CT IRM)

Bilan cardio AF négative

ECG normal, Holter non contributif, test d'effort RAS

PET CT normal, Score calcique 0, Coronarographie Normale

Echo, IRM RAS

EEP / Ajmalin nég. Massage sinus carotidien (pause de 3 sec)

Moniteur sous cutanée

Aptitude au vol ?

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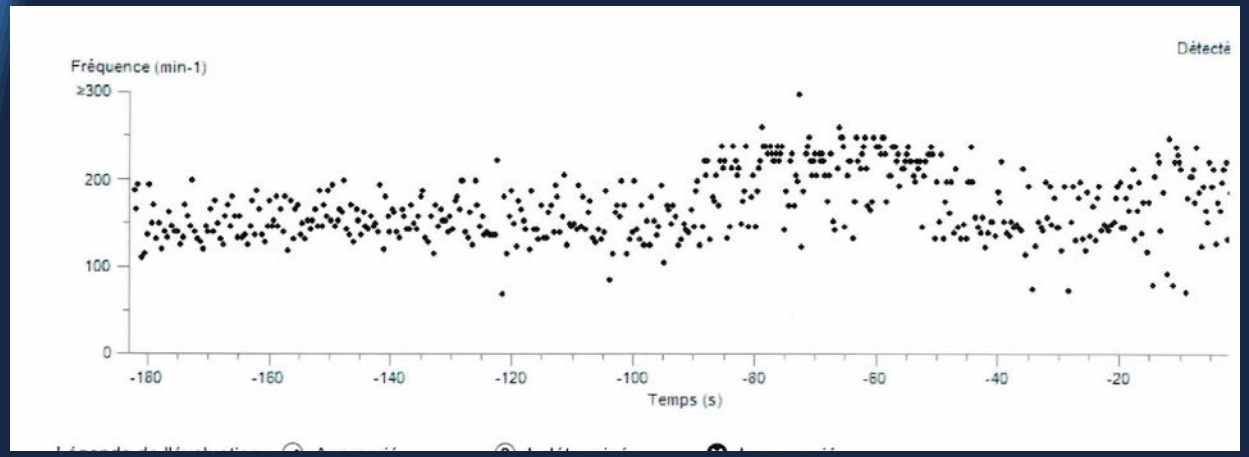

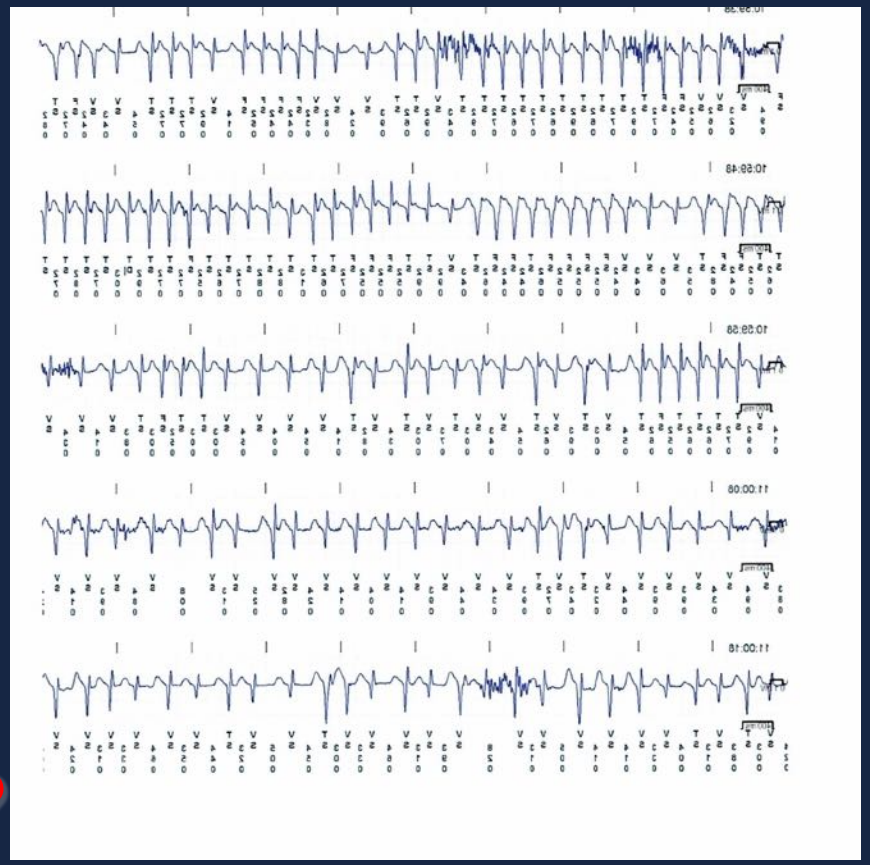

Isolation des veines pulmonaires mardi dernier

Résultat -----> Reveal

Aptitude au vol ? Si oui ? Quand ?

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Jeune Homme de 27 ans.

Pompier professionnel à l'aéroport de Genève

Aucun problème de santé

Pas de symptôme Pas de vertige Pas de perte de connaissance

Histoire familiale négative

Cardiofréquencemètre : Épisode d'accélération de sa fréquence, **Graphique à l'appui !**

Demande de bilan «officielle» du médecin de ce bataillon !

Que faites vous ?

Que proposez-vous ?

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1)	AF/Examen clinique	RAS
2)	ECG	RAS
3)	Holter	RAS
4)	Imagerie	Echocardiographie
		IRM cardiaque
5)	EEP	Blanche

L'autorisez-vous à reprendre son travail de pompier professionnel d'aéroport ?

Mme. MD 1963

Ingénieure, Cadre Dirigeante LVMH à Paris (*Voisine de Bureau de B. Arnaud)*

Consultation en **«urgence»** à la demande des oncologues

- Cancer du sein localisé
  - 1 er chimiothérapie il y a quelques jours
- Apnée du sommeil, CPAP non tolérée
- Hypertension traitée
- Bilan médicaux et cardiologique régulier
  - ECG, Echo, Test effort à Paris

Plaintes Réveils nocturnes plus fréquents, maux de tête. Dyspnée ?

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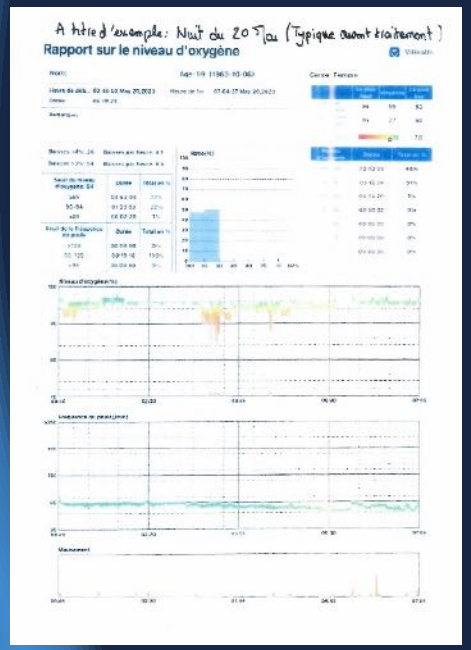
Mme. MD 1963



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Mme. MD 1963

Anamnèse	Rassurante
Examen clinique	Sans particularité, Pas d'insuffisance cardiaque droite ou gauche
Auscultation pulmonaire	Normale.
Saturation à l'air ambiant	98 %
Électrocardiogramme	Sans anomalie notable
Nouvelle échocardiographie	Sans anomalie notable
Selon l'oncologue	Certaines des molécules utilisées ---> échanges gazeux modifiés?
	Pas de notion dans la littérature favorisant les apnées centrales.

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Mme. MD 1963

Patiente angoissée

Médecin interloqué

Cout médicaux élevé

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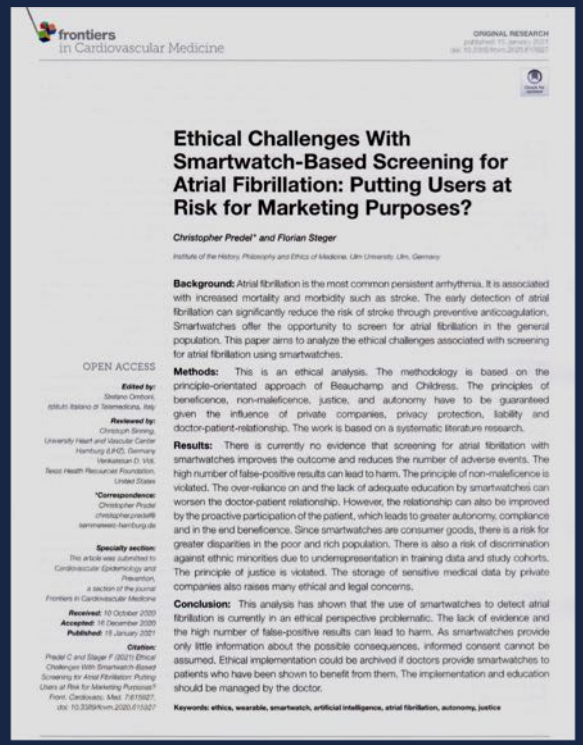
Smart Watch et Anxiété



frontiers in Cardiovascular Medicine

ORIGINAL RESEARCH

Ethical Challenges With Smartwatch-Based Screening for Atrial Fibrillation: Putting Users at Risk for Marketing Purposes?

Christopher Predel and Florian Steger*

Institute of the History, Philosophy and Ethics of Medicine, Ulm University, Ulm, Germany

OPEN ACCESS

Edited by: Stefano Omboni, Istituto Italiano di Telemedicina, Italy

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***Correspondence:** Christopher Predel christopher.predel@tamswees-hamburg.de

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Background: Atrial fibrillation is the most common persistent arrhythmia. It is associated with increased mortality and morbidity such as stroke. The early detection of atrial fibrillation can significantly reduce the risk of stroke through preventive anticoagulation. Smartwatches offer the opportunity to screen for atrial fibrillation in the general population. This paper aims to analyze the ethical challenges associated with screening for atrial fibrillation using smartwatches.

Methods: This is an ethical analysis. The methodology is based on the principle-orientated approach of Beauchamp and Childress. The principles of beneficence, non-maleficence, justice, and autonomy have to be guaranteed given the influence of private companies, privacy protection, liability and doctor-patient-relationship. The work is based on a systematic literature research.

Results: There is currently no evidence that screening for atrial fibrillation with smartwatches improves the outcome and reduces the number of adverse events. The high number of false-positive results can lead to harm. The principle of non-maleficence is violated. The over-reliance on and the lack of adequate education by smartwatches can worsen the doctor-patient relationship. However, the relationship can also be improved by the proactive participation of the patient, which leads to greater autonomy, compliance and in the end beneficence. Since smartwatches are consumer goods, there is a risk for greater disparities in the poor and rich population. There is also a risk of discrimination against ethnic minorities due to underrepresentation in training data and study cohorts. The principle of justice is violated. The storage of sensitive medical data by private companies also raises many ethical and legal concerns.

Conclusion: This analysis has shown that the use of smartwatches to detect atrial fibrillation is currently in an ethical perspective problematic. The lack of evidence and the high number of false-positive results can lead to harm. As smartwatches provide only little information about the possible consequences, informed consent cannot be assumed. Ethical implementation could be archived if doctors provide smartwatches to patients who have been shown to benefit from them. The implementation and education should be managed by the doctor.

Keywords: ethics, wearable, smartwatch, artificial intelligence, atrial fibrillation, autonomy, justice

PERSPECTIVES

When smartwatches contribute to health anxiety in patients with atrial fibrillation

Lindsey Rosman, PhD,* Anil Gehi, MD, FHRS,* Rachel Lampert, MD, FHRS†

*From the *Department of Medicine, Division of Cardiology, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, and †Department of Internal Medicine, Section of Cardiovascular Medicine, Yale School of Medicine, New Haven, Connecticut.*

Landmark studies have demonstrated that wrist-worn wearable devices (eg, smartwatches, fitness bands) can provide potentially actionable data to improve real-time surveillance of respiratory diseases, such as influenza,[1] and facilitate the detection of irregular heart rhythms.[2] Although these tools undoubtedly will transform health care and energize scientific research, important ethical, legal, and social issues have been raised and require careful public deliberation.[3] We have identified another aspect of the digital health revolution that has not yet received due attention: the unanticipated and potentially negative effects of wearable devices on patients' psychological health, quality of life, and health care utilization.

Although unlimited access to digital health information can motivate some individuals to engage in healthy behaviors, these data may inadvertently contribute to pathologic symptom monitoring and impaired function in others. Patients with intermittent atrial fibrillation (AF) may be especially susceptible to excessive cardiac monitoring with a wearable device given the transient, unpredictable nature of arrhythmias and the ongoing risk of recurrence despite medical or procedural therapy. Anxiety is prevalent among those with AF and has been associated with a higher AF symptom burden, worse quality of life, and increased health care consumption.[4,5] Thus, technologies that heighten awareness and attention to normal and potentially abnormal fluctuations in heart rates may lead to substantial increases in anxiety in predisposed persons and prompt unnecessary medical care.

To illustrate this point, we describe a case from our cardiology clinic of a 70-year-old woman with paroxysmal AF. One year after her initial AF diagnosis, a clinical health psychologist (LR) diagnosed her as having new-onset health anxiety that was primarily triggered by excessive cardiac monitoring with a commercially available smartwatch. No evidence of previous mental health problems was noted in her medical records. She had hypertension, a moderate risk of stroke (CHA_2DS_2-VASc score 3), and arrhythmia burden <1%, and she was compliant with oral anticoagulation and antihypertensive therapies. Smartwatch data provided by the patient revealed that she had performed 916 electrocardiograms (ECGs) over a 1-year period. Of those ECG recordings, 701 were sinus rhythm, 55 were possible AF, 30 indicated low or high heart rate, and 130 were inconclusive. As shown in Figure 1, smartwatch ECG monitoring increased over time. Acute escalations in ECG-taking behaviors were frequently triggered by smartwatch notifications that were either inaccurate (eg, transient exercise-induced elevations in heart rate), inconclusive, or indicative of possible AF. Notably, irregular rhythm notifications and findings of uncertain significance ("inconclusive" ECG) produced a relatively similar behavioral response, suggesting that ambiguous data may have been misinterpreted as actual health threats.

Based on diagnostic interview and validated questionnaires,[4,5] it became apparent that our patient had developed an enduring belief that smartwatch notifications were a sign of worsening cardiac function, leading to a vicious cycle of excessive worry, preoccupation with cardiac stimuli and sensations, and compensatory behaviors (eg, habitual cardiac monitoring with the smartwatch and repeatedly seeking reassurance from health care professionals). Despite repeated medical assessment and reassurance, this maladaptive pattern resulted in 12 ambulatory clinic and emergency department visits and numerous telephone calls to health care providers. Because she was asymptomatic and receiving appropriate anticoagulation therapy, none of these clinical encounters led to alterations in medical treatment. Furthermore, her constant worry and frequent health care visits had a profoundly negative impact on her mental health, relationships, and quality of life. The patient was referred to our cardiac psychologist (LR) for further psychological evaluation, and she ultimately was diagnosed with illness anxiety disorder (formerly known as hypochondriasis). The patient subsequently completed 6 sessions of cognitive behavioral therapy to target health anxiety[6] associated with AF, which resulted in complete symptom remission.

The notion that fear and uncertainty may drive some patients with AF to engage in hypervigilant self-monitoring behaviors with a wearable device to "control" or mitigate distress associated with an unpredictable heart rhythm disorder should come

KEYWORDS Anxiety; Arrhythmia; Atrial fibrillation; Digital health; Smartwatch; Wearables (Cardiovascular Digital Health Journal 2020;1:9–10)

Address reprint requests and correspondence: Dr Lindsey Rosman, Department of Medicine, Division of Cardiology, University of North Carolina at Chapel Hill, UNC Cardiology, 160 Dental Circle, CB 7075, Burnett-Womack Building, Chapel Hill, NC 27599-7075. E-mail address: Lindsey_Rosman@med.unc.edu.

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Quelques définitions

Connected Health	
m-Health	Remote monitoring
e-Health	Cybersanté
Big Data	Modélisation (risque fa sur ECG en RS)

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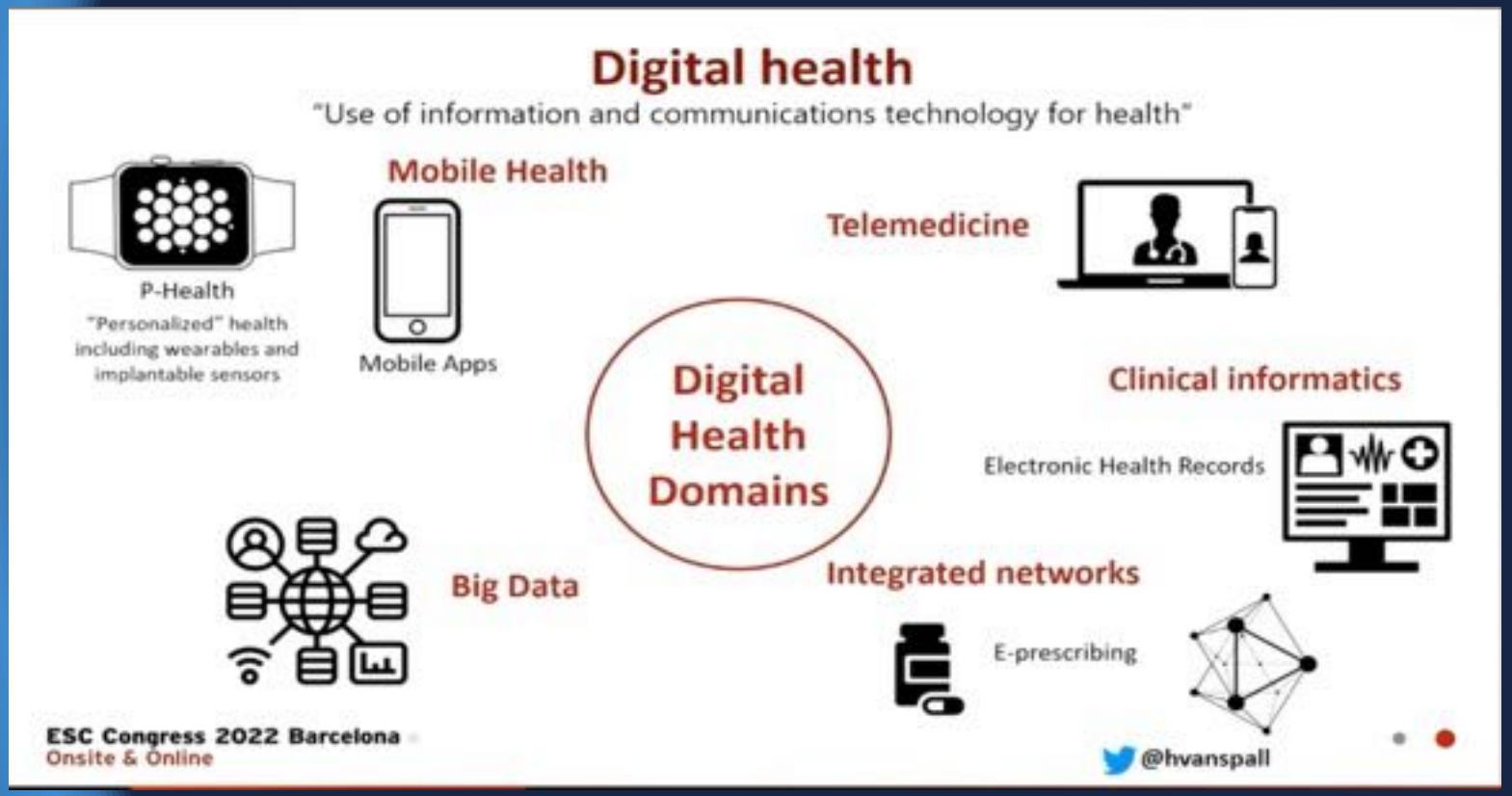

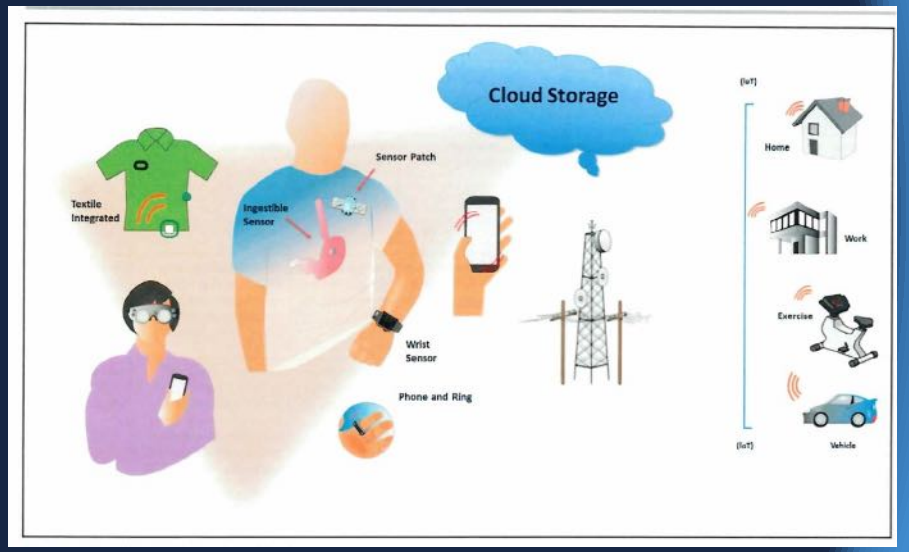

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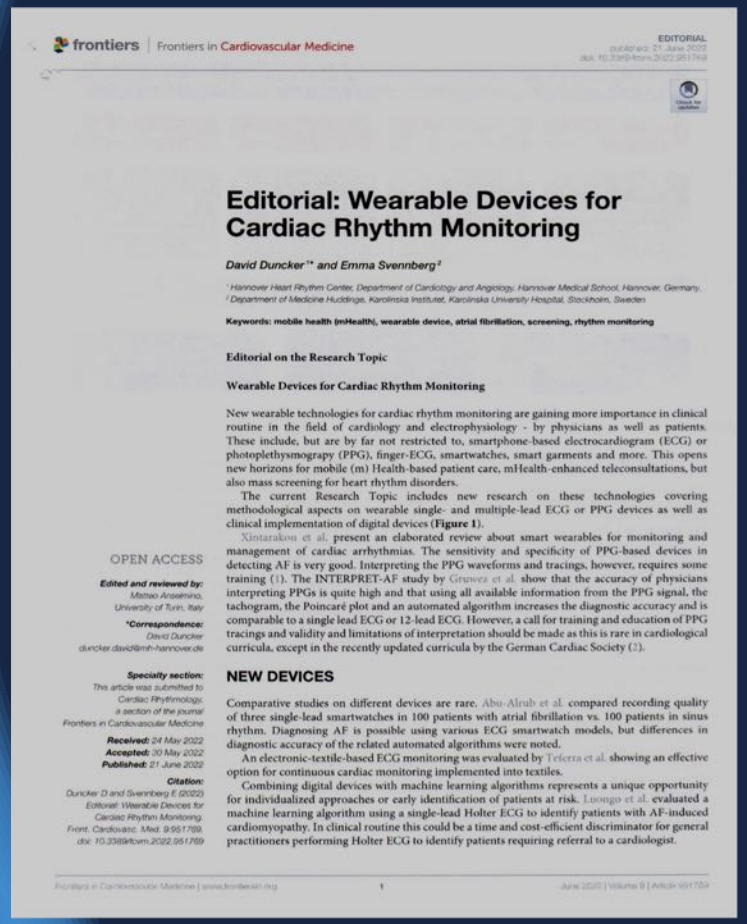

frontiers | Frontiers in Cardiovascular Medicine

EDITORIAL

Editorial: Wearable Devices for Cardiac Rhythm Monitoring

David Duncker[1]* *and Emma Svennberg*[2]

[1] Hannover Heart Rhythm Center, Department of Cardiology and Angiology, Hannover Medical School, Hannover, Germany, [2] Department of Medicine Huddinge, Karolinska Institutet, Karolinska University Hospital, Stockholm, Sweden

Keywords: mobile health (mHealth), wearable device, atrial fibrillation, screening, rhythm monitoring

Editorial on the Research Topic

Wearable Devices for Cardiac Rhythm Monitoring

New wearable technologies for cardiac rhythm monitoring are gaining more importance in clinical routine in the field of cardiology and electrophysiology - by physicians as well as patients. These include, but are by far not restricted to, smartphone-based electrocardiogram (ECG) or photoplethysmograpy (PPG), finger-ECG, smartwatches, smart garments and more. This opens new horizons for mobile (m) Health-based patient care, mHealth-enhanced teleconsultations, but also mass screening for heart rhythm disorders.

The current Research Topic includes new research on these technologies covering methodological aspects on wearable single- and multiple-lead ECG or PPG devices as well as clinical implementation of digital devices (**Figure 1**).

Xintarakou et al. present an elaborated review about smart wearables for monitoring and management of cardiac arrhythmias. The sensitivity and specificity of PPG-based devices in detecting AF is very good. Interpreting the PPG waveforms and tracings, however, requires some training (1). The INTERPRET-AF study by Gruwez et al. show that the accuracy of physicians interpreting PPGs is quite high and that using all available information from the PPG signal, the tachogram, the Poincaré plot and an automated algorithm increases the diagnostic accuracy and is comparable to a single lead ECG or 12-lead ECG. However, a call for training and education of PPG tracings and validity and limitations of interpretation should be made as this is rare in cardiological curricula, except in the recently updated curricula by the German Cardiac Society (2).

OPEN ACCESS

Edited and reviewed by: Matteo Anselmino, University of Turin, Italy

**Correspondence:* David Duncker duncker.david@mh-hannover.de

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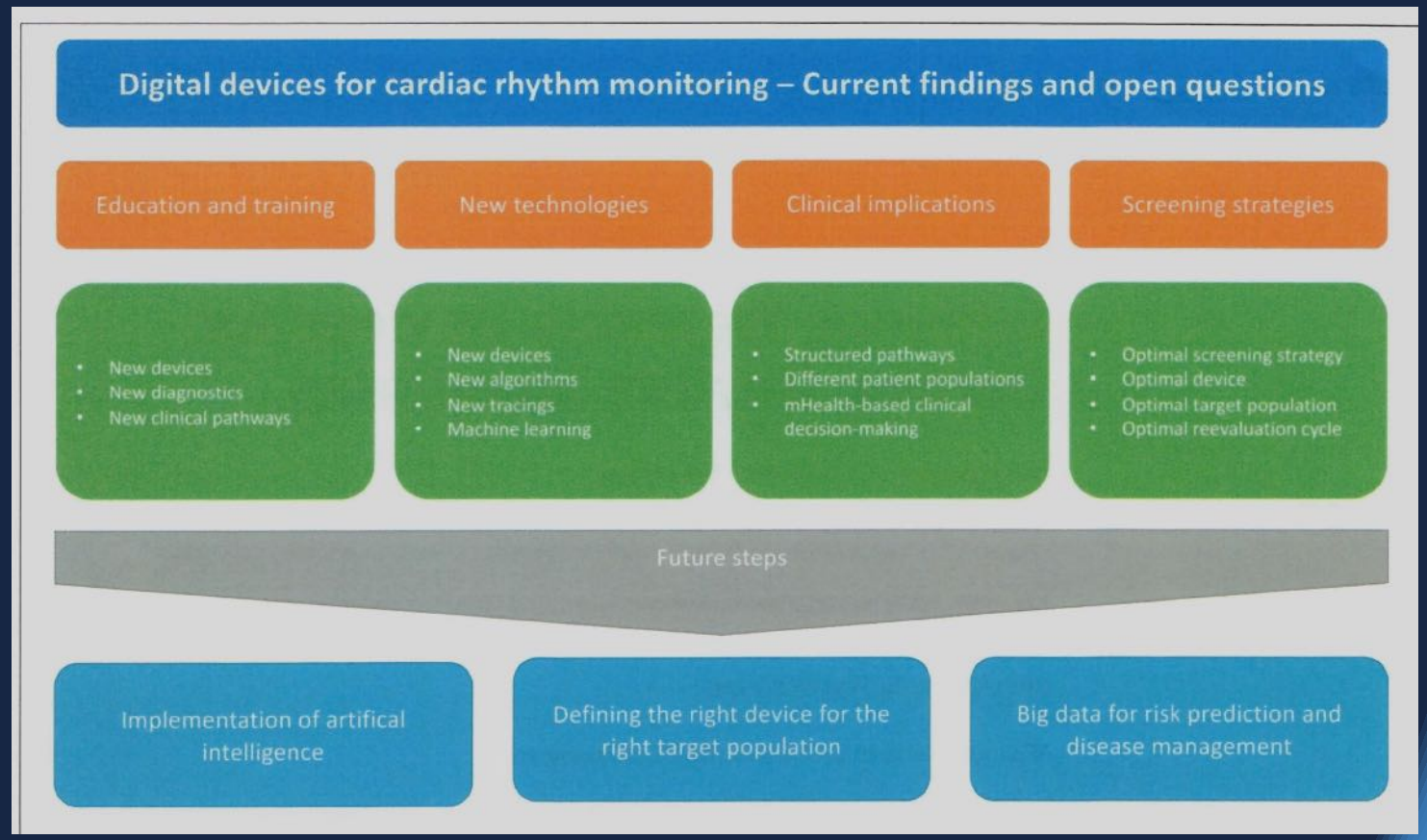
NEW DEVICES

Comparative studies on different devices are rare. Abu-Alrub et al. compared recording quality of three single-lead smartwatches in 100 patients with atrial fibrillation vs. 100 patients in sinus rhythm. Diagnosing AF is possible using various ECG smartwatch models, but differences in diagnostic accuracy of the related automated algorithms were noted.

An electronic-textile-based ECG monitoring was evaluated by Teferra et al. showing an effective option for continuous cardiac monitoring implemented into textiles.

Combining digital devices with machine learning algorithms represents a unique opportunity for individualized approaches or early identification of patients at risk. Luongo et al. evaluated a machine learning algorithm using a single-lead Holter ECG to identify patients with AF-induced cardiomyopathy. In clinical routine this could be a time and cost-efficient discriminator for general practitioners performing Holter ECG to identify patients requiring referral to a cardiologist.



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Valeur ou Valeur ajoutée

Fiabilité

Acceptation

Coût

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Changement de pratique

Gestion des données reçues ou pas !

Changement de relation médecin-malade.

Initiative patient

Changement de relation avec assurance social/mutuelle.

Relation avec industrie

Enjeux économiques.

Enjeux publicitaires

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Connected Health

Marché ! **Estimé à 7€ billion Euros (10^{12}) 2018 Europe**

Comment se positionne les médecins

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ESC European Society of Cardiology

European Heart Journal – Digital Health (2021) 2, 49–59 doi:10.1093/ehjdh/ztab011

POSITION PAPER

ESC working group on e-cardiology position paper: use of commercially available wearable technology for heart rate and activity tracking in primary and secondary cardiovascular prevention—in collaboration with the European Heart Rhythm Association, European Association of Preventive Cardiology, Association of Cardiovascular Nursing and Allied Professionals, Patient Forum, and the Digital Health Committee

Magnus T. Jensen[1]*, Roderick W. Treskes[2], Enrico G. Caiani[3,4], Ruben Casado-Arroyo[5], Martin R. Cowie[6], Polychronis Dilaveris[7], David Duncker[8], Marco Di Rienzo[9], Ines Frederix[10,11,12,13], Natasja De Groot[14], Philippe H. Kolh[15], Harald Kemps[16,17], Mamas Mamas[18], Paul McGreavy[19], Lis Neubeck[20], Gianfranco Parati[21,22], Pyotr G. Platonov[23], Arno Schmidt-Trucksäss[24], Mark J. Schuuring[25], Iana Simova[26], Emma Svennberg[27,28], Axel Verstrael[19], and Joost Lumens[29]

Circulation: Arrhythmia and Electrophysiology

SPECIAL REPORT

2021 ISHNE/HRS/EHRA/APHRS Expert Collaborative Statement on mHealth in Arrhythmia Management: Digital Medical Tools for Heart Rhythm Professionals

From the International Society for Holter and Noninvasive Electrocardiology/ Heart Rhythm Society/European Heart Rhythm Association/Asia-Pacific Heart Rhythm Society

Niraj Varma, MA, MD, PhD (ISHNE Chair); Iwona Cygankiewicz, MD, PhD (ISHNE Vice-Chair); Mintu P. Turakhia, MD, MAS (HRS Vice-Chair); Hein Heidbuchel, MD, PhD, FESC, FEHRA (EHRA Vice-Chair); Yu-Feng Hu, MD (APHRS Vice-Chair); Lin Yee Chen, MD, MS; Jean-Philippe Couderc, PhD, MBA; Edmond M. Cronin, MB BCh, BAO; Jerry D. Estep, MD; Lars Grieten, MD; Deirdre A. Lane, PhD; Reena Mehra, MD, MS; Alex Page, PhD; Rod Passman, MD, MSCE; Jonathan P. Piccini, MD, MHS; Ewa Piotrowicz, MD, PhD; Ryszard Piotrowicz, MD, PhD; Pyotr G. Platonov, MD, PhD, FESC, FHRS; Antonio Luiz Ribeiro, MD, PhD; Robert E. Rich, BA, MBA, PhD (Hon)*; Andrea M. Russo, MD; David Slotwiner, MD; Jonathan S. Steinberg, MD; Emma Svennberg, MD, PhD

ABSTRACT: This collaborative statement from the International Society for Holter and Noninvasive Electrocardiology/Heart Rhythm Society/European Heart Rhythm Association/Asia-Pacific Heart Rhythm Society describes the current status of mobile health technologies in arrhythmia management. The range of digital medical tools and heart rhythm disorders that they may be applied to and clinical decisions that may be enabled are discussed. The facilitation of comorbidity and lifestyle management (increasingly recognized to play a role in heart rhythm disorders) and patient self-management are novel aspects of mobile health. The promises of predictive analytics but also operational challenges in embedding mobile health into routine clinical care are explored.

GRAPHIC ABSTRACT: A graphic abstract is available for this article.

Key Words: arrhythmias ■ atrial fibrillation ■ comorbidities ■ digital medicine ■ heart rhythm ■ mHealth

HRS White Paper on Clinical Utilization of Digital Health Technology

Elaine Y. Wan, MD, FHRS,[1,†] Hamid Ghanbari, MD,[2,†] Nazem Akoum, MD, MS, FHRS,[3] Zachi Itzhak Attia, MSEE, PhD,[4] Samuel J. Asirvatham, MD, FHRS,[5] Eugene H. Chung, MD, FHRS,[6] Lilas Dagher, MD,[7] Sana M. Al-Khatib, MD, MHS, FHRS, CCDS,[8] G. Stuart Mendenhall, MD, FHRS,[7] David D. McManus, MD, MSCI, FHRS,[9] Rajeev K. Pathak, MBBS, PhD, FHRS,[9] Rod S. Passman, MD, FHRS,[10] Nicholas S. Peters, MBBS, FHRS,[11] David S. Schwartzman, MD, FHRS, CCDS,[12] Emma Svennberg, MD, PhD,[13] Khaldoun G. Tarakji, MD, MPH, FHRS,[14] Mintu P. Turakhia, MD, MS, FHRS,[15] Anthony Trela, NP, RN,[16] Hirad Yarmohammadi, MD, MPH, FHRS,[1] Nassir F. Marrouche, MD, FHRS[5]

From the [1]Division of Cardiology, Department of Medicine, Vagelos College of Physicians and Surgeons, New York-Presbyterian/Columbia University Irving Medical Center, New York, NY, USA, [2]University of Michigan, Ann Arbor, MI, USA, [3]University of Washington, Seattle, WA, USA, [4]Department of Cardiovascular Medicine, Mayo Clinic, Rochester, MN, USA, [5]Tulane Research Innovation for Arrhythmia Discoveries (TRIAD), Heart and Vascular Institute, Tulane University School of Medicine, New Orleans, LA, USA, [6]Duke Clinical Research Institute, Durham, NC, USA, [7]Scripps Memorial Hospital-La Jolla, La Jolla, CA, USA, [8]University of Massachusetts Medical School, Worchester, MA, USA, [9]Cardiac Electrophysiology Unit, Department of Cardiology, Canberra Hospital and Health Services, Australian National University, Canberra, Australia, [10]Northwestern University Feinberg School of Medicine, Chicago, IL, USA, [11]Imperial College London, and NHS Trust, London, United Kingdom, [12]Butler Health System, Cardiac Electrophysiology, Pittsburgh, PA, USA, [13]Karolinska Institutet, Department of Medicine Huddinge, Karolinska University Hospital, Stockholm, Sweden, [14]Department of Cardiovascular Medicine, Cleveland Clinic Foundation, Cleveland, OH, USA, [15]Department of Medicine, Stanford University, Stanford, California; Veterans Affairs Palo Alto Health Care System, Palo Alto, California, and Center for Digital Health, Stanford, CA, USA, and [16]Lucile Packard Children's Hospital, Pediatric Cardiology, Palo Alto, CA, USA.

†These authors contributed equally to this manuscript.

This collaborative statement from the Digital Health Committee of the Heart Rhythm Society provides everyday clinical scenarios in which wearables may be utilized by patients for cardiovascular health and arrhythmia management. We describe herein the spectrum of wearables that are commercially available for patients, and their benefits, shortcomings and areas for technological improvements. Although wearables for rhythm diagnosis and management have not been examined in large randomized clinical trials, undoubtedly the usage of wearables has quickly escalated in clinical practice. This document is the first of a planned series in which we will update information on wearables as they are revised and released to consumers.

KEYWORDS Arrhythmia; Digital health; Remote monitoring; Wearables (Cardiovascular Digital Health Journal 2021;2:196–211)

TABLE OF CONTENTS

Address reprint requests and correspondence: Dr Nassir F. Marrouche, Cardiac Electrophysiology, Tulane University School of Medicine, 1430 Tulane Avenue, Box 8548, New Orleans, LA 70112. E-mail address: nmarrouche@tulane.edu.

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mHealth/ eCardiologie: impact sur notre pratique

amazon

Appareils de santé connectés

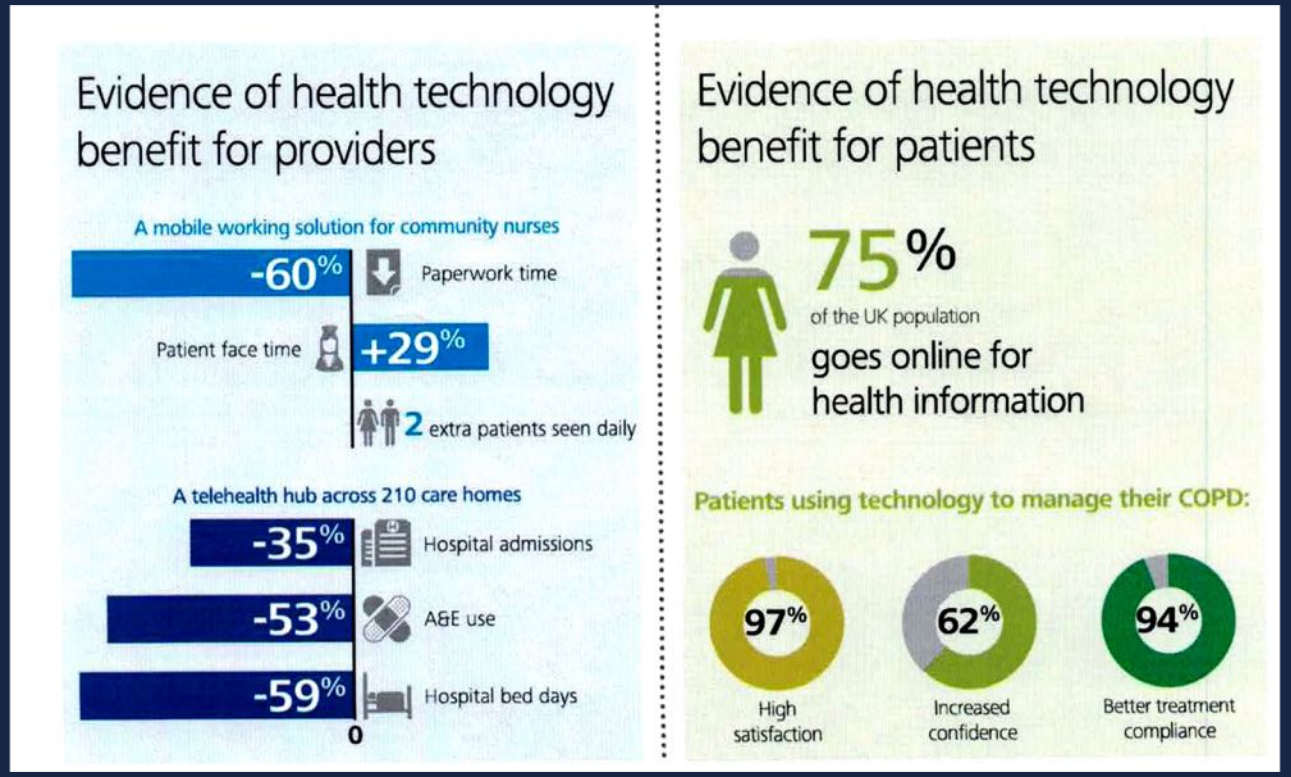
Plus de 20 pages !

624 résultats !

> 400 «wearable devices»

Bracelet d'activité, cardio-fréquencemètre, tensiomètre, rappel d'activité , monitoring de sommeil, calorie, nombre de pas. oxymètre... Balance, etc.

Connected Health



Connected Health

70 % de pénétration des smartphone au UK (europe)

75 % des patients vont WWW pour infos

- >100.000 Applications médicales (non validées) sur les «Stores»
  dont 63% sont propriété de la **pharma** !
- **Maladie chronique/Age augmentation → besoin soins hors institution aug.**
- **Médecins surchargés**
- **Place Machine Learning et AI ?**

Aspect Juridique

Protection des données (serveur souvent non localisable)

Changement de relation avec nos patients

Stress nouveau pour les patients et pour nous

Flow d'informations → Surcharge de travail

Assécurologique et remboursement ?

Pratico Rythmo

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Remboursement

Pace,CRTD, CRTP,

Moniteur s/cutanée

Prestation en l'absence du patient

Contrôle sans programmation

4 x / an + Urgence

Autres systèmes

23 13:09 Haute Autorité de Santé - Télésurveillance médicale : 2 décrets actent l'intégration de la télésurveillance médicale dans le dro...

Télésurveillance médicale : 2 décrets actent l'intégration de la télésurveillance médicale dans le droit commun

COMMUNIQUÉ DE PRESSE - Mis en ligne le 13 janv. 2023

16 janvier 2023

MINISTÈRE DE LA SANTÉ ET DE LA PRÉVENTION — HAS HAUTE AUTORITÉ DE SANTÉ — AGENCE DU NUMÉRIQUE EN SANTÉ

Publiés le 31 décembre au journal officiel, 2 décrets permettent l'entrée en vigueur d'un modèle de droit commun spécifique à la télésurveillance prévu par l'article 36 de la loi de financement de la sécurité sociale pour 2022, ainsi que la fin de l'expérimentation ETAPES au 1er juillet 2023. Ce nouveau cadre associe la rémunération du suivi médical réalisé à distance par une équipe soignante et celle du dispositif médical numérique associé. Ainsi, le 1er décret porte sur les modalités d'évaluation et d'inscription au remboursement de la télésurveillance et le 2nd, sur la déclaration des activités de télésurveillance des équipes soignantes aux agences régionales de santé (ARS). Ces textes seront prochainement complétés par des arrêtés cadrant les rémunérations des équipes soignantes et le financement des solutions numériques.

ESC European Society of Cardiology — Europace (2022) 00, 1–6 — https://doi.org/10.1093/europace/euac118 — REVIEW

Current status of reimbursement practices for remote monitoring of cardiac implantable electrical devices across Europe

Giuseppe Boriani [1,2]*, Haran Burri [3], Emma Svennberg [4], Jacopo Francesco Imberti [1,5], José Luis Merino [6], and Christophe Leclercq [7]

[1]Cardiology Division, Department of Biomedical, Metabolic and Neural Sciences, University of Modena and Reggio Emilia, Policlinico di Modena, Via del Pozzo, 71, 41124 Modena, Italy; [2]EHRA mHEALTH and Health Economics Section, European Heart Rhythm Association; [3]Cardiac Pacing Unit, Cardiology Service, University Hospital of Geneva, 1211 Geneva, Switzerland; [4]Karolinska Institutet, Department of Medicine, Karolinska University Hospital Huddinge, 1/177 Stockholm, Sweden; [5]Clinical and Experimental Medicine PhD Program, University of Modena and Reggio Emilia, 41125 Modena, Italy; [6]University Hospital La Paz, Autonoma University, Arrhythmia & Robotic EP Unit, IdiPaz, 28046 Madrid, Spain; and [7]Department of Cardiology, University Hospital of Rennes, 35000 Rennes, France

Received 27 May 2022; accepted 9 June 2022

Abstract Remote monitoring (RM) of cardiac implantable electrical devices (CIEDs) is currently proposed as a standard of care for CIEDs follow-up, as recommended by major cardiology societies worldwide. By detecting a series of relevant device and patient-related parameters, RM is a valuable option for early detection of CIEDs' technical issues, as well as changes in parameters related to cardio-respiratory functions. Moreover, RM may allow longer spacing between in-office follow-ups and better organization of in-hospital resources. Despite these potential advantages, resulting in improved patient safety, we are still far from a widespread diffusion of RM across Europe. Reimbursement policies across Europe still show an important heterogeneity and have been considered as an important barrier to full implementation of RM as a standard for the follow-up of all the patients with pacemakers, defibrillators, devices for cardiac resynchronization, or implantable loop recorders. Indeed, in many countries, there are still inertia and unresponsiveness to the request for widespread implementation of RM for CIEDs, although an improvement was found in some countries as compared to years ago, related to the provision of some form of reimbursement. As a matter of fact, the COVID-19 pandemic has promoted an increased use of digital health for connecting physicians to patients, even if digital literacy may be a limit for the widespread implementation of telemedicine. CIEDs have the advantage of making possible RM with an already defined organization and reliable systems for data transmissions that can be easily implemented as a standard of care for present and future cardiology practice.

Keywords Cardioverter-defibrillator • Pacemaker • COVID-19 • Reimbursement • Remote monitoring • Telemedicine

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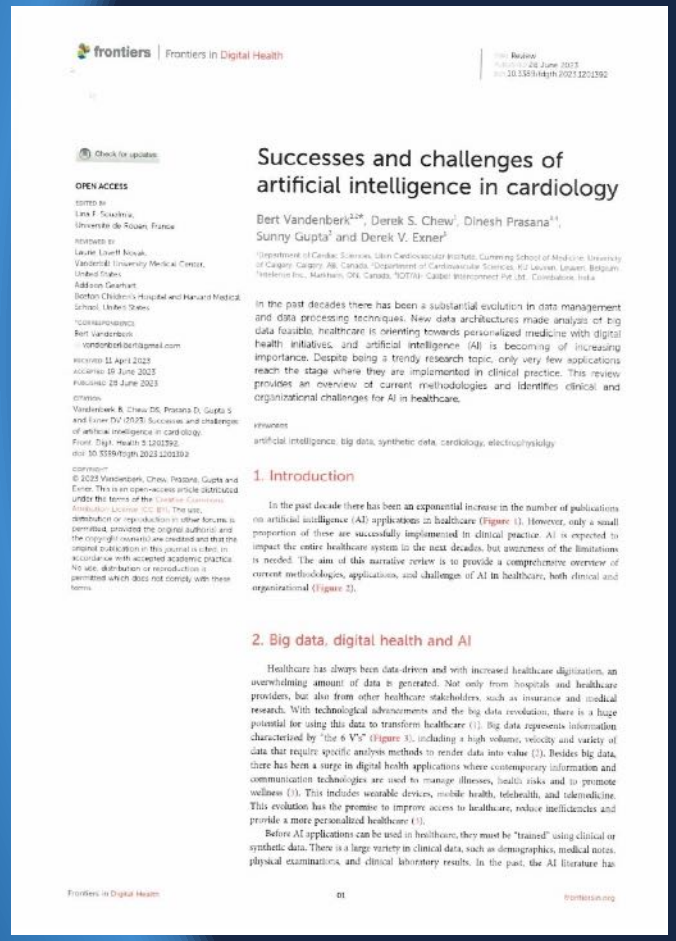


frontiers | Frontiers in Digital Health

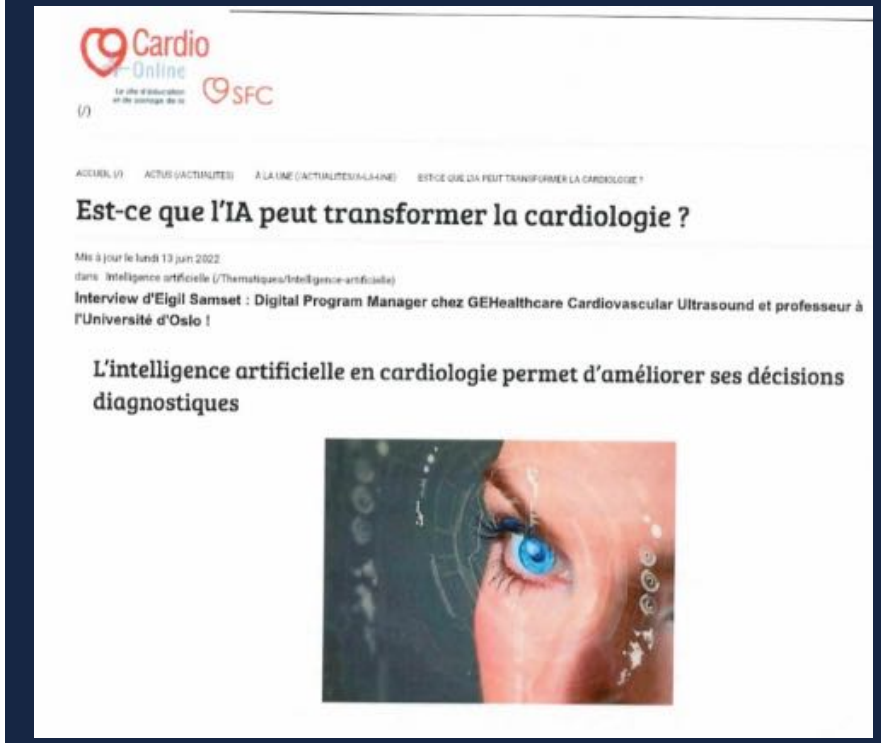
Successes and challenges of artificial intelligence in cardiology

Bert Vandenberk[1,2]*, Derek S. Chew[3], Dinesh Prasana[4,5], Sunny Gupta[3] and Derek V. Exner[3]

1. Introduction

2. Big data, digital health and AI

IA



Cardio Online

SFC

Est-ce que l'IA peut transformer la cardiologie ?

Mis à jour le lundi 13 juin 2022

dans Intelligence artificielle (/Thematiques/Intelligence-artificielle)

Interview d'Eigil Samset : Digital Program Manager chez GEHealthcare Cardiovascular Ultrasound et professeur à l'Université d'Oslo !

L'intelligence artificielle en cardiologie permet d'améliorer ses décisions diagnostiques

Collecter un nombre de données

Les travailler

Sortir élément pertinent

Puis s'imbrique comme pièces puzzle

Pour nous assister

Phase Diagnostic

Thérapeutique

Lyon 18 Octobre 2023

Dr. JT Metzger

Clinique des Grangettes Genève

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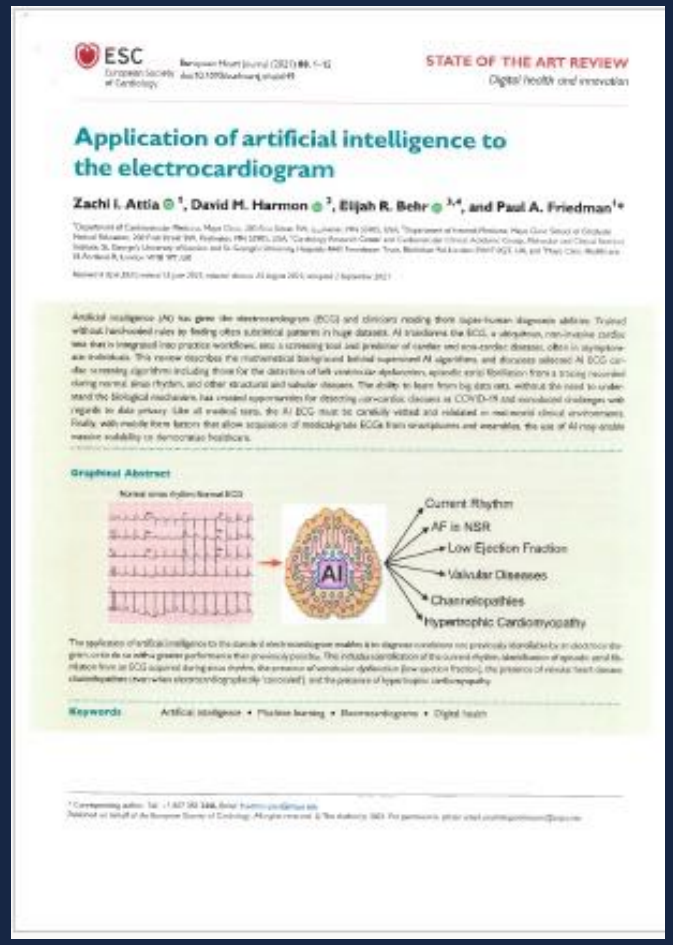
IA et fa



ESC European Society of Cardiology

STATE OF THE ART REVIEW
Digital health and innovation

Application of artificial intelligence to the electrocardiogram

Zachi I. Attia [1], David M. Harmon [2], Elijah R. Behr [3,4], and Paul A. Friedman [1]*

Graphical Abstract

Keywords Artificial intelligence • Machine learning • Electrocardiogram • Digital health

ESC European Society of Cardiology

CLINICAL RESEARCH

An artificial intelligence–based model for prediction of atrial fibrillation from single-lead sinus rhythm electrocardiograms facilitating screening

Tove Hygrell [1,2†], Fredrik Viberg [1†], Erik Dahlberg [2], Peter H. Charlton [3], Katrin Kemp Gudmundsdottir [1], Jonathan Mant [3], Josef Lindman Hörnlund [2], and Emma Svennberg [4]

Aims

Methods and results

Conclusion

Lyon 18 Octobre 2023

Pratico Rythmo

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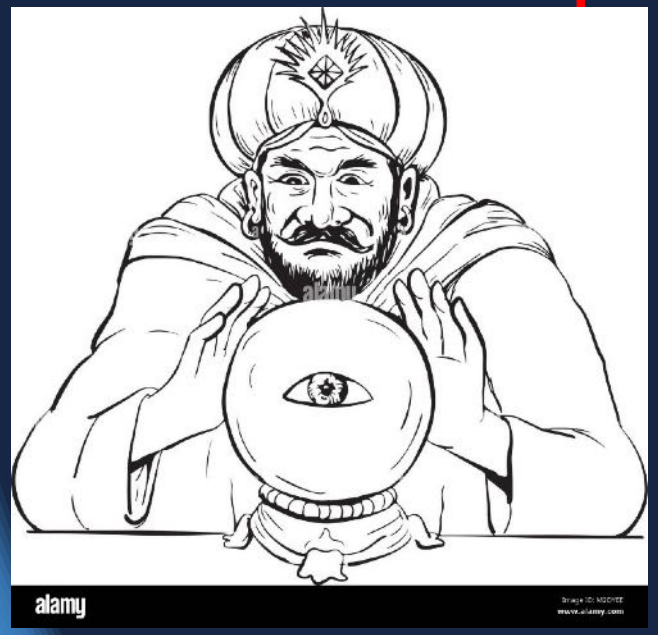
Apple Watch®

Préparez-vous à devenir DEVIN !



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Apple Watch

400 €-850 € !!!

Pratico Rythmo

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Apple Watch®

Surveiller des informations de santé importantes avec l'Apple Watch Ultra

Votre Apple Watch Ultra peut vous aider à atteindre vos objectifs de sommeil, suivre les informations importantes relatives à votre cœur, conserver un historique de vos émotions et de vos humeurs, enregistrer vos traitements et effectuer le suivi de votre cycle menstruel.

Recevoir des notifications de santé cardiovasculaire

Vous pouvez activer les notifications de l'app Fréquence cardiaque sur votre Apple Watch, afin qu'elle vous avertisse en cas de fréquence cardiaque faible ou élevée ou d'un rythme irrégulier évocateur d'une fibrillation auriculaire (FA). Si l'on vous a déjà diagnostiqué une FA, vous pouvez activer l'historique de FA pour consulter une estimation de votre fréquence d'arythmie cardiaque. Vous pouvez également activer des alertes en cas de faible niveau de santé cardiovasculaire.

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Apple Watch®

☺ Applications primordials pour les Cardiologues ☺

Donner la priorité à son sommeil

Grâce à l'app Sommeil sur l'Apple Watch, vous pouvez créer un programme de sommeil, définir un objectif de durée de sommeil et consulter l'historique de vos dernières nuits. Vous pouvez même voir la durée estimée de vos phases de sommeil paradoxal, lent ou profond, et vérifier l'heure à laquelle vous vous êtes potentiellement réveillé. Pendant que vous dormez, l'Apple Watch surveille également des mesures sur votre oxygène sanguin, votre fréquence cardiaque, la durée de votre sommeil, votre fréquence respiratoire et, sur l'Apple Watch Series 8 et l'Apple Watch Series 9, votre température au poignet. Pour commencer, ouvrez l'app Sommeil sur votre Apple Watch et suivez les instructions à l'écran. Portez ensuite votre montre pendant la nuit. L'Apple Watch s'occupe du reste.

Enregistrer son état d'esprit

En plus de vous offrir l'opportunité de vous concentrer sur votre respiration et de vous inciter à prendre des moments de réflexion, l'app Pleine conscience peut vous aider à développer votre conscience et votre résilience émotionnelles en identifiant vos sentiments. Il vous suffit d'ouvrir l'app Pleine conscience, de toucher « État d'esprit », puis d'enregistrer vos émotions passagères et vos humeurs quotidiennes.

Pratico Rythmo

Le séminaire de rythmologie pratique dédié aux cardiologues

mHealth/ eCardiologie: impact sur notre pratique

Apple Watch®

Table des matières ⊕

Gérer la détection des chutes sur l'Apple Watch

Lorsque la détection des chutes est activée, si l'Apple Watch détecte une chute lourde, elle peut vous aider à contacter les secours et à envoyer un message à vos contacts d'urgence. Si l'Apple Watch détecte une chute lourde et que vous restez immobile pendant environ une minute, elle génère un toc sur votre poignet, fait sonner une alarme, puis tente d'appeler les secours.

Pour appeler les secours, votre Apple Watch ou votre iPhone à proximité doit disposer d'une connexion cellulaire, ou doit avoir la fonctionnalité « Appels Wi-Fi » activée et une couverture Wi-Fi disponible.

Si la couverture cellulaire et Wi-Fi n'est pas disponible et que votre iPhone 14 ou iPhone 14 Pro est à proximité de votre Apple Watch, la détection des chutes utilisera votre iPhone pour envoyer la notification à l'aide de la fonctionnalité « SOS d'urgence par satellite », si celle-ci est disponible. Consultez l'article Utilisation de la fonctionnalité SOS d'urgence par satellite sur votre iPhone de l'assistance Apple.

Garder le contrôle de ses traitements

L'app Traitements vous aide à surveiller vos traitements, vos vitamines et vos compléments. Ajoutez simplement vos traitements à l'app Santé sur votre iPhone et enregistrez chaque prise sur votre Apple Watch.

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Suivre le cycle menstruel

Utilisez l'app Suivi de cycle pour enregistrer des informations quotidiennes concernant votre cycle menstruel. Votre Apple Watch utilise ces informations pour fournir des prédictions de règles et de période de fertilité. Pour améliorer les prédictions, l'app Suivi de cycle peut non seulement utiliser les données que vous avez enregistrées, mais également les données sur votre fréquence cardiaque. Si vous portez l'Apple Watch Series 8 ou l'Apple Watch Series 9 chaque soir pendant que vous dormez, l'app peut utiliser votre température au poignet pour améliorer les prédictions des règles et fournir des estimations d'ovulation rétrospectives.

Remarque : la fonctionnalité permettant de recevoir des estimations d'ovulation rétrospectives n'est pas disponible partout.

Pas encore de système de notification ou de stimulation du compagnon ☹

Ni Si est averti?

Pratico Rythmo

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Apple Watch®

Fibrillation auriculaire

Notifications de fréquence cardiaque.

L'Apple Watch surveille en arrière-plan les fréquences cardiaques anormalement basses ou élevées, qui peuvent être le signe d'un trouble sous-jacent grave. Cela peut vous aider, vous et votre patientèle, à identifier les situations pouvant nécessiter des examens approfondis.

L'utilisateur ou l'utilisatrice reçoit une notification si sa fréquence cardiaque est supérieure à 120 battements par minute ou inférieure à 40 battements par minute en cas d'inactivité depuis 10 minutes. Il est possible de régler le seuil d'alerte, d'activer ou de désactiver ces notifications. Toutes les notifications de fréquence cardiaque, ainsi que la date, l'heure et la fréquence cardiaque sont disponibles dans l'app Santé sur iPhone.

En savoir plus sur les notifications de fréquence cardiaque ›

Notification d'arythmie.

L'algorithme de détection du pouls recherche de manière opportune les signes d'arythmie pouvant suggérer une fibrillation auriculaire (FA). Cette fonctionnalité n'est pas en mesure de détecter tous les cas de FA, mais elle peut identifier des signes avant-coureurs et préconiser des examens approfondis.

Les notifications d'arythmie utilisent le cardiofréquencemètre optique pour détecter le pouls au niveau du poignet et mesurer les éventuelles variations d'intervalle entre les battements au repos. Si l'algorithme détecte à plusieurs reprises une arythmie pouvant suggérer une FA, votre patient ou patiente reçoit une notification, et la date, l'heure et la fréquence cardiaque battement par battement sont enregistrés dans l'app Santé.

La fonctionnalité de notification d'arythmie est marquée CE et est approuvée pour les utilisateurs et utilisatrices de 22 ans et plus n'ayant pas d'antécédents de fibrillation auriculaire dans certains pays de l'Union européenne.

App ECG.

Grâce à l'app ECG, les personnes souffrant de symptômes tels qu'un rythme cardiaque rapide ou irrégulier, ou recevant une notification d'arythmie, peuvent enregistrer leur électrocardiogramme et consigner leurs symptômes. Ces données concrètes donnent des informations essentielles pour décider rapidement de la suite des examens et des soins.

L'app ECG exploite le cardiofréquencemètre électrique intégré à la Digital Crown et au dos de la montre pour enregistrer un électrocardiogramme monocanal similaire à un électrocardiogramme à une dérivation. L'app ECG fournit ensuite un résultat indiquant un rythme sinusal, une fibrillation auriculaire, une fibrillation auriculaire avec fréquence cardiaque élevée ou un relevé non concluant ou de mauvaise qualité, et invite la personne à saisir ses symptômes, tels qu'un rythme cardiaque rapide, des palpitations, des vertiges ou de la fatigue. Le résultat peut se révéler non concluant en présence d'arythmies autres qu'une FA, d'un DAI ou d'un stimulateur cardiaque, ou de signaux électriques trop faibles pendant l'enregistrement, ce qui peut se produire dans le cas d'une déviation axiale droite. Le tracé, les résultats, la date, l'heure et tous les symptômes sont enregistrés et peuvent être exportés au format PDF depuis l'app Santé, puis partagés avec le personnel médical. Si les symptômes signalés évoquent un trouble grave, la personne est invitée à appeler les services médicaux d'urgence au plus vite.

Dans une étude clinique utilisant un ECG à 12 dérivations comme appareil de référence, l'app ECG a démontré une spécificité de 99,6 % dans la classification du rythme sinusal et une sensibilité de 98,3 % dans la classification de la FA pour les résultats pouvant être répertoriés.

L'app ECG est marquée CE et est approuvée pour les utilisateurs et utilisatrices de 22 ans et plus dans certains pays de l'Union européenne.

Diagnostic de la fibrillation auriculaire Apple Watch®

Algorithme de Appel Watch®

Photoplétismographie

Tachygramme (TG) toutes 2 à 4 h (pas continu)

SI TG irréguliers augmentation fréquence des enregistrements au 15 min.

Si 5 TG/6 irrégulier / 48h → fa

Si 2 TG régulier → remise à zéro

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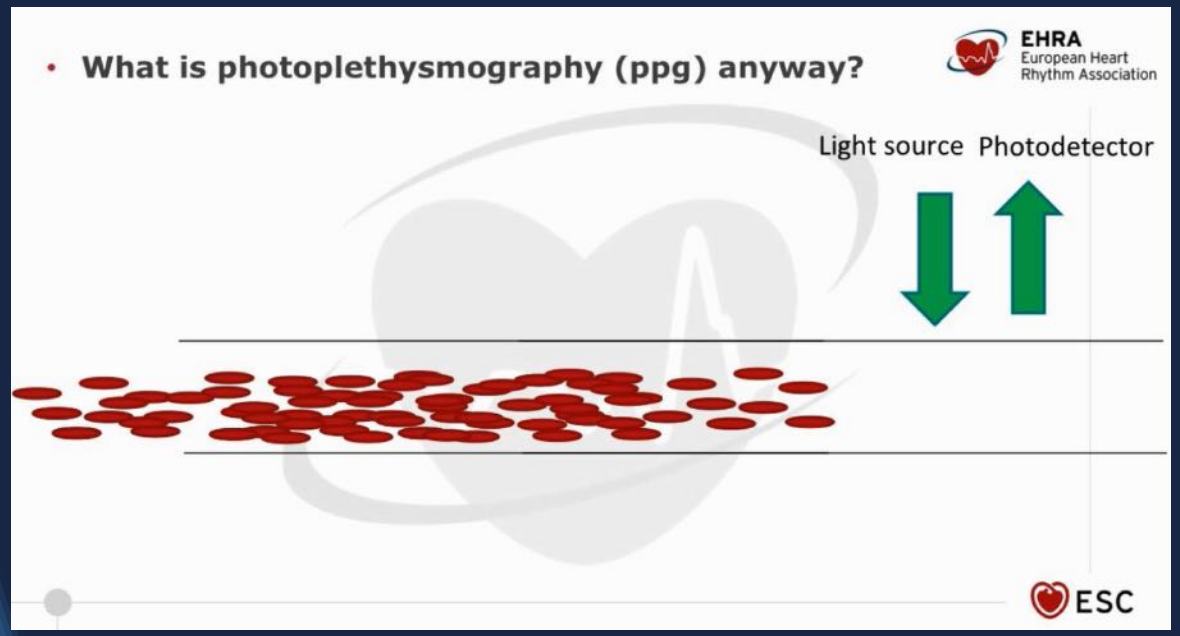
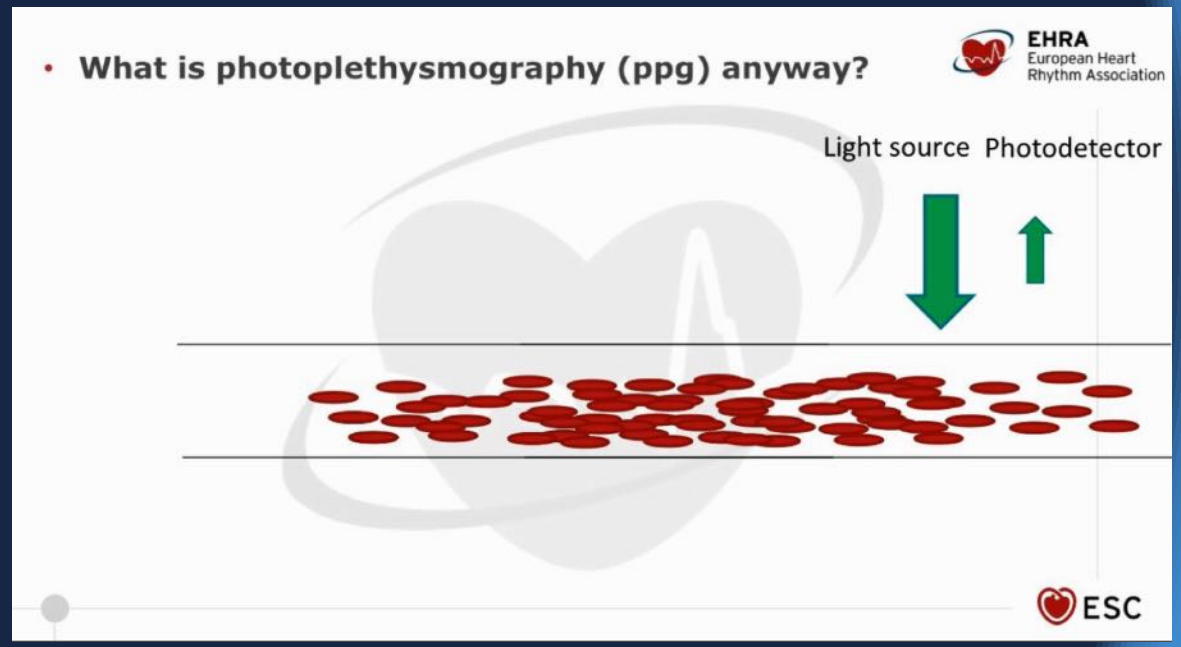
Photoplétismographie PPG



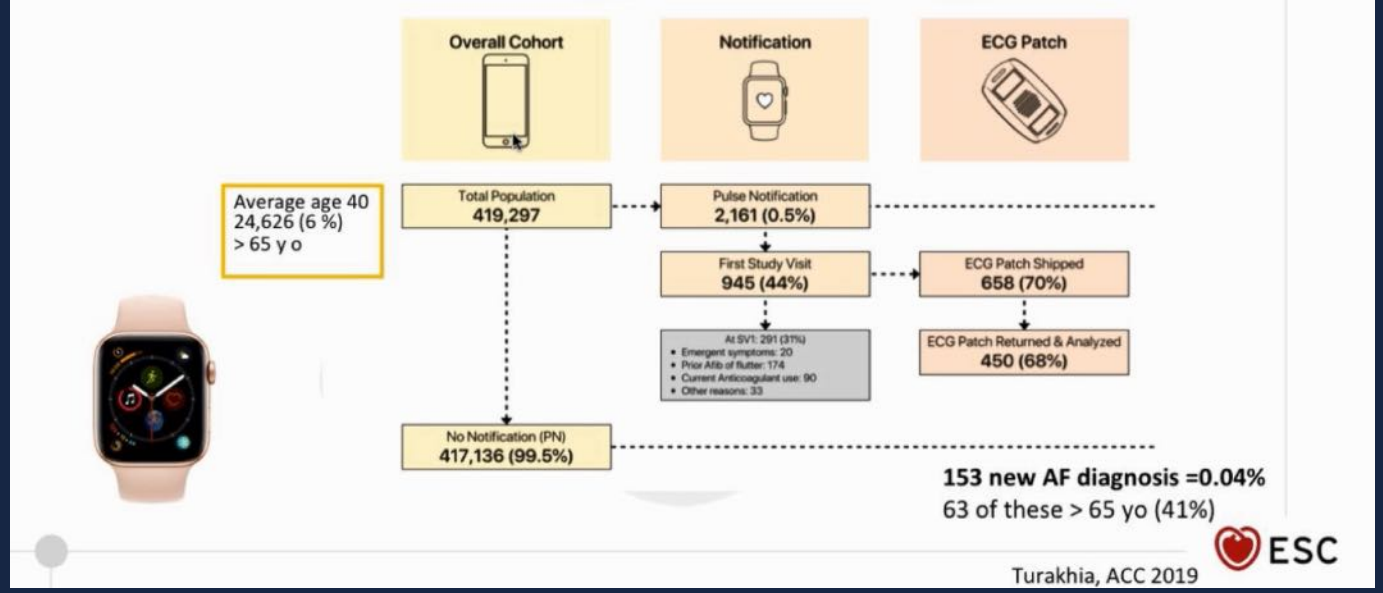


CAVE Montre doit être bien ajustée artefact de mouvement

Apple Watch study

- How much arrhythmia can I expect to find?
  – Apple Heart Study

EHRA European Heart Rhythm Association



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2019

THE NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Large-Scale Assessment of a Smartwatch to Identify Atrial Fibrillation

Marco V. Perez, M.D., Kenneth W. Mahaffey, M.D., Haley Hedlin, Ph.D., John S. Rumsfeld, M.D., Ph.D., Ariadna Garcia, M.S., Todd Ferris, M.D., Vidhya Balasubramanian, M.S., Andrea M. Russo, M.D., Amol Rajmane, M.D., Lauren Cheung, M.D., Grace Hung, M.S., Justin Lee, M.P.H., Peter Kowey, M.D., Nisha Talati, M.B.A., Divya Nag, Santosh E. Gummidipundi, M.S., Alexis Beatty, M.D., M.A.S., Mellanie True Hills, B.S., Sumbul Desai, M.D., Christopher B. Granger, M.D., Manisha Desai, Ph.D., and Mintu P. Turakhia, M.D., M.A.S., for the Apple Heart Study Investigators*

ABSTRACT

BACKGROUND

Optical sensors on wearable devices can detect irregular pulses. The ability of a smartwatch application (app) to identify atrial fibrillation during typical use is unknown.

METHODS

Participants without atrial fibrillation (as reported by the participants themselves) used a smartphone (Apple iPhone) app to consent to monitoring. If a smartwatch-based irregular pulse notification algorithm identified possible atrial fibrillation, a telemedicine visit was initiated and an electrocardiography (ECG) patch was mailed to the participant, to be worn for up to 7 days. Surveys were administered 90 days after notification of the irregular pulse and at the end of the study. The main objectives were to estimate the proportion of notified participants with atrial fibrillation shown on an ECG patch and the positive predictive value of irregular pulse intervals with a targeted confidence interval width of 0.10.

RESULTS

We recruited 419,297 participants over 8 months. Over a median of 117 days of monitoring, 2161 participants (0.52%) received notifications of irregular pulse. Among the 450 participants who returned ECG patches containing data that could be analyzed — which had been applied, on average, 13 days after notification — atrial fibrillation was present in 34% (97.5% confidence interval [CI], 29 to 39) overall and in 35% (97.5% CI, 27 to 43) of participants 65 years of age or older. Among participants who were notified of an irregular pulse, the positive predictive value was 0.84 (95% CI, 0.76 to 0.92) for observing atrial fibrillation on the ECG simultaneously with a subsequent irregular pulse notification and 0.71 (97.5% CI, 0.69 to 0.74) for observing atrial fibrillation on the ECG simultaneously with a subsequent irregular tachogram. Of 1376 notified participants who returned a 90-day survey, 57% contacted health care providers outside the study. There were no reports of serious app-related adverse events.

CONCLUSIONS

The probability of receiving an irregular pulse notification was low. Among participants who received notification of an irregular pulse, 34% had atrial fibrillation on subsequent ECG patch readings and 84% of notifications were concordant with atrial fibrillation. This siteless (no on-site visits were required for the participants), pragmatic study design provides a foundation for large-scale pragmatic studies in which outcomes or adherence can be reliably assessed with user-owned devices. (Funded by Apple; Apple Heart Study ClinicalTrials.gov number, NCT03335800.)

From the Division of Cardiovascular Medicine (M.V.P.), Stanford Center for Clinical Research (K.W.M., A.R., N.T.), the Quantitative Sciences Unit (H.H., A.G., V.B., J.L., S.E.G., M.D.), Information Resources and Technology (T.F., C.H.), Department of Medicine (S.D.), and the Center for Digital Health (M.P.T.), Stanford University, Stanford, Apple, Cupertino (L.C., D.N., A.B., S.D.), and the Veterans Affairs Palo Alto Health Care System, Palo Alto (M.P.T.) — all in California; the University of Colorado School of Medicine, Aurora (J.S.R.); the Division of Cardiovascular Disease, Cooper Medical School of Rowan University, Camden, NJ (A.M.R.); the Lankenau Heart Institute and Jefferson Medical College, Philadelphia (P.K.); StopAfib.org, American Foundation for Women's Health, Decatur, TX (M.T.H.); and the Duke Clinical Research Institute, Duke University, Durham, NC (C.B.G.). Address reprint requests to Dr. Perez or Dr. Turakhia at Stanford Center for Clinical Research, 1070 Arastradero Rd., Palo Alto, CA 94304, or at mvperez@stanford.edu or mintu@stanford.edu.

*A complete list of the Apple Heart Study Investigators is provided in the Supplementary Appendix, available at NEJM.org.

Drs. M. Desai and Turakhia contributed equally to this article.

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JOURNAL OF MEDICAL INTERNET RESEARCH

Review

Diagnostic Accuracy of Smartwatches for the Detection of Cardiac Arrhythmia: Systematic Review and Meta-analysis

Scarlet Nazarian*, BSc, MBBS, MRCS; Kyle Lam*, MA (Cantab), MB BChir, MRCS; Ara Darzi, PC, KBE, FRS, FMedSci, HonFREng; Hutan Ashrafian, PhD

Imperial College London, London, United Kingdom

*these authors contributed equally

Corresponding Author:
Hutan Ashrafian, PhD
Imperial College London
10th Floor QEQM Building, St Mary's Hospital
Praed Street
London, W2 1NY
United Kingdom
Phone: 44 7799 871 597
Email: hutan@researchtrials.net

Abstract

Background: Significant morbidity, mortality, and financial burden are associated with cardiac rhythm abnormalities. Conventional investigative tools are often unsuccessful in detecting cardiac arrhythmias because of their episodic nature. Smartwatches have gained popularity in recent years as a health tool for the detection of cardiac rhythms.

Objective: This study aims to systematically review and meta-analyze the diagnostic accuracy of smartwatches in the detection of cardiac arrhythmias.

Methods: A systematic literature search of the Embase, MEDLINE, and Cochrane Library databases was performed in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to identify studies reporting the use of a smartwatch for the detection of cardiac arrhythmia. Summary estimates of sensitivity, specificity, and area under the curve were attempted using a bivariate model for the diagnostic meta-analysis. Studies were examined for quality using the Quality Assessment of Diagnostic Accuracy Studies 2 tool.

Results: A total of 18 studies examining atrial fibrillation detection, bradyarrhythmias and tachyarrhythmias, and premature contractions were analyzed, measuring diagnostic accuracy in 424,371 subjects in total. The signals analyzed by smartwatches were based on photoplethysmography. The overall sensitivity, specificity, and accuracy of smartwatches for detecting cardiac arrhythmias were 100% (95% CI 0.99-1.00), 95% (95% CI 0.93-0.97), and 97% (95% CI 0.96-0.99), respectively. The pooled positive predictive value and negative predictive value for detecting cardiac arrhythmias were 85% (95% CI 0.79-0.90) and 100% (95% CI 1.0-1.0), respectively.

Conclusions: This review demonstrates the evolving field of digital disease detection. The current diagnostic accuracy of smartwatch technology for the detection of cardiac arrhythmias is high. Although the innovative drive of digital devices in health care will continue to gain momentum toward screening, the process of accurate evidence accrual and regulatory standards ready to accept their introduction is strongly needed.

Trial Registration: PROSPERO International Prospective Register of Systematic Reviews CRD42020213237; https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=213237.

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RESEARCH LETTER

Clinical validation of a novel smartwatch for automated detection of atrial fibrillation

Patrick Badertscher, MD,*†‡ Mirko Lischer, MMed,*†‡ Diego Mannhart, MMed,*†
Sven Knecht, DSC, MASC,*† Corinne Isenegger, MS,*†
Jeanne Du Fay de Lavallaz, MD, PhD,*† Beat Schaer, MD,*† Stefan Osswald, MD,*†
Michael Kühne, MD,*† Christian Sticherling, MD*†

From the *Department of Cardiology, University Hospital Basel, Basel, Switzerland, and* †Cardiovascular Research Institute Basel, University Hospital Basel, Basel, Switzerland.

Wearable smart devices capable of screening for atrial fibrillation (AF) presently are available, and more are expected to enter the market soon. The Withings Scanwatch (Withings SA, Issy les Moulineaux, France) is a novel smartwatch that can record an intelligent electrocardiogram (iECG) with automated detection of AF. Although the iECG function from 3 major manufacturers have been investigated extensively[1–3] and are approved by the Food and Drug Administration, there is a paucity of data regarding the diagnostic performance of the iECG function of the Withings Scanwatch. Whereas previous studies assessed smart device–based photoplethysmography technology mainly in healthy smartwatch users and reported AF prevalence as low as <1%,[4,5] we sought to assess the diagnostic accuracy of the iECG function of a novel smart device in patients with suspected cardiac arrhythmias.

This prospective, observational study enrolled consecutive patients who presented to the cardiology department of the University Hospital Basel. The study was approved by the local ethics committee and was performed according to the principles of the Declaration of Helsinki. *Written informed consent* was *obtained* from all *patients*. The aim of this study was to assess the diagnostic performance of the iECG function of the Withings Scanwatch in detecting AF compared to a simultaneously acquired cardiologist-interpreted 12-lead ECG. To obtain an iECG, patients were instructed to hold the stainless steel ring on the top case of the smartwatch for 30 seconds. The reading from the automated algorithm (sinus rhythm, AF, or unclassified) was recorded, and a PDF file of the iECG waveform was saved. Incomplete (<30 seconds) recordings were repeated immediately, but unclassified tracings by the algorithm were not. All iECG rhythm strips and 12-lead ECGs were anonymized and distributed to 2 blinded cardiologists who independently interpreted each tracing and assigned a diagnosis of sinus rhythm, AF, or unclassified. Sensitivities and specificities were directly calculated after tabulating values in a 2×2 table. iECGs and 12-lead ECGs were simultaneously recorded in 319 patients (median 67 years; interquartile range 54–76 years; 48% female). The clinical reasons for obtaining an ECG were assessment of cardiac rhythm in 80.2%, signs of ischemia in 1.3%, QT-interval measurements in 5%, and unknown in 13.5%. Baseline intervals such as HR, PR, QRS, and QT intervals were automatically calculated by the smartwatch in 297 (93%), 227 (71%), 250 (78%), and 179 (56%) patients, respectively. Using the automated algorithm, rhythm was deemed inconclusive in 44 patients (14%). Among these patients, 17 tracings (5.3%) were due to high or low heart rate, and 27 tracings (8.4%) were due to motion artifacts. Overall, AF was present in 34 patients (11%). Of the tracings for which the algorithm provided a diagnosis, the algorithm correctly identified AF with sensitivity of 76% (95% confidence interval [CI] 55%–91%), specificity of 99% (95% CI 97%–100%), and a kappa (κ) coefficient of 0.72 compared with cardiologist-interpreted 12-lead ECGs. Of the patients in sinus rhythm, 3 were labeled as AF (false-positive). The 44 unclassified recordings were interpreted by blinded cardiologists to determine whether these tracings were clinically useful. The interpreting cardiologists were able to correctly diagnose AF with sensitivity of 100% (95% CI 59%–100%), specificity of 93% (95% CI 77%–99%), and κ coefficient of 0.49. To assess the quality of the iECG tracings produced by the smartwatch, cardiologist-interpreted iECGs were compared to corresponding 12-lead ECGs. A total of 13 iECG recordings (4.1%) were determined to be

KEYWORDS Artificial intelligence; Atrial fibrillation; Digital health; Electrocardiography; Intelligent electrocardiography; Smartwatch (Heart Rhythm O2 2022;3:208–210)

‡Dr Patrick Badertscher and Dr Mirko Lischer contributed equally and should be considered shared first authors. **Address reprint requests and correspondence:** Dr Patrick Badertscher, University Hospital Basel, Petersgraben 4, 4031 Basel, Switzerland. E-mail address: patrick.badertscher@uhs.ch.

0.52 % Notification !!!
Patch de confirmation après !

Metanalyse 18 études
85 % Valeur prédictive +
100 % Valeur prédictive –

Étude Baloise montre Withings
Mauvais classification automatique
Cardiologue > Algorithme

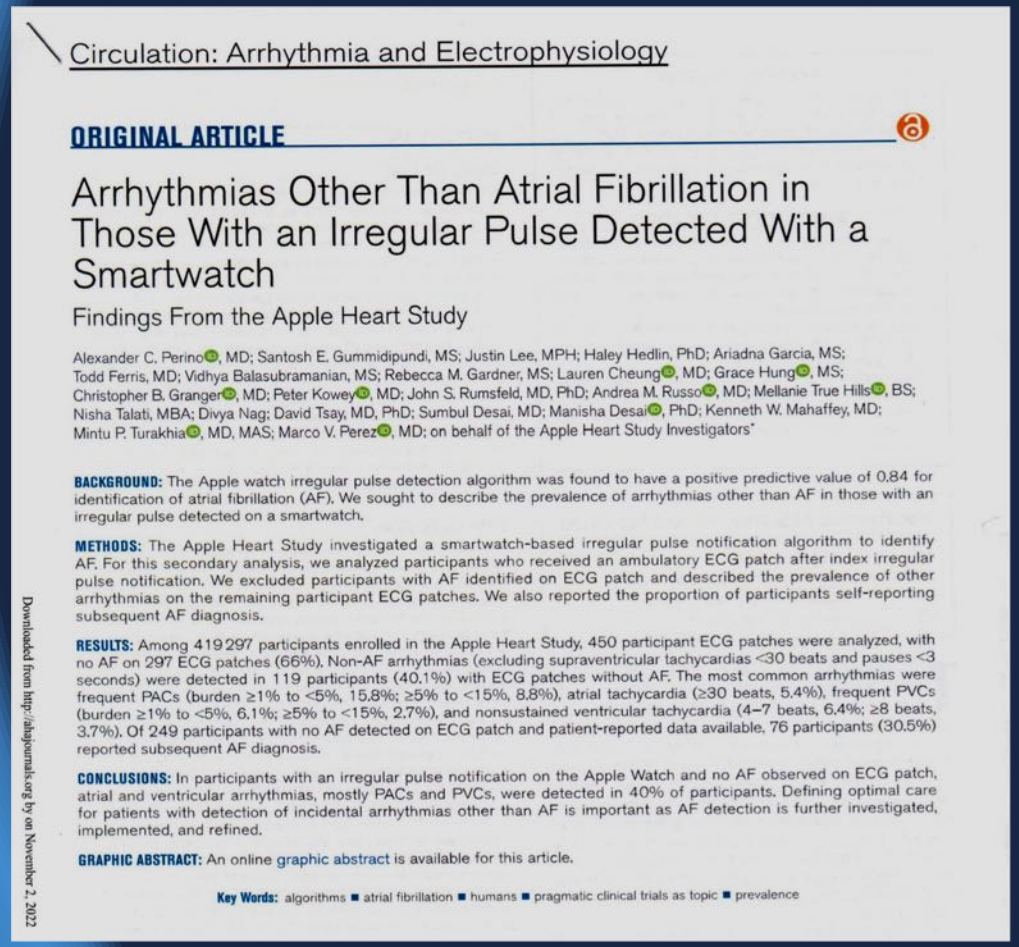
Lyon 18 Octobre 2023

Dr. JT Metzger
Clinique des Grangettes Genève
HIRSLANDEN

Pratico Rythmo

Le séminaire de rythmologie pratique dédié aux cardiologues

mHealth/ eCardiologie: impact sur notre pratique



Circulation: Arrhythmia and Electrophysiology

ORIGINAL ARTICLE

Arrhythmias Other Than Atrial Fibrillation in Those With an Irregular Pulse Detected With a Smartwatch

Findings From the Apple Heart Study

Alexander C. Perino, MD; Santosh E. Gummidipundi, MS; Justin Lee, MPH; Haley Hedlin, PhD; Ariadna Garcia, MS; Todd Ferris, MD; Vidhya Balasubramanian, MS; Rebecca M. Gardner, MS; Lauren Cheung, MD; Grace Hung, MS; Christopher B. Granger, MD; Peter Kowey, MD; John S. Rumsfeld, MD, PhD; Andrea M. Russo, MD; Mellanie True Hills, BS; Nisha Talati, MBA; Divya Nag; David Tsay, MD, PhD; Sumbul Desai, MD; Manisha Desai, PhD; Kenneth W. Mahaffey, MD; Mintu P. Turakhia, MD, MAS; Marco V. Perez, MD; on behalf of the Apple Heart Study Investigators*

BACKGROUND: The Apple watch irregular pulse detection algorithm was found to have a positive predictive value of 0.84 for identification of atrial fibrillation (AF). We sought to describe the prevalence of arrhythmias other than AF in those with an irregular pulse detected on a smartwatch.

METHODS: The Apple Heart Study investigated a smartwatch-based irregular pulse notification algorithm to identify AF. For this secondary analysis, we analyzed participants who received an ambulatory ECG patch after index irregular pulse notification. We excluded participants with AF identified on ECG patch and described the prevalence of other arrhythmias on the remaining participant ECG patches. We also reported the proportion of participants self-reporting subsequent AF diagnosis.

RESULTS: Among 419 297 participants enrolled in the Apple Heart Study, 450 participant ECG patches were analyzed, with no AF on 297 ECG patches (66%). Non-AF arrhythmias (excluding supraventricular tachycardias <30 beats and pauses <3 seconds) were detected in 119 participants (40.1%) with ECG patches without AF. The most common arrhythmias were frequent PACs (burden ≥1% to <5%, 15.8%; ≥5% to <15%, 8.8%), atrial tachycardia (≥30 beats, 5.4%), frequent PVCs (burden ≥1% to <5%, 6.1%; ≥5% to <15%, 2.7%), and nonsustained ventricular tachycardia (4–7 beats, 6.4%; ≥8 beats, 3.7%). Of 249 participants with no AF detected on ECG patch and patient-reported data available, 76 participants (30.5%) reported subsequent AF diagnosis.

CONCLUSIONS: In participants with an irregular pulse notification on the Apple Watch and no AF observed on ECG patch, atrial and ventricular arrhythmias, mostly PACs and PVCs, were detected in 40% of participants. Defining optimal care for patients with detection of incidental arrhythmias other than AF is important as AF detection is further investigated, implemented, and refined.

GRAPHIC ABSTRACT: An online graphic abstract is available for this article.

Key Words: algorithms ■ atrial fibrillation ■ humans ■ pragmatic clinical trials as topic ■ prevalence

AppleWatch

Si Notification

Patch

40 % cas ESSV ou ESV

Autre utilisation

Si symptômes

Enregistrement classé «peu concluant»

Mon utilisation Apple Watch

1) Diagnostic d'une fibrillation suspectée dans les groupes «à risque» ; toujours avec confirmation ECG
2) Charge en fibrillation auriculaire
3) Après ablation de fibrillation auriculaire pour chercher les récidives
4) À la recherche d'autres arythmies symptomatiques(Évent recorder)

Conclusions

Nouveaux outils!

- Lesquels seront « utiles» ?
- Pertinents ?

Changement de rapport avec les patients

Nouveau vrais ou faux diagnostics

- Implications ?
- Investigations ?
- Coût ?

Anxiété pour le patient seul face à ses résultats

Ne pas rater ce train ?
Nous positionner
Ne pas les subir

Conclusions

Les nouveaux système de diagnostic sont user «friendly»

Ils doivent trouver leur patient et leur population cible

Dans les population à haut risque ils vont augmenter la puissance diagnostic

Leur impact sur l'évolution et le pronostic des pathologie CV doivent être mieux définis

The Huawei Heart Study

189 012 patients

Age moyen 35 ans

hommes 87%

Résultats 0.23 % FA

PLAN

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