Meeting Nazionale ITACARE-P 2025

La Cardiologia Riabilitativa e Preventiva come snodo fondamentale della cura della persona con cardiopatia

Simposio
Nuove tecnologie in Sanità e in Cardiologia Riabilitativa e Preventiva

Le opportunità delle nuove tecnologie nel post-dimissione dopo evento cardiologico acuto
Bruno Passaretti

CENTRO CONGRESSI FRENTANI
Roma, 21-22 novembre 2025

medicina

Editorial

Current Status, Challenges, and Future Directions in Cardiac Rehabilitation

Francisco Epelde

Medicina **2024**, *60*, 388. https://doi.org/10.3390/medicina60030388

The future of cardiac rehabilitation is dynamic and holds the promise of transforming the way we approach cardiovascular health. By embracing personalized and precision medicine, integrating artificial intelligence, harnessing virtual and augmented reality, expanding tele-rehabilitation, and incorporating insights from behavioral economics, we can create a new era in cardiac rehabilitation. The collaboration between healthcare professionals, researchers, and technology innovators will be paramount in ensuring that these advancements translate into tangible improvements in patient outcomes and contribute to a healthier cardiovascular landscape. The journey ahead is one of innovation, inclusivity, and personalized care, charting a course towards a brighter future for cardiac rehabilitation.

Cochrane Library
Cochrane Database of Systematic Reviews

Home-based versus centre-based cardiac rehabilitation (Review)

Cochrane Database of Systematic Reviews 2023, Issue 10. Art. No.: CD007130.
DOI: 10.1002/14651858.CD007130.pub5.

McDonagh STJ, Dalal H, Moore S, Clark CE, Dean SG, Jolly K, Cowie A, Afzal J, Taylor RS

Across this evidence base, we found no evidence supporting important differences in outcomes for patients receiving home-based or centre-based cardiac rehabilitation either in the short-term (3 to 12 months) or longer-term (up to 24 months) for mortality, cardiac events, exercise capacity, modifiable risk factors (total cholesterol; LDL cholesterol; systolic blood pressure; diastolic blood pressure; proportion of smokers at follow-up) or HRQoL or trial completion. There was a small outcome difference in favour of centre-based participants for HDL cholesterol. In contrast, in home-based participants, there was some evidence of higher levels of programme adherence attributed to attendance. We found no consistent evidence to support an important difference in the average cost per patient of providing home-based versus centre-based programmes.

Figure 4. Funnel plot of comparison: 1 home-base vs centre-based, outcome: 1.1 Total mortality.

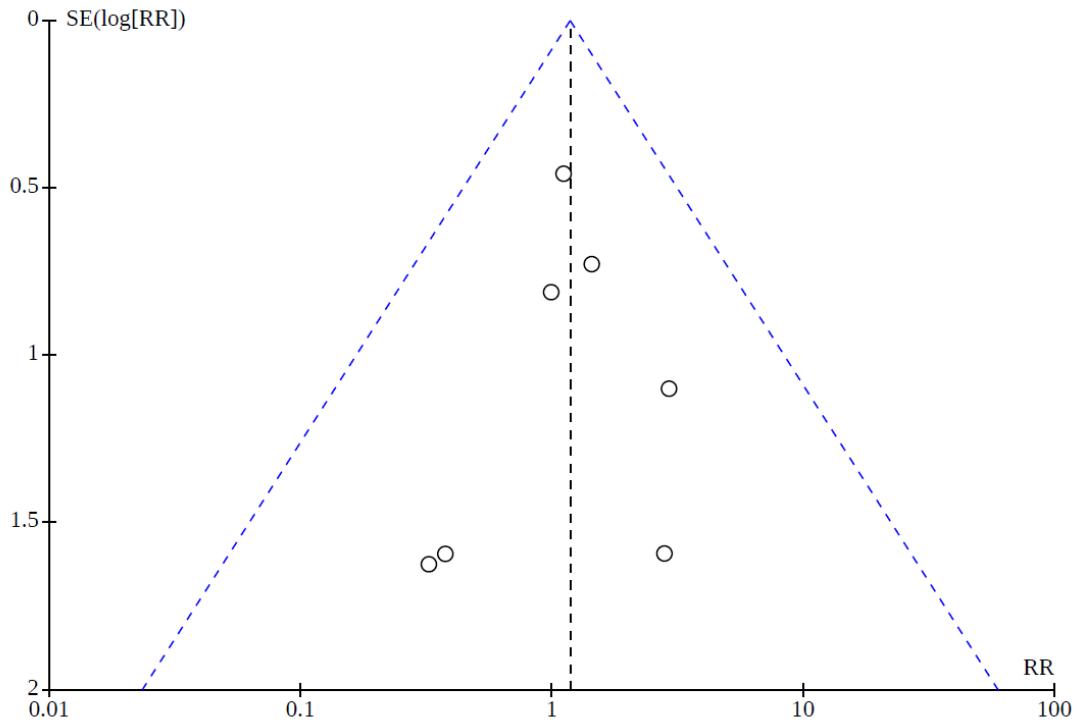

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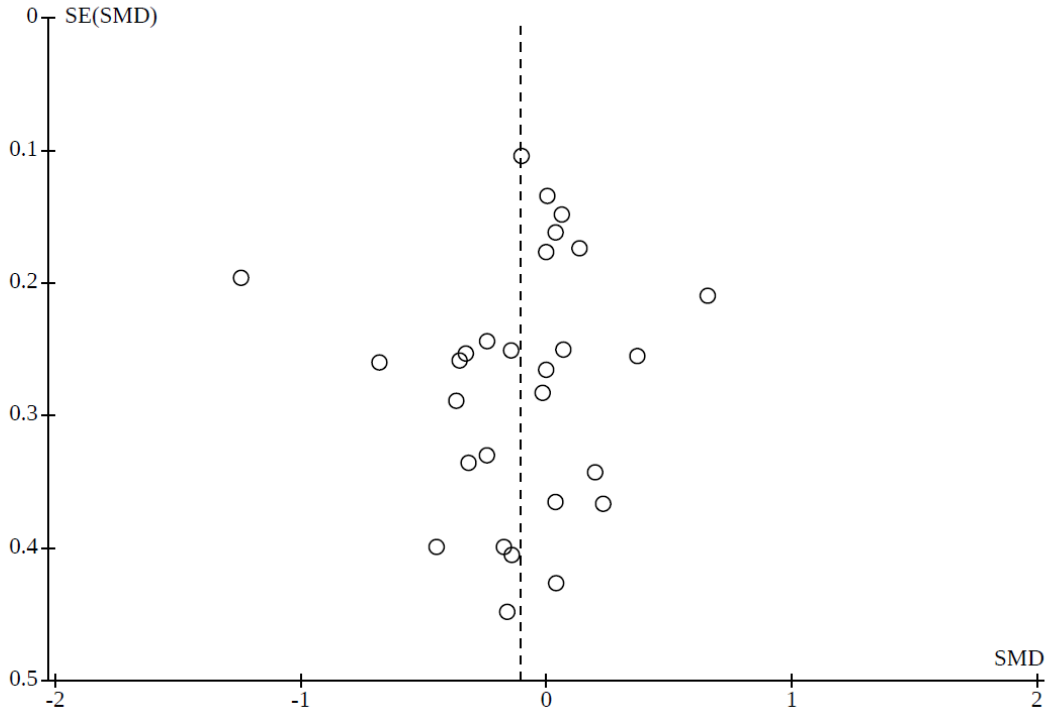
Figure 5. Funnel plot of comparison: 1 home-base vs centre-based, outcome: 1.2 Exercise capacity ≤ 12 months.



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JACC VOL. 85, NO. 22, 2025
JUNE 10, 2025:2135–2237

CLINICAL PRACTICE GUIDELINE

2025 ACC/AHA/ACEP/NAEMSP/SCAI Guideline for the Management of Patients With Acute Coronary Syndromes

To overcome challenges that have prevented greater patient participation, new strategies and innovative models that utilize digital health tools are emerging to meet the evolving needs of CR patients. CR programs have traditionally been delivered via center-based CR. These programs require patients to be physically present at a facility located in a hospital or outpatient center, which limits access for many patients, especially women and some racial and ethnic groups.[9,27,28]

recurrent MI, and rehospitalization.[29] Advances in technology and remote monitoring may help to improve the efficacy and safety of this approach.

10.5.3. Cardiac Rehabilitation

Recommendations for CR
Referenced studies that support recommendations are summarized in the Evidence Table.

COR	LOE	RECOMMENDATIONS
1	A	1. Patients with ACS should be referred to an outpatient CR program prior to hospital discharge to reduce death, MI, hospital readmissions, and improve functional status and QOL.[1-4]
2a	B-R	2. In patients with ACS, a home-based CR program is a reasonable alternative to a center-based CR program to improve functional status and QOL.[5-9]

Nakayama *et al. Environmental Health and Preventive Medicine* (2020) 25:48
https://doi.org/10.1186/s12199-020-00885-2

Environmental Health and Preventive Medicine

RESEARCH ARTICLE Open Access

Remote cardiac rehabilitation is a good alternative of outpatient cardiac rehabilitation in the COVID-19 era

Atsuko Nakayama[1*], Naoko Takayama[2], Momoko Kobayashi[2], Kanako Hyodo[2], Naomi Maeshima[2], Fujiwara Takayuki[1], Hiroyuki Morita[1*] and Issei Komuro[1]

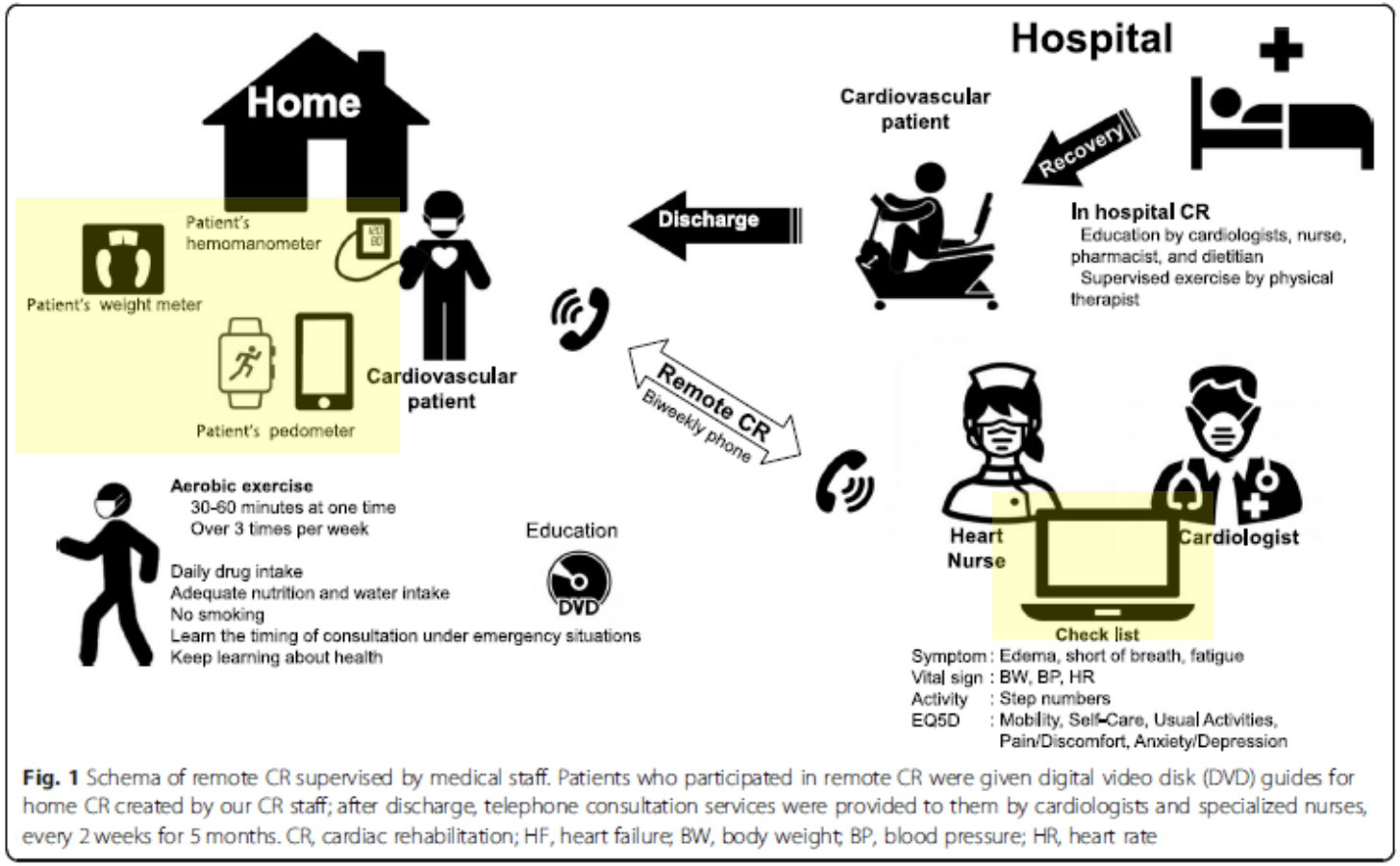

Fig. 1 Schema of remote CR supervised by medical staff. Patients who participated in remote CR were given digital video disk (DVD) guides for home CR created by our CR staff; after discharge, telephone consultation services were provided to them by cardiologists and specialized nurses, every 2 weeks for 5 months. CR, cardiac rehabilitation; HF, heart failure; BW, body weight; BP, blood pressure; HR, heart rate

Nakayama *et al. Environmental Health and Preventive Medicine* (2020) 25:48
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Environmental Health and Preventive Medicine

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Conclusions

HF patients might be highly susceptible to COVID-19 infection. Therefore, cardiologists and nurses may be hesitant to commence CR for them. However, adequate management of heart diseases, including CR, is still clinically valuable. In order to improve the prognosis of HF patients, we can promote adequate lifestyle guidance and early CR intervention during hospitalization along with remote CR services with telephone support after discharge.

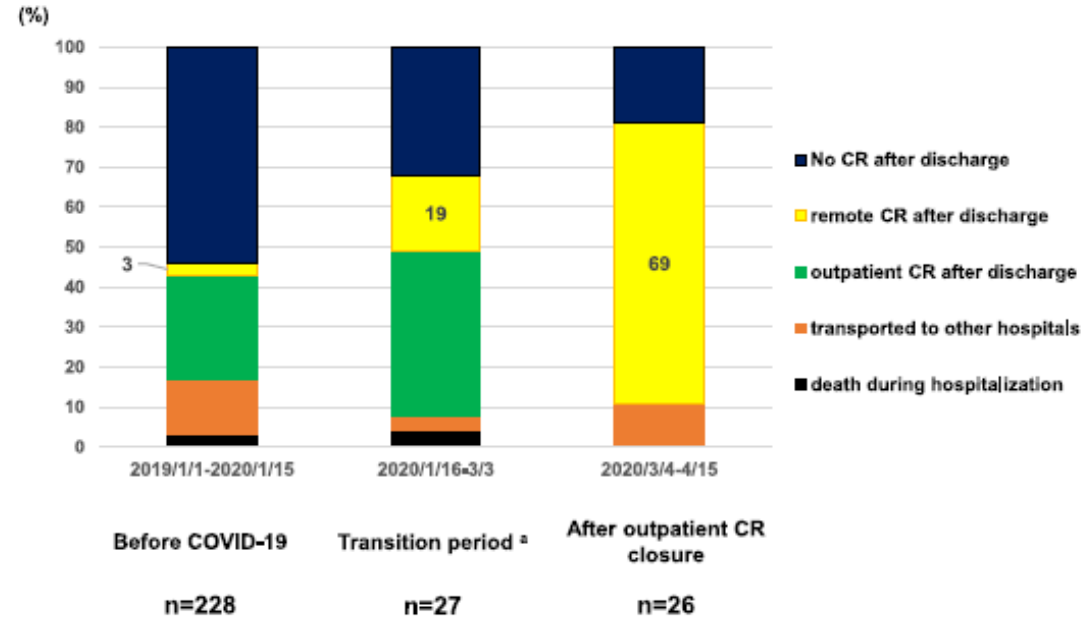


Fig. 2 Remote cardiac rehabilitation for patients with heart failure before and during the COVID-19 pandemic. CR after discharge for patients with HF before and during the COVID-19 pandemic. Superscript letter "a" denotes the period from the first report of COVID-19 in Japan to outpatient CR closure in our hospital. CR, cardiac rehabilitation

REVIEW ARTICLE

Cardiac Rehabilitation — Challenges, Advances, and the Road Ahead

Randal J. Thomas, M.D.

N Engl J Med 2024;390:830-41.
DOI: 10.1056/NEJMra2302291

Efficacia della rehab a distanza

Necessità imposte dal Covid

Miglioramento della connettività (fibra ecc.)

Avanzamento della tecnologia

FUTURE DIRECTIONS

"Necessity remains the mother of invention."

— Clayton M. Christensen, 2003[90]

The future of cardiac rehabilitation for eligible patients will include an array of tools and strategies to help deliver effective cardiac rehabilitation to increasingly diverse patient groups in various locations — from centers to homes to anywhere else they are throughout the day (at work, traveling, etc.). Advances in cardiac rehabilitation will also result from new intervention strategies and interactive tools, including wearable technologies, physiological monitors, and communication devices. These advances will help expand the effective options for interacting with and guiding patients in the short and longer term, with the use of a menu of evidence-based options tailored to each patient's characteristics, needs, and preferences.[89]

Journal of Cardiac and Pulmonary Rehabilitation
Payal, J Card Pulm Rehabi 2024, 8:2
Review Article Open Access

Innovations in Cardiac Rehabilitation: Integrating Technology for Better Outcomes

Payal Patel*
Department of Cardiology, King George's Medical University, India

Virtual platforms: Virtual platforms provide a digital environment for delivering cardiac rehabilitation programs, offering interactive exercise sessions, educational modules, self-monitoring tools, and social support networks. These platforms enhance accessibility, particularly for individuals with limited mobility or geographical constraints, and promote continuity of care beyond traditional clinic settings [4].

Wearable devices: Wearable devices, such as activity trackers, heart rate monitors, and smartwatches, play a crucial role in cardiac rehabilitation by enabling real-time monitoring of physical activity, heart rate variability, sleep patterns, and adherence to exercise regimens. These devices empower patients to track their progress, set goals, and receive feedback, promoting self-management and motivation [5].

Telehealth: Telehealth services allow for remote consultations, follow-up appointments, and educational sessions, bridging the gap between healthcare providers and patients [6]. Telehealth platforms facilitate personalized care plans, medication management, lifestyle coaching, and psychosocial support, improving access to cardiac rehabilitation services and reducing barriers to participation.

Digital monitoring tools: Digital monitoring tools, including mobile applications and web-based portals, enable healthcare providers to monitor patients' progress, track vital signs, assess risk factors, and deliver personalized interventions [7]. These tools facilitate data-driven decision-making, optimize treatment plans, and enhance communication between patients and providers, leading to better outcomes.

Conclusion

Innovations in cardiac rehabilitation through technology have revolutionized the delivery of care, offering personalized, accessible, and engaging interventions for individuals with cardiovascular diseases. Virtual platforms, Wearable devices, Tele-health services and digital monitoring tools empower patients, improve adherence, enhance communication, and optimize outcomes. As technology continues to evolve, the integration of innovative solutions in cardiac rehabilitation will play a vital role in advancing cardiovascular care, promoting long-term health, and reducing the burden of CVDs on individuals and healthcare systems.

THE PRESENT AND FUTURE

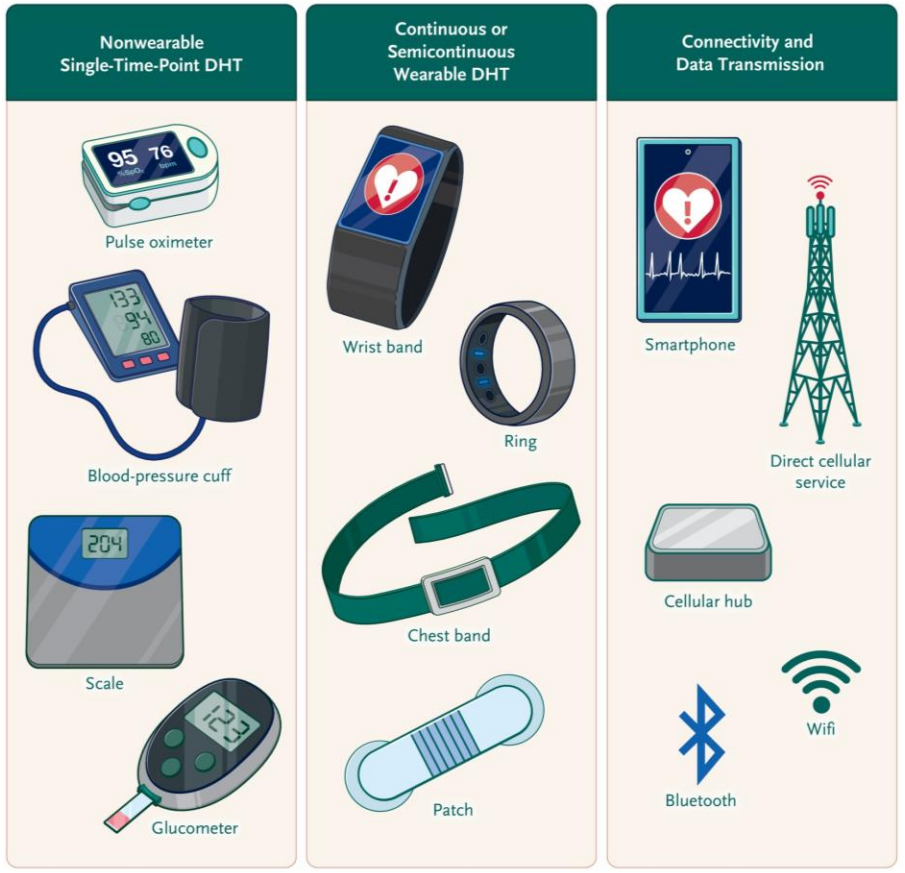
https://doi.org/10.1016/j.jacc.2020.01.046

Wearable Devices for Ambulatory Cardiac Monitoring

JACC State-of-the-Art Review

Furrukh Sana, PhD,[a] Eric M. Isselbacher, MD, MSc,[b] Jagmeet P. Singh, MD, PhD,[c] E. Kevin Heist, MD, PhD,[c] Bhupesh Pathik, MBBS, PhD,[d] Antonis A. Armoundas, PhD[a,e]

JACC VOL. 75, NO. 13, 2020
APRIL 7, 2020:1582–92



Devices for Ambulatory Monitoring

- Wristwatches
- Smartphones
- Patches
- Headbands
- Eye-glasses
- Necklaces

Ambulatory Monitoring Capabilities

- ECG
- Heart Rate
- Arrhythmia
- Blood Pressure
- Cardio-Respiratory Fitness
- Stress
- Respiratory Rate
- Temperature
- Oxygen Saturation
- Ischemia
- Apnea

TABLE 1 Summary of Wearable Device and System Types Along With Clinical Applications

Ref. #	Device Name	Device Type	Clinical Applications
(8,9)	Zio patch	Patch	ECG monitoring, arrhythmia detection
(10)	NUVANT MCT	Patch	ECG monitoring, arrhythmia detection
(11)	Scanadu Scout	Handheld	HR, RR, blood pressure, temperature, oxygen saturation
(12)	Apple Watch	Wristwatch	ECG monitoring, HR, AF detection
(14)	Pulse-Smart	Smartphone camera-based app	AF, PAC, and PVC detection
(15)	Kardia Mobile	Smartphone case	ECG monitoring, AF detection
(17)	ECG Check	Smartphone case	ECG monitoring
(18–20)	cvrPhone	Smartphone app	ECG monitoring, ischemia and apnea detection, arrhythmia susceptibility
(22)	N/A	Smartphone app	HR
(23)	N/A	Smartphone-connected device	Blood pressure
(24)	N/A	Flexible patch	Blood pressure
(25)	N/A	Patch and wristwatch	ECG, blood pressure, contractility
(26)	Google Glass	Head-mounted	HR, RR
(27)	Masimo Personal Health	Smartphone-connected probe	HR and SpO_2
(28)	N/A	Multiple wearable sensors	SpO_2, HR, RR, walk speed, and acceleration
(31)	N/A	Patch	HR variability, skin temperature, stress diagnosis

AF = atrial fibrillation; app = application; ECG = electrocardiography; HR = heart rate; MCT = Mobile Cardiac Telemetry; N/A = not available; PAC = premature atrial contraction; PVC = premature ventricular contraction; RR = respiratory rate; SpO_2 = oxygen saturation.

Review

Are Wearable ECG Devices Ready for Hospital at Home Application?

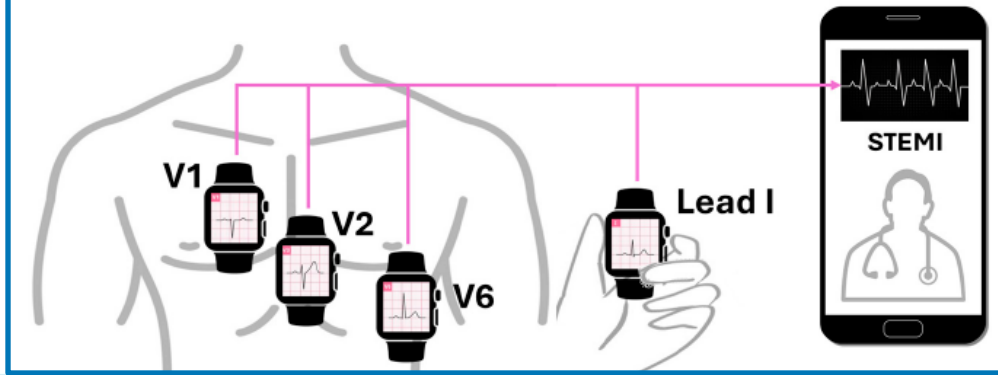
Jorge Medina-Avelino [1,2], Ricardo Silva-Bustillos [3] and Juan A. Holgado-Terriza [1,*]

Sensors **2025**, *25*, 2982 https://doi.org/10.3390/s2510

A challenge with smartwatch recordings is their limited detection capabilities, typically restricted to lead I. They often fail to detect ST segment elevations,

una vs. 12 derivazioni

In another study involving 100 patients (54 with STEMI, 27 with NSTEMI, and 19 healthy individuals), recording multiple smartwatch ECG tracings (leads 1 to 3, V1–V6) demonstrated correspondence with the standard ECG for identifying normal patients, those with ST segment elevation changes, and those with ST segment elevations not related to myocardial infarction [4]. These findings indicate that multi-lead smartwatch tracings align with traditional ECG waveforms observed in acute coronary syndromes, supporting the potential ability to adequately detect ST-segment elevation and provide accurate diagnoses as shown in Figure 8.



Review

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A challenge with smartwatch recordings is their limited detection capabilities, typically restricted to lead I. They often fail to detect ST segment elevations,

The sampling rate of the electrocardiogram (ECGs) generated by wearable devices is a crucial factor in the accuracy and detail of the recorded signal. The American Heart Association (AHA) recommends a minimum sampling rate of 500 Hz for standard diagnostic ECGs in adults, but some studies even suggest that a sampling frequency of at least 1000 Hz [36,37] would be desirable for accurate measurements, especially in children. Wearable devices commonly generate sampling rates between 100 and 350 Hz,

Unlike conventional healthcare settings where patients are typically monitored only during brief hospital visits, HaH and RPM offer continuous monitoring, providing a comprehensive view of patients' cardiac health over time. This continuous surveillance ensures prompt detection and management of potential cardiac issues [2]. However, the question arises: are current wearable devices equipped to deliver the required functionality?

una vs. 12 derivazioni

importanza della frequenza di acquisizione del segnale

monitoraggio breve vs. monitoraggio continuo, ideale per diagnosi precoce di un evento acuto

Review

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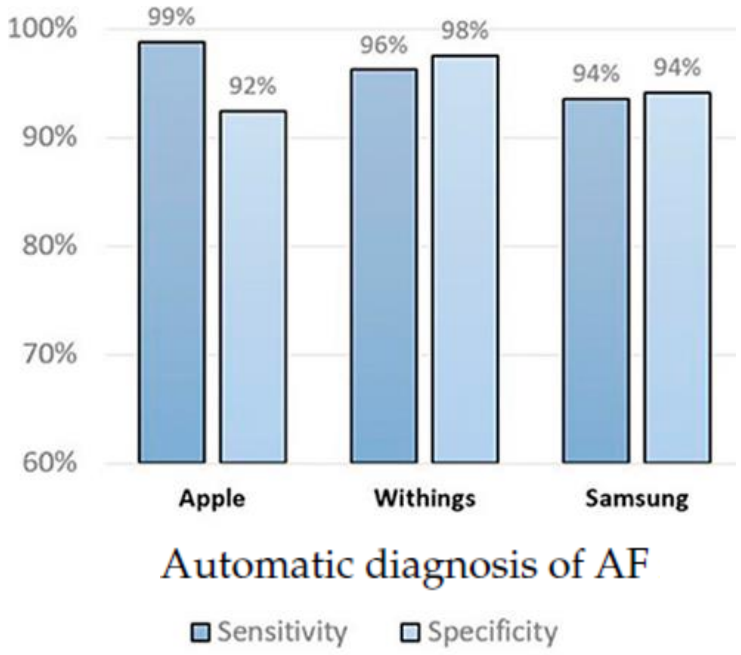
Jorge Medina-Avelino [1,2], Ricardo Silva-Bustillos [3] and Juan A. Holgado-Terriza [1,*]

Sensors **2025**, *25*, 2982 https://doi.org/10.3390/s2510

toxicity, particularly in relation to severe proarrhythmia, is a major concern with many proposed treatments, including lopinavir/ritonavir, chloroquine/hydroxychloroquine (HCQ), and azithromycin (AZM) [30,53]. Monitoring the QT interval and heart rate is crucial for ensuring the safety of these medications [53].

The advent of wearable electrocardiogram (ECG) devices, coupled with the power of machine learning and deep learning algorithms, is revolutionizing cardiac diagnostics. By continuously monitoring the heart's electrical activity in everyday settings, these AI-driven wearable systems offer unprecedented opportunities for early diagnosis, personalized risk assessment, and improved management of a wide range of cardiovascular conditions, extending beyond traditional clinical ECG assessments.

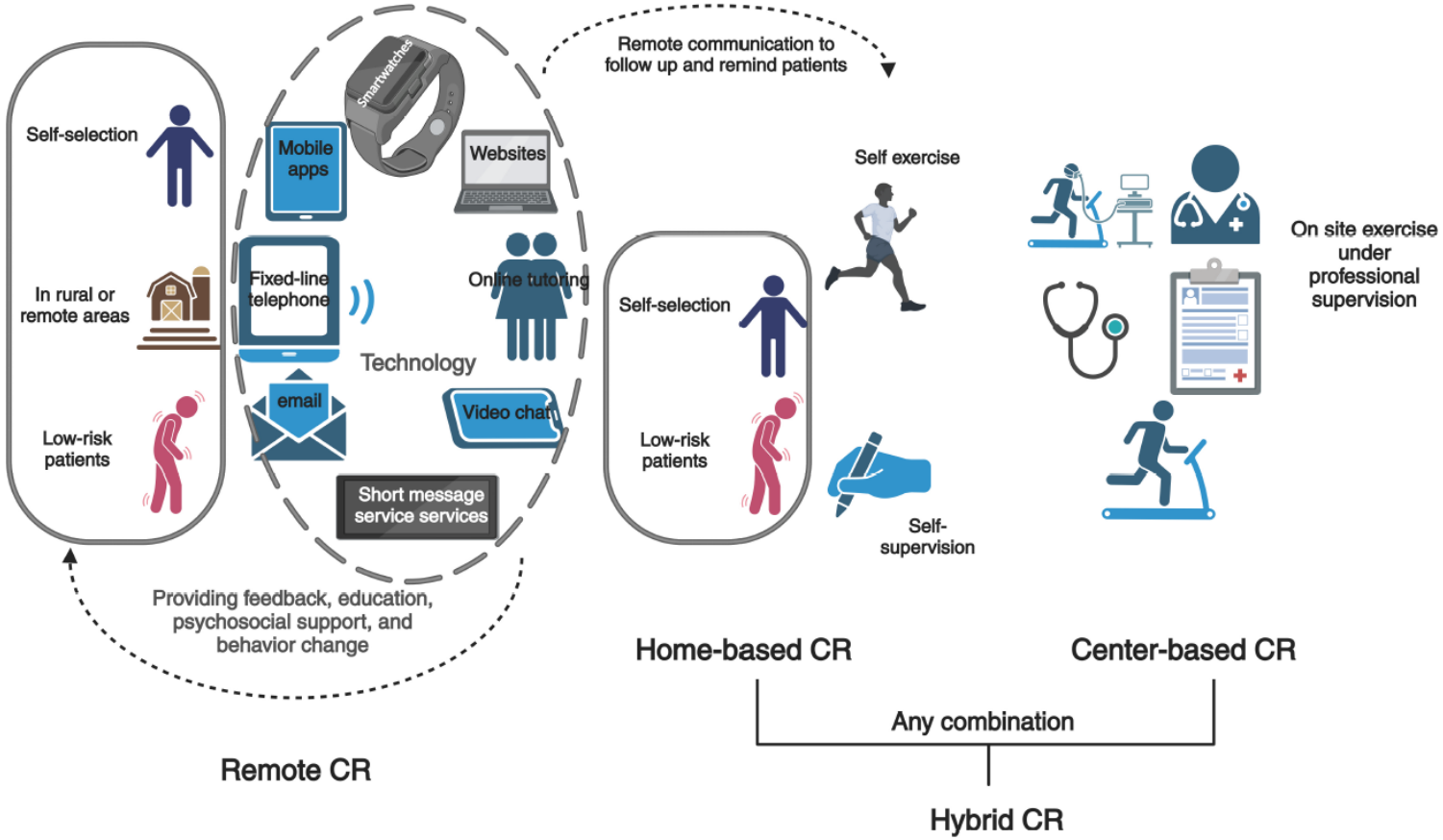


Reviews in Cardiovascular Medicine
Rev. Cardiovasc. Med. **2024**; 25(3): 76
https://doi.org/10.31083/j.rcm2503076

Review

Current Role and Future Perspectives of Cardiac Rehabilitation in Heart Disease

Lamei Yang[1,2], Yi Bai[1,2], Li Li[1,2], Sisi Zheng[1,2], Xiaoli Yan[3], Li Yu[1,2,*,†], Shilan Luo[4,*,†]



Circulation

AHA SCIENCE ADVISORY

Digital Technologies in Cardiac Rehabilitation: A Science Advisory From the American Heart Association

Jessica R. Golbus, MD, MS, Chair; Francisco Lopez-Jimenez, MD, MSc, FAHA, Vice Chair; Ana Barac, MD, PhD, FAHA; William K. Cornwell III, MD, MS, FAHA; Patrick Dunn, PhD, FAHA; Daniel E. Forman, MD, FAHA; Seth S. Martin, MD, MHS, FAHA; Erica N. Schorr, PhD, RN, FAHA; Marta Supervia, MD, MSc, PhD; on behalf of the Exercise, Cardiac Rehabilitation and Secondary Prevention Committee of the Council on Clinical Cardiology; Council on Lifelong Congenital Heart Disease and Heart Health in the Young; Council on Quality of Care and Outcomes Research; and Council on Cardiovascular and Stroke Nursing

Circulation. 2023;148:95–107. DOI: 10.1161/CIR.0000000000001150

EQUITY IN DIGITAL CR

The use of digital technologies in CR has the potential to improve health equity. However, rapidly advancing technology may also exacerbate the exclusion of sociodemographic subgroups or individuals with disabilities,[43] introduce digital biases, and paradoxically widen the digital divide.[44,45]

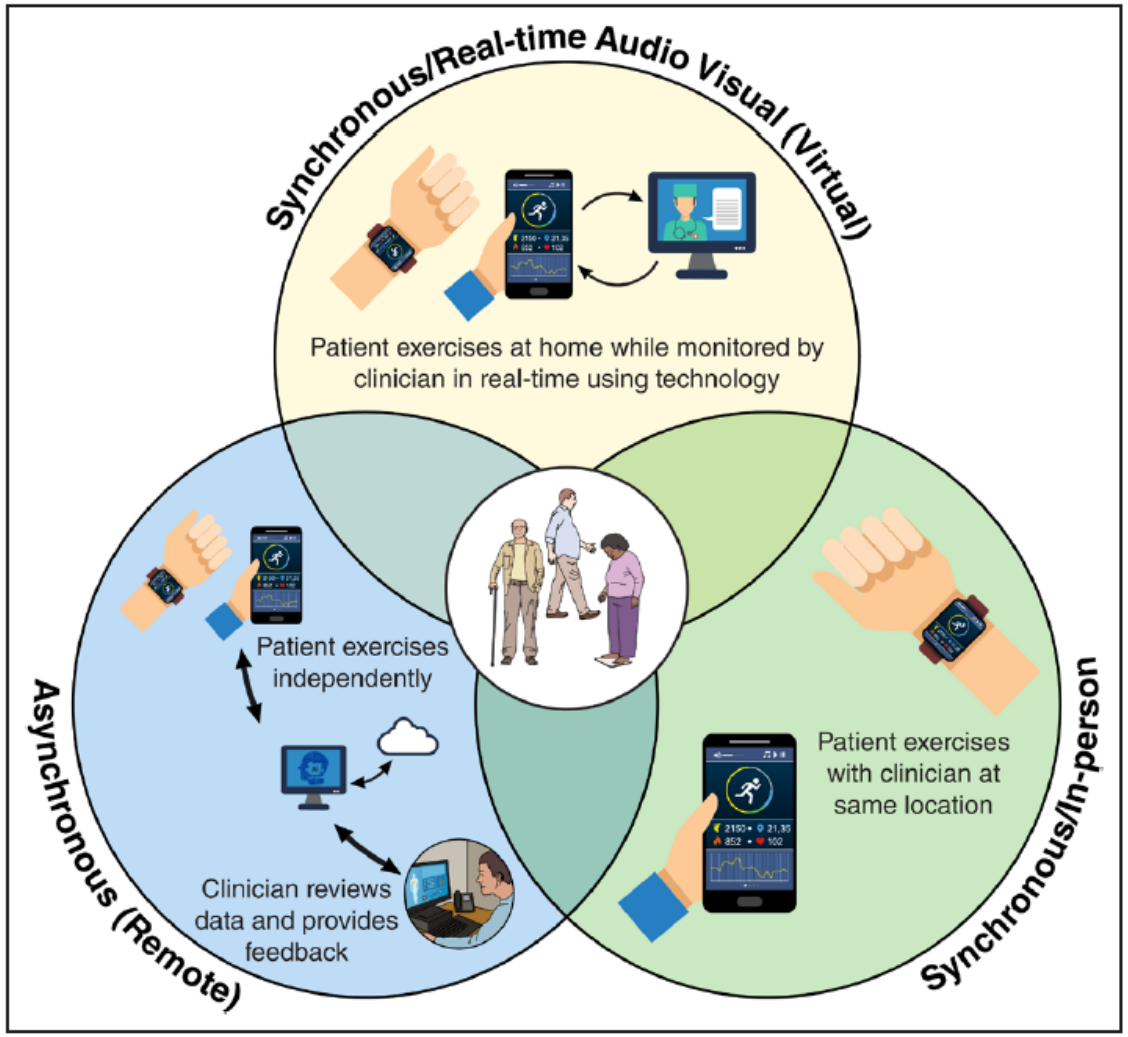


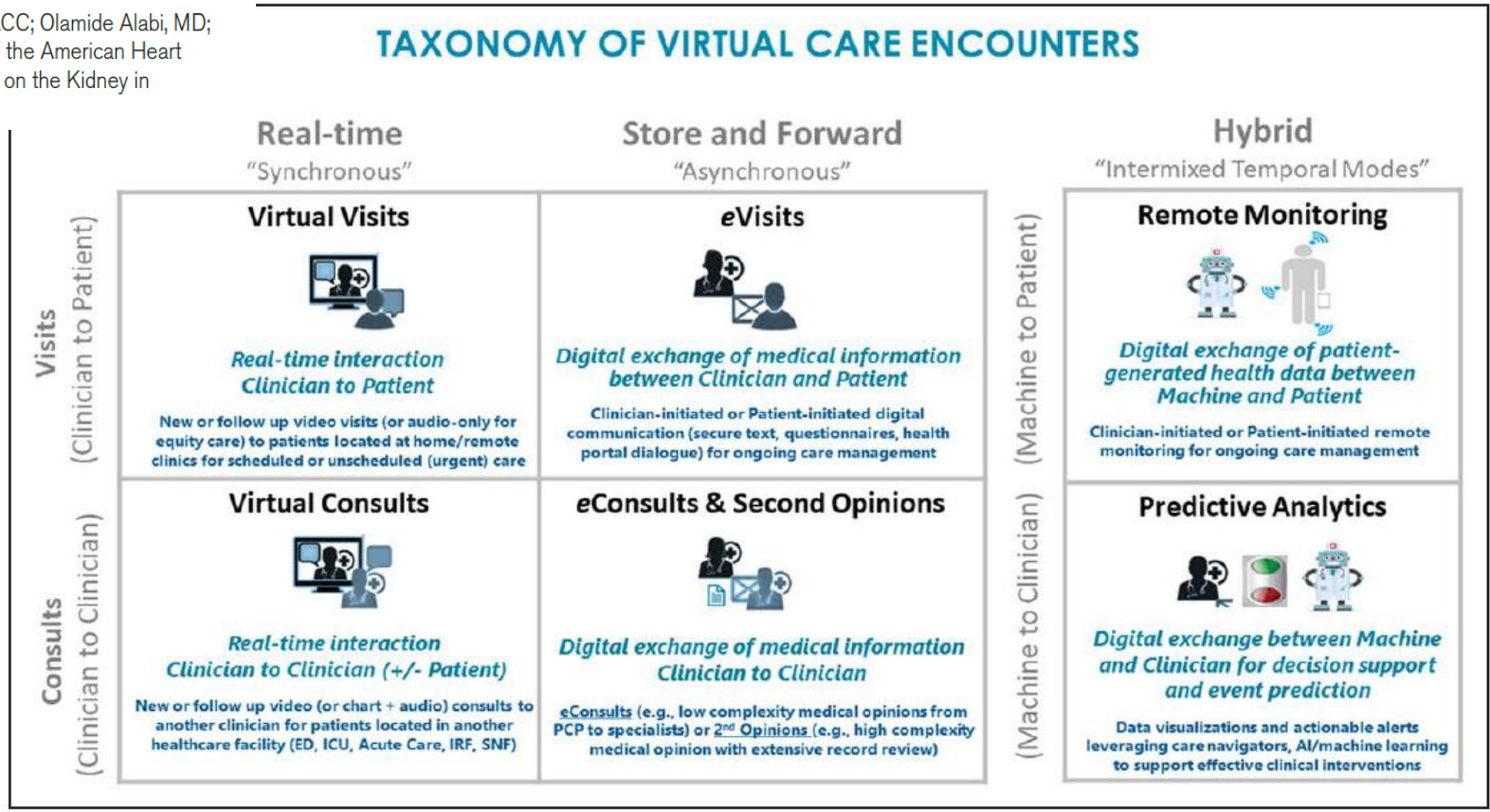
Figure 1. Digital technology and modes of CR delivery.
Diverse populations can use digital technology to support delivery of cardiac rehabilitation (CR) using various models and sites of care. Individuals can participate in CR using 1 or multiple delivery formats. In virtual CR, patients and clinicians are in different locations and use audiovisual communication to support monitored exercise in real time. In synchronous/in-person CR, patients and clinicians are in the same location (eg, hospital, community center), but CR delivery may be augmented through the use of digital technology. In remote CR, patients exercise independently and can use digital technology to monitor exercise and then transmit those data to clinicians for review.

Circulation *Circulation*. 2022;146:e558–e568. DOI: 10.1161/CIR.0000000000001107

AHA SCIENTIFIC STATEMENT

An Overview of Telehealth in the Management of Cardiovascular Disease: A Scientific Statement From the American Heart Association

Edwin A. Takahashi, MD, Chair; Lee H. Schwamm, MD, FACC, Vice Chair; Opeolu M. Adeoye, MD, FACC; Olamide Alabi, MD; Eiman Jahangir, MD, MPH, FACC; Sanjay Misra, MD, FACC; Carolyn H. Still, PhD, MSM; on behalf of the American Heart Association Council on Cardiovascular Radiology and Intervention, Council on Hypertension, Council on the Kidney in Cardiovascular Disease, and Stroke Council



npj | digital medicine
Published in partnership with Seoul National University Bundang Hospital
https://doi.org/10.1038/s41746-025-01655-6

Effectiveness of digital healthcare to improve clinical outcomes in discharged patients with coronary artery disease

Lanshu Yang[1,2], Zuoxiang Wang[1,2], Sheng Zhao[1], Mengyuan Liu[1], Yalin Zhu[1], Fenghuan Hu[1], Xiaojin Gao[1,3] ✉ & Yongjian Wu[1,3]

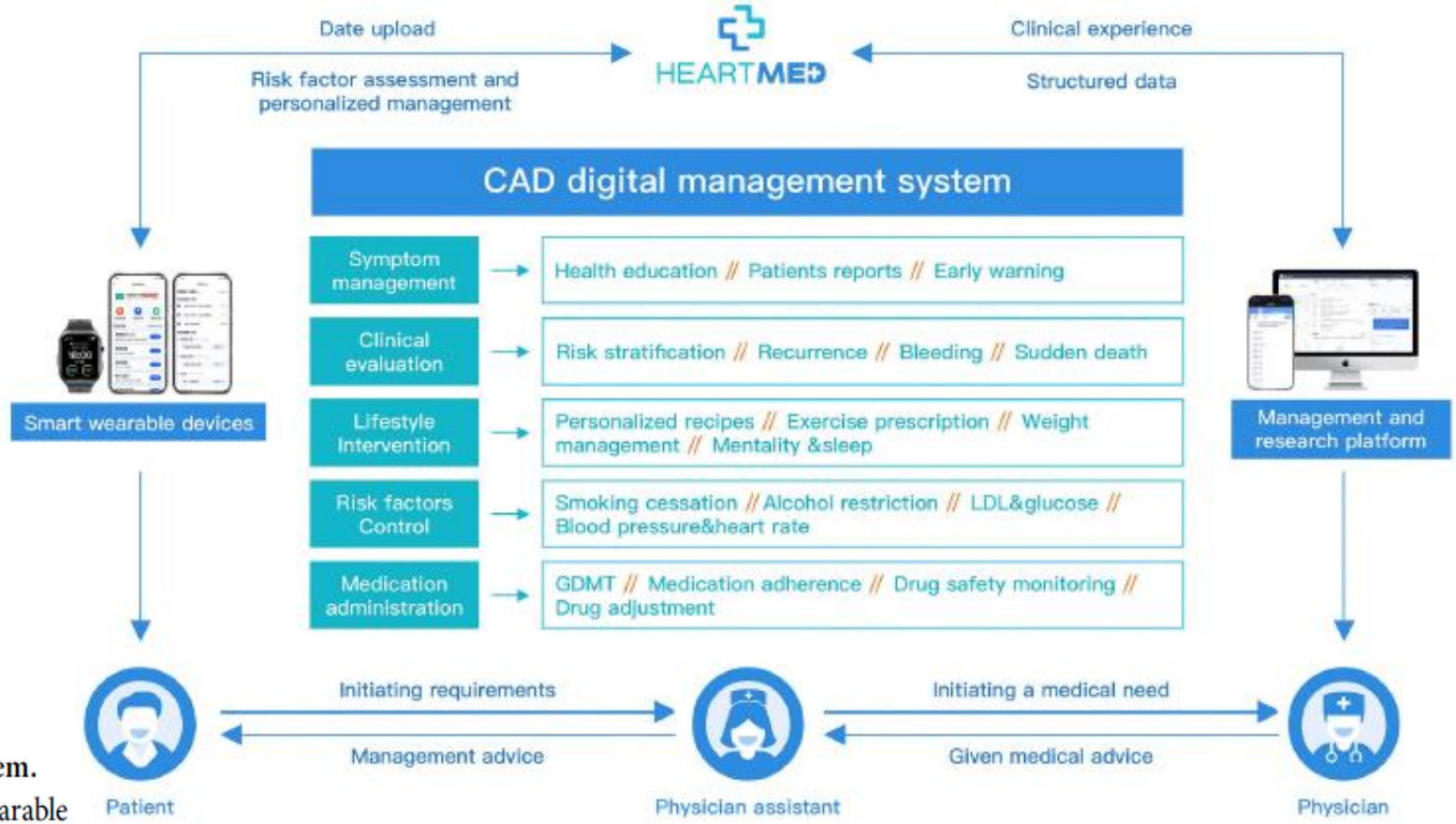


Fig. 3 | Operating diagram of heartmed medical digital management system. "Heartmed medical digital management system" integrates smartphones, wearable devices, and medical data platforms to achieve secondary prevention of coronary heart disease. Through bidirectional data transmission between participants and caregivers, the system facilitates the transmission of educational knowledge, real-time assessment of risk factors, personalized reminders for lifestyle changes and rehabilitation exercises, recording of medication usage, and reminders for follow-up appointments. The system simultaneously adjusts the health management status based on the risk stratification and providing personalized disease management plans.

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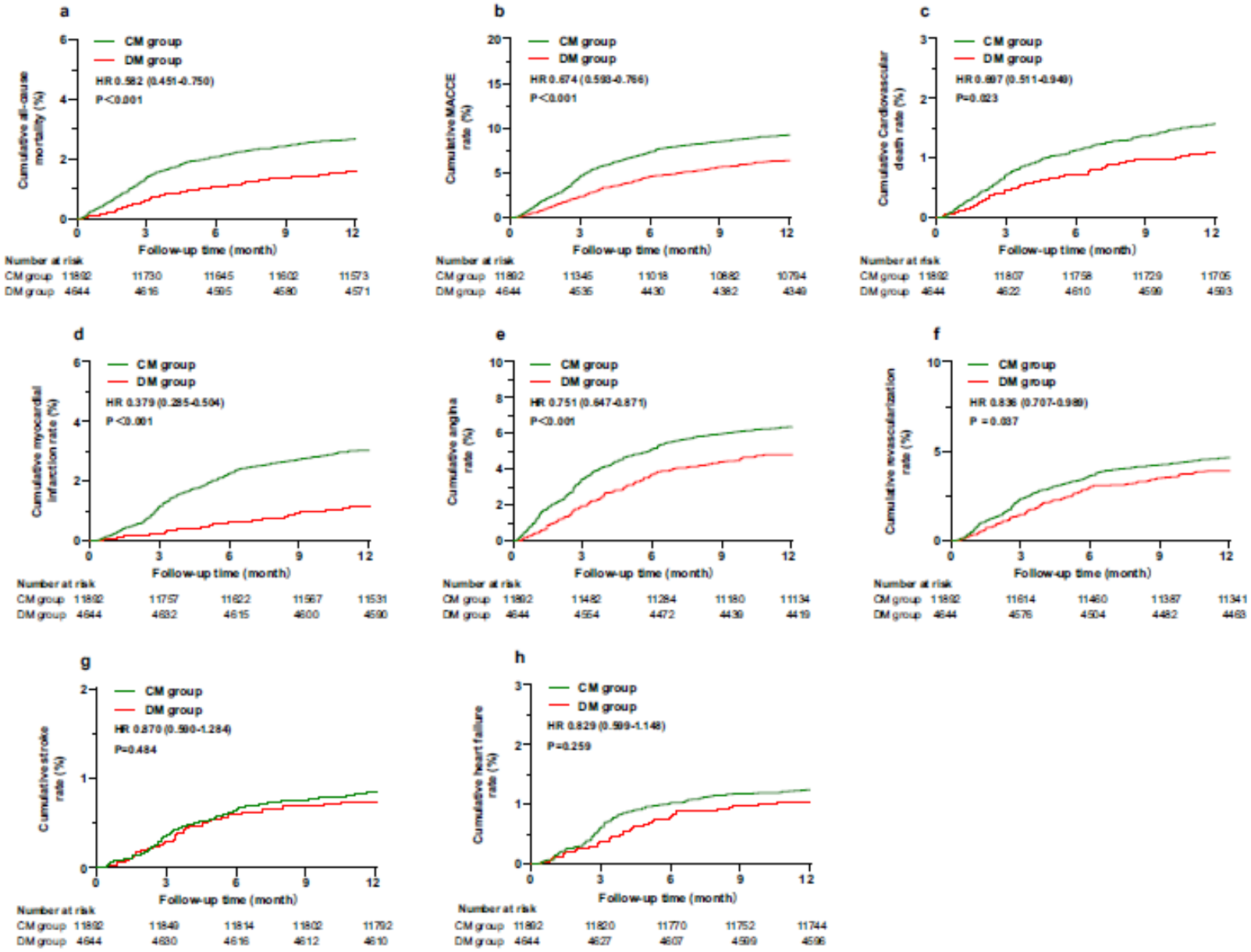
Post-discharge management of coronary artery disease (CAD) remains clinically challenging, with digital healthcare's efficacy underexplored. This study analyzed 16,797 CAD patients enrolled in the HeartMed Digital Management System (June 2018–September 2022), comparing outcomes between a digital management (DM, n = 4,713) and conventional management (CM, n = 12,084) cohort over 12 months. Cox models adjusted for confounders revealed significantly reduced all-cause mortality in the DM group (1.6% vs. 2.7%; HR 0.58, 95% CI 0.45–0.75, p < 0.001) and lower risks for major adverse cardiovascular events (MACCE: 6.4% vs. 9.2%; HR 0.67, 0.59–0.77, p < 0.001), cardiovascular death (HR 0.70, 0.51–0.95), myocardial infarction (HR 0.38, 0.29–0.50), recurrent angina (HR 0.75, 0.65–0.87), revascularization (HR 0.84, 0.71–0.99), and readmissions (HR 0.76, 0.68–0.84) (p < 0.05 for all). Digital healthcare demonstrates superior post-discharge optimization of CAD outcomes, significantly attenuating mortality and morbidity.

Table 5 | Endpoint events at 12-month post-discharge

Characteristic	Total	DM group	CM group	P value
Clinical events				
All-cause death	2.4%	1.6%	2.7%	<0.001
MACCE	8.4%	6.4%	9.2%	<0.001
Cardiovascular death	1.4%	1.1%	1.6%	0.021
Myocardial infarction	2.5%	1.2%	3.0%	<0.001
Recurrent angina	5.9%	4.8%	6.4%	<0.001
Revascularization	4.4%	3.9%	4.6%	0.039
Stroke	0.8%	0.7%	0.8%	0.483
Heart failure	1.2%	1.0%	1.2%	0.260
Readmission	11.1%	9.2%	11.9%	<0.001
Death + non-fatal MI + non-fatal stroke + readmission	12.8%	10.6%	13.6%	<0.001

MACCE composite endpoint event of all-cause death, myocardial infarction, revascularization, and stroke; *MI* myocardial infarction.



A New Era in Cardiac Rehabilitation Delivery: Research Gaps, Questions, Strategies, and Priorities

Alexis L. Beatty, MD, MAS; Theresa M. Beckie, PhD; John Dodson, MD; Carly M. Goldstein, PhD; Joel W. Hughes, PhD; William E. Kraus, MD; Seth S. Martin, MD, MHS; Thomas P. Olson, PhD, MS; Quinn R. Pack, MD, MSc; Haley Stolp, MPH; Randal J. Thomas, MD, MS; Wen-Chih Wu, MD; Barry A. Franklin, PhD

Circulation. 2023;147:254–266. DOI: 10.1161/CIRCULATIONAHA.122.061046

Circulation

CR has an important and positive effect for eligible patients with CVD. Because of disparities in access, referral, and participation, the benefits of CR remain largely unrealized by large numbers of eligible people. New innovations in delivery are needed to meaningfully improve access, participation, and outcomes. However, there are important questions remaining about how to make CR participation more accessible, affordable, and equitable so that every eligible person can receive the proven benefits.

…anziani e fragili, donne, residenti in zone rurali…
…vantaggi per i caregiver che non perdono giornate di lavoro…
…vantaggio in termini di sostenibilità ambientale…

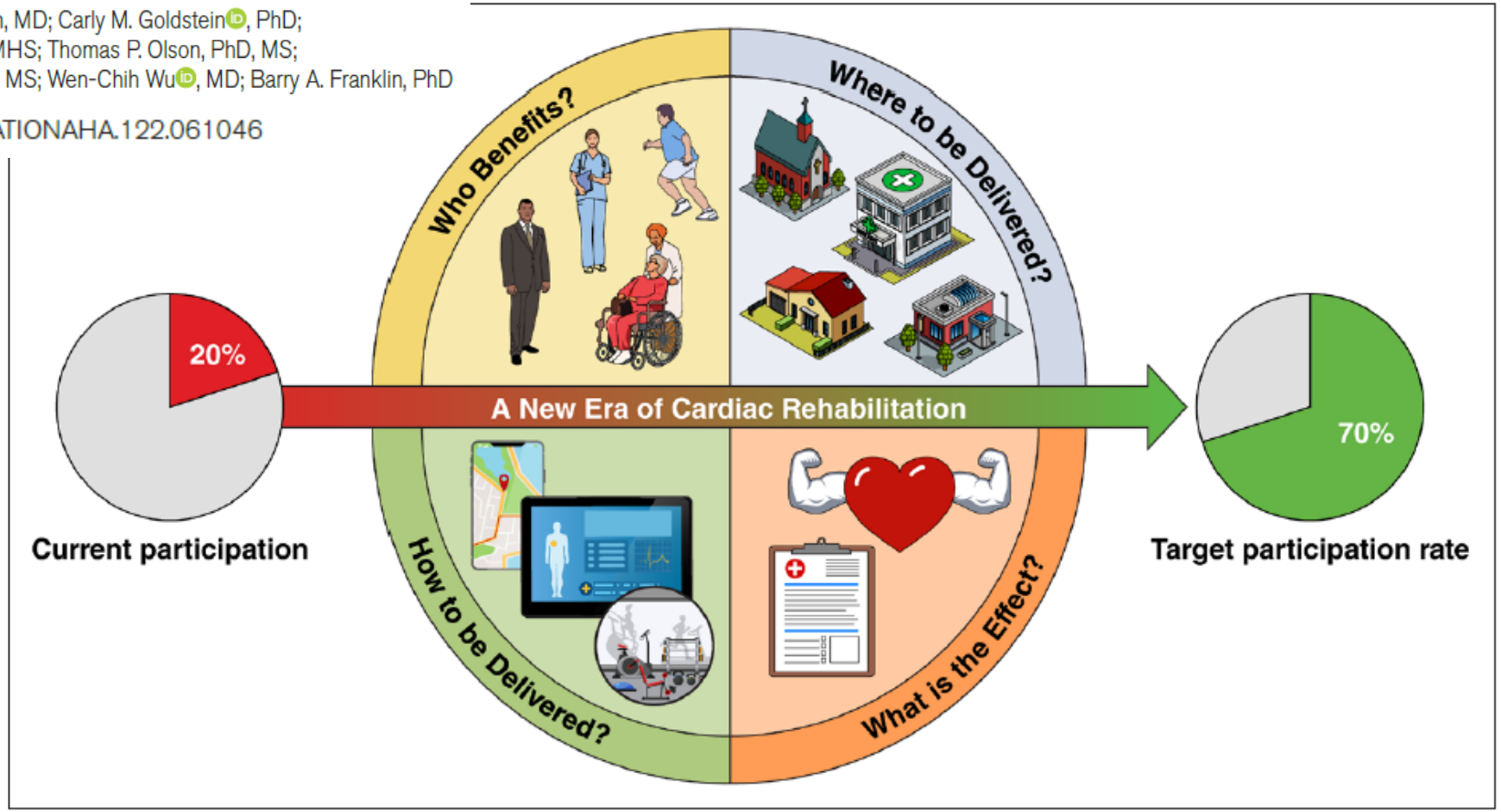


Figure 1. Remaining questions about virtual and remote cardiac rehabilitation.

Circulation

AHA SCIENCE ADVISORY

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EQUITY IN DIGITAL CR

The use of digital technologies in CR has the potential to improve health equity. However, rapidly advancing technology may also exacerbate the exclusion of sociodemographic subgroups or individuals with disabilities,[43] introduce digital biases, and paradoxically widen the digital divide.[44,45]

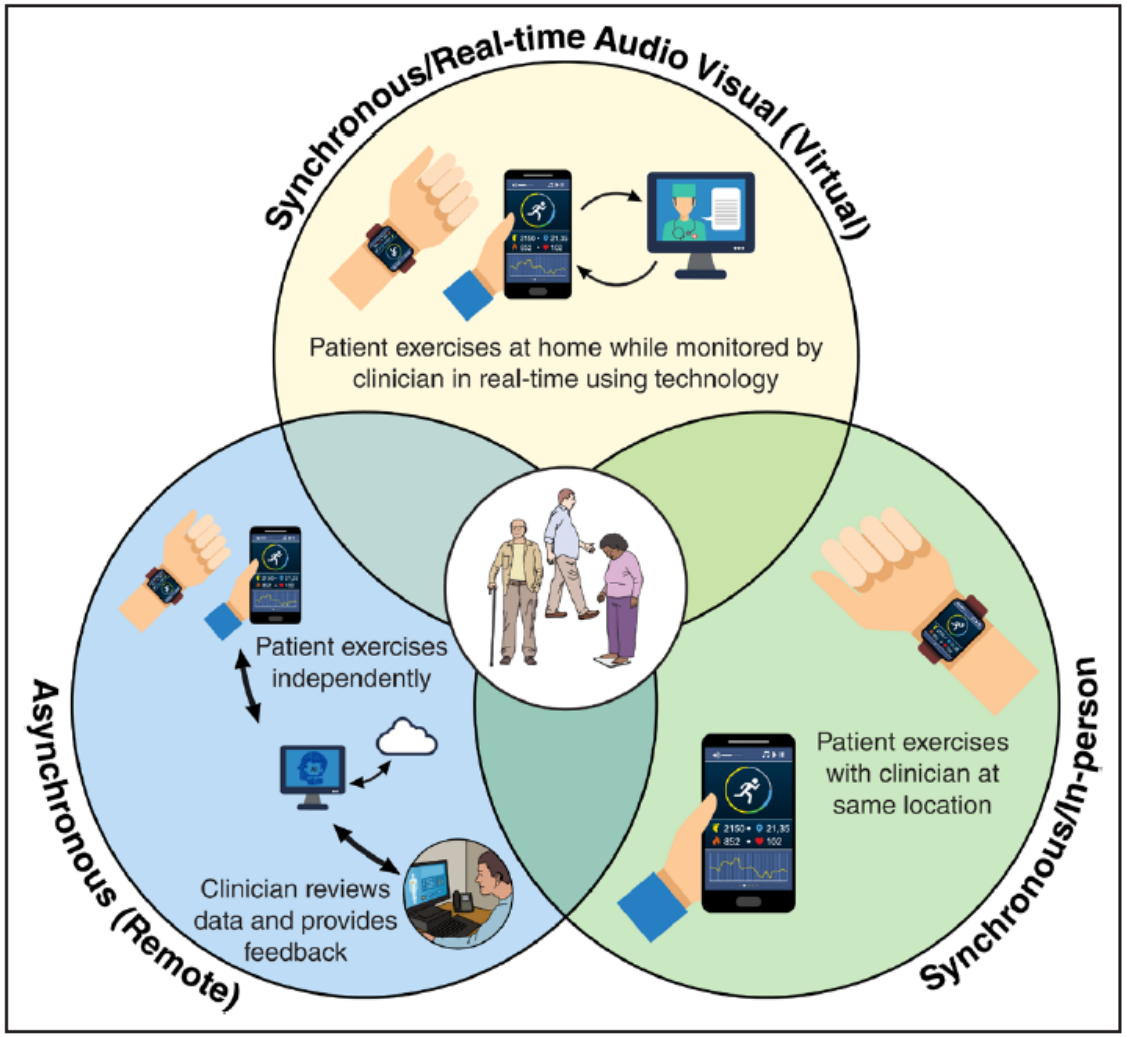

Figure 1. Digital technology and modes of CR delivery.
Diverse populations can use digital technology to support delivery of cardiac rehabilitation (CR) using various models and sites of care. Individuals can participate in CR using 1 or multiple delivery formats. In virtual CR, patients and clinicians are in different locations and use audiovisual communication to support monitored exercise in real time. In synchronous/in-person CR, patients and clinicians are in the same location (eg, hospital, community center), but CR delivery may be augmented through the use of digital technology. In remote CR, patients exercise independently and can use digital technology to monitor exercise and then transmit those data to clinicians for review.

Telehealth for Patients Experiencing Homelessness—An Unexpected Opportunity

Katherine A. Koh, MD, MSc; Travis P. Baggett, MD, MPH; Denise De Las Nueces, MD, MPH; Ateev Mehrotra, MD, MPH

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A perhaps surprising but consistent finding—that most individuals experiencing homelessness now own a mobile phone[2]—makes telehealth possible as a way to provide low-barrier care.

We work clinically at the Boston Health Care for the Homeless Program (BHCHP), which cares for 11 000 homeless-experienced individuals annually. In 2020, BHCHP pivoted to telehealth. Despite initial doubts, we found that it was feasible. In the first 6 months, 76% of behavioral health visits and 26% of medical visits were conducted via telehealth.

Why the success? A major reason for missed appointments among patients experiencing homelessness is the need for transportation; telehealth eliminates this need. Patients experiencing homelessness often focus on daily survival needs over health care; telehealth offers a lower barrier to access health care. Many patients experiencing homelessness struggle with loneliness and lack of regular contact with others; telehealth offers an easy avenue to increase interaction.

Telehealth care and remote monitoring strategies in heart failure patients: A systematic review and meta-analysis

Vittorio Masotta, Angelo Dante *, Valeria Caponnetto, Alessia Marcotullio, Fabio Ferraiuolo, Luca Bertocchi, Francesco Camero, Loreto Lancia, Cristina Petrucci

Heart & Lung - The Journal of Acute and Critical Care 64 (2024) 149–167

Meta-analyses confirm the hypothesis that telemonitoring strategies are effective in reducing both all-cause mortality and the number of patients rehospitalized when compared with usual care strategies. Evidence from studies included in the narrative analysis partially confirms the effectiveness of telemonitoring in reducing mortality and the number of rehospitalized patients during the various follow-up periods investigated, despite their methodological heterogeneity. The heterogeneity detected in the meta-analyses needs to be overcome by performing studies that contemplate the application of similar monitoring strategies and care interventions in populations with similar clinical characteristics.

Review

Digital Health Technologies for Post-Discharge Care after Heart Failure Hospitalisation to Relieve Symptoms and Improve Clinical Outcomes

Paweł Krzesiński

J. Clin. Med. **2023**, *12*, 2373

Table 1. Digital health technologies used in heart failure.

Telecare and remote disease management
• Video (tele) consultations, virtual visits, virtual wards; • Structured telephone support, automated voice response systems; • Transmission of information on symptoms and signs (e.g., apps); • Cardiac telerehabilitation; • Tele-education, remote psychological support.
Telemonitoring
• Invasive remote monitoring (e.g., CIEDs, haemodynamic implanted monitors); • Non-invasive remote monitoring of vital signs —standalone and wearable devices (e.g., blood pressure, heart rate, weight, oxygen saturation, electrocardiogram, volemia, glucose, activity).
Supporting digital tools
• Electronic medical records; • Electronic telemedicine platforms, cloud-based platforms; • Computer algorithms, machine learning, artificial intelligence (risk stratification, diagnosis, recommendation support).

Cochrane Library

Cochrane Database of Systematic Reviews

Structured telephone support or non-invasive telemonitoring for patients with heart failure (Review)

Inglis SC, Clark RA, Dierckx R, Prieto-Merino D, Cleland JGF

This review demonstrates that supporting people with heart failure at home using information technology can reduce the rates of death and heart failure-related hospitalisation. It can improve people's quality of life and knowledge about heart failure and self care. Most patients, even those who are elderly, learn to use the technology easily and are satisfied with these interventions.

Cosa ci riserva il futuro?

- **Superarci negli stessi compiti che ci definiscono**
- **Svolgere compiti che non possiamo nemmeno comprendere**

Cfr. ASI, Artificial Super Intelligence o Intelligenza Artificiale Sovrumana)

Aumento della massa dei dati raccolti, della precisione con cui vengono raccolti, possibilità di esplorare domini e parametri cui noi non possiamo accedere, creazione di un enorme data base, possibilità di trasmissione di tali dati....

A New Era in Cardiac Rehabilitation Delivery: Research Gaps, Questions, Strategies, and Priorities

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Circulation. 2023;147:254–266. DOI: 10.1161/CIRCULATIONAHA.122.061046

With respect to the goal of teaching patients to apply their knowledge to real-world situations, innovative delivery methods may have the inherent advantage of greater ecological validity than traditional center-based CR. For example, during nutritional counseling, participants could show the dietician their kitchen and the contents of their refrigerator and pantry. Registered dieticians remotely observing the patient's living environment may be able to make observations and suggestions, which may be more readily adopted given the power of learning in the context in which the knowledge will be applied.

Futuro distopico

O tempora o mores, ovvero «del perché ci stiamo estinguendo»

I mangiatori di patate, 1885,
Amsterdam, olio su tela

o Futuro dispeptico?

Il mangiatore di patate, 2025,
Amsterdam, olio di semi

Rilevatore di grassi saturi