

World Heart Federation Roadmap on cardiac rehabilitation: a pathway to lifelong cardiovascular health

Julie Redfern^{1,2}✉, Randal J. Thomas³, Tom Briffa⁴, Lilian Mbau⁵, Robyn Gallagher², Dion Candelaria², Irene Gibson⁶, Wen-Chih Wu⁷, Alexis Beatty⁸, Gabriela L. M. Ghisi⁹, Alice Namanja¹⁰, Dawn Scantlebury¹¹, Abraham Samuel Babu¹², Giuliano Gardenghi¹³, Yihong Sun¹⁴, Aashish Contractor¹⁵, Ana Abreu¹⁶, Roque Daniel González¹⁷, Pat O'Donnell¹⁸, Rongjing Ding¹⁹, David Wood²⁰ & Sidney C. Smith Jr²¹

Abstract

With an ageing population and the persistence of unhealthy lifestyle behaviours, health-care systems are challenged by a growing number of individuals living longer with cardiovascular disease and its sequelae. The evolution of cardiac rehabilitation, from a group exercise-based programme to encompassing all aspects of secondary prevention, has led to the ultimate objective of achieving lifelong cardiovascular health for all. In this World Heart Federation Roadmap, we present a united and forward-looking vision to consolidate global and collaborative efforts that enhance equitable access, improve patient outcomes and ensure value-based health care. The Roadmap outlines a reframing of terminology and interconnected solutions founded on unity, person-centredness and being future-focused. The five key roadblocks and widely applicable solutions are interlinked and include having a greater emphasis on lifelong cardiovascular health, better engagement among patients and clinicians, a greater emphasis on new models of care, workforce strengthening and support for strong advocacy and policy. We present a series of practical solutions and successful international case studies. The next steps are to facilitate local and regional implementation and evaluation strategies. A shift to systems, policy and advocacy thinking is crucial for the sector, with a view to long-term investment to meet growing demands. This World Heart Federation Roadmap is endorsed by the International Council of Cardiovascular Prevention and Rehabilitation.

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- Health-care systems are now challenged with a growing number of individuals living longer with cardiovascular disease and its sequelae.
- The evolution of cardiovascular rehabilitation from being exercise-based to encompassing all aspects of secondary prevention has led to the ultimate goal of achieving cardiovascular health for all individuals who are eligible.
- This Roadmap presents a united and forward-looking vision to consolidate efforts that increase equitable access, improve patient outcomes and ensure value-based health care.
- The interconnected solutions addressing the five key roadblocks are grounded in unity, person-centredness and a future focus: adopting a lifelong approach to cardiovascular health, increasing programme engagement, implementing flexible care models, strengthening the workforce and advancing advocacy and policy.
- The next steps are to facilitate local and regional implementation plans, together with an evaluation framework; a shift towards systems, policy and advocacy thinking is crucial for the sector, with a view to long-term investment to meet growing demands.

Introduction

Cardiovascular disease (CVD) remains the leading cause of death worldwide, accounting for ~15.6% of all disease burden¹. Over the past century, considerable advances have transformed the management of CVD, with improved diagnostics, arterial revascularization techniques, protective pharmacotherapies and multidisciplinary care^{2,3}. These advances have led to more individuals surviving initial cardiac episodes, with shortened stays in hospital⁴. However, with ageing populations and the persistence of unhealthy lifestyle behaviours (owing to complex individual, social and population factors), health-care systems are now challenged by the growing number of individuals living longer with CVD and its sequelae³.

Historically, cardiac rehabilitation programmes have been the cornerstone for providing structured care that is integral to initiating comprehensive secondary prevention for CVD^{2,3,5}. These programmes originated >50 years ago as group-based exercise and education sessions, which patients attended multiple times per week for ~6–12 weeks⁶. The model of care has evolved over time to now have a greater focus on supporting patients with their overall physical and psychosocial recovery^{7,8}. Core components of typical programmes include patient assessment, monitoring and review; multidisciplinary team involvement; CVD and risk factor management (including diet, body weight, blood pressure, lipid levels, glucose levels and smoking status); graduated exercise and strength training; and evaluation of programme quality⁵. Substantial scientific research has highlighted the benefits of cardiac rehabilitation^{7,9,10}, including improved functional capacity, quality of life, adherence to preventive medications and CVD risk factor control, as well as a reduced risk of re-infarction and hospital admissions, with favourable cost-effectiveness^{7,9,11,12}.

Programmes vary in terms of comprehensiveness, dose and delivery model, with multiple factors contributing to the variation,

including health system funding models^{13,14}. Unfortunately, although major international guidelines strongly recommend cardiac rehabilitation for individuals with CVD^{15–19}, research consistently shows that survivors have unacceptably poor rates of referral (30% of eligible individuals)²⁰, attendance (9% of eligible individuals) and completion (<5% of eligible individuals)²¹. Furthermore, adherence to evidence-based medications and lifestyle improvements typically decline within 6 months of an acute event²² and are rarely sustained^{23,24}. Moreover, services are frequently under-resourced and lack universally agreed standards and quality measures, resulting in disparities between and within countries, regions and populations²⁵.

Transformation of the sector is needed. Ongoing improvements require greater person-centredness, continuity in care, flexibility and consideration of financial feasibility, especially given the growing numbers of individuals living with the sequelae of all manifestations of CVD^{3,26}. Learning points from our co-workers working in cancer care demonstrate how they have embraced the importance of survivorship care to emphasize lifelong well-being for individuals with cancer²⁷. Consequently, global leaders have proposed five organizational areas (the 5Ps) for improving lifelong cardiovascular health: personalization, processes (and systems) improvement, patient-centred care, parlance and partnership involving unified advocacy³. In this context, global experts came together to develop this Roadmap on cardiovascular rehabilitation as a pathway to lifelong cardiovascular health, under the auspices of the World Heart Federation (WHF). The overarching purpose of WHF Roadmaps is to present a united and forward-looking vision to consolidate efforts that enhance equitable access, improve patient outcomes and ensure value-based health care. The proposed solutions form part of the WHF commitment to improving global cardiovascular health and contributing to the United Nations' Sustainable Development Goals²⁸. This Roadmap is endorsed by the International Council of Cardiovascular Prevention and Rehabilitation (ICCPR).

Processes and methodology

This Roadmap was developed based on a three-stage iterative process encompassing a global survey, a global forum and the formation and preparation of the Roadmap by an international expert writing group. Ethics approval was obtained for the survey and global forum from the University of Sydney Human Research Ethics Committees (2024/HE000426).

Global survey

In July 2024, a survey was conducted to gather diverse perspectives on the challenges and enablers in the delivery of, and engagement with, cardiovascular health programmes globally, focusing on the reach and uptake of the programmes. The nine-item, anonymous survey targeted clinicians and experts in the field and was distributed via professional networks and social media accounts of the ICCPR and SOLVE-CHD networks. The survey included demographic and open-ended questions on professional experience, opportunities for global unity and strategies to improve programmes and care. Data were collected via REDCap and analysed descriptively and thematically.

In total, 327 responses were received from individuals with medical, allied health, nursing, research and consumer expertise ('Supplementary Material 1' in the Supplementary Information). Respondents reported varying years of experience: >11 years (55%), 6–10 years (23%) or 0–5 years (22%); represented 50 countries; and were from diverse

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geographical regions, including Africa, the Eastern Mediterranean, the Americas, Europe, South-East Asia and the Western Pacific. Approximately half of respondents worked in a hospital setting (51%), with others working in public or private practice (45%), community (19%) or other (18%) organizations. Synthesized strategies based on the results of the survey are presented in 'Supplementary Material 2' in the Supplementary Information.

Global Forum

After the online survey, an in-person Global Cardiac Prevention and Rehabilitation Forum (the 'Global Forum') was held on the 29 August 2024 in London, UK. The aim was to build on the survey findings through focused discussion of key challenges and strategies and to mobilize and unite the international cardiac rehabilitation community. Potential participants were identified via the ICCPR and SOLVE-CHD networks, and invitations were sent to all ICCPR member organizations, with the opportunity to nominate a representative.

An organizing committee planned the logistics, agenda, speakers and structure of the in-person Global Forum, with added input from a broad advisory group of global experts. The Global Forum included sessions focused on discussing and identifying practical and feasible strategies that improve global collaboration and unity, thereby elevating cardiovascular health and rehabilitation quality and outcomes, plus identification of cross-cutting themes and prioritization of findings. In total, 52 global experts and emerging leaders attended ('Supplementary Material 3' in the Supplementary Information), representing >40 organizations (including the WHF) and 20 countries across all WHO regions²⁹.

The survey and Global Forum responses and discussions highlighted various potential strategies to facilitate global unity and to improve programme reach and quality:

- The development, dissemination and implementation of global standards to support best practice.
- The establishment of recognized accreditation or certification processes and systems to support quality and standards.
- The creation of a global database to enable benchmarking, research and quality improvement.
- Clinician training and education programmes, especially in low-resource settings.
- The integration of timely referrals and digital technologies to enhance accessibility and monitoring.
- Increased awareness and advocacy for the importance of multi-disciplinary team capacity building and promotion of the benefits of structured cardiovascular health programmes among patients, clinicians and policymakers.

Formation and preparation of the Roadmap by an international expert writing group

After the successful Global Forum, the WHF commissioned a writing group to develop the Roadmap. A public call for expressions of interest ensured broad and diverse representation. A multidisciplinary writing group was then appointed, representing various regions, skills and multidisciplinary expertise, including consumer and community involvement.

The writing group worked collaboratively through in-person, online and electronic communications. At the initial meeting, it was determined that the target audience for the Roadmap would include health-care practitioners, policymakers, health system administrators, individuals living with CVD, advocacy organizations and international

health entities; that it would have a global focus; and that it would include practical solutions and exemplary case studies. The writing group agreed that the Roadmap would focus on CVD and add value to previous WHF Roadmaps (including those focusing on secondary prevention³⁰, digital health³¹ and hypertension³²).

Roadblocks and solutions

Five interconnected roadblocks (Fig. 1) were identified through the synthesis of results and input from the global survey, Global Forum and consensus discussions of the writing group. The proposed solutions (Fig. 1 and Box 1) are founded on the themes of unity, person-centredness and future focus and are intended to be adaptable to varying contextual, geographical and resource circumstances.

Roadblock 1: short-term focus with a lack of emphasis on lifelong cardiovascular health

Approximately six decades ago, bedrest was the standard of care after a myocardial infarction, but research started to show that light activity was safe, and the concept of 'rehabilitation' emerged as a strategy for so-called cardiac patients to overcome physical deconditioning². The term implies a focus on cardiac diagnoses and the need to 'rehabilitate' individuals during a finite period of recovery, rather than the promotion of lifelong cardiovascular health. The original term has become outdated, and a broader vision is for programmes to ensure a lifelong journey to cardiovascular health and self-management for all individuals with any form of CVD diagnosis, including peripheral and cerebrovascular disease as well as cardiac disease^{3,26}. Focusing solely on rehabilitation using short-term terminology could, in common parlance (one of the 5Ps)³, negatively affect engagement by patients, clinicians and policymakers³³.

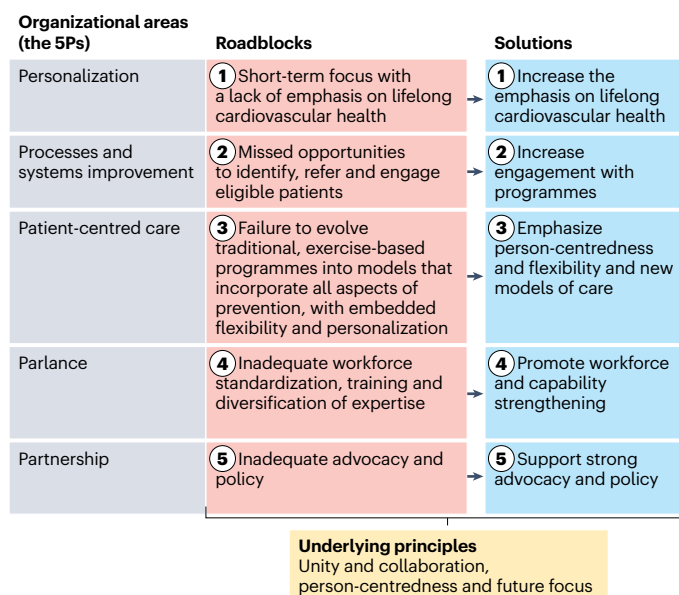


Fig. 1 | Five interlinked roadblocks and proposed solutions to improve cardiovascular health programmes. The five roadblocks align with five organizational areas (the 5Ps) for improving lifelong cardiovascular health³. The solutions include having a greater emphasis on lifelong cardiovascular health, better engagement among patients and clinicians, a greater emphasis on new models of care, workforce strengthening and support for strong advocacy and policy.

Box 1 | Cardiovascular health programme roadblocks and potential solutions

Roadblock 1: short-term focus with a lack of emphasis on lifelong cardiovascular health

- Reframe cardiac rehabilitation as an entry point to lifelong cardiovascular health;
- Integrate cardiovascular health programmes into protocols and services for management of chronic diseases;
- Apply marketing principles to cardiovascular health.

Roadblock 2: missed opportunities to identify, refer and engage eligible patients

- Implement automated referral systems and pathways;
- Activate nursing and allied health staff to initiate referral and engagement with programmes;
- Build awareness of, and support for, lifelong cardiovascular health among physicians who care for patients with cardiovascular disease;
- Build awareness in patients and families of the availability, purposes and benefits of participation in a cardiovascular health programme.

Roadblock 3: failure to evolve traditional, exercise-based programmes into models that incorporate all aspects of prevention, with embedded flexibility and personalization

- Deliver systematic, personalized care early after a cardiovascular event;

- Demonstrate value and accelerate adoption of new models of care (including the ‘hub-and-spoke’ model, in which well-resourced, large tertiary centres support regional centres with fewer resources);
- Establish broadly recognized standards and certification processes for centres;
- Develop and implement care models that deliver contextually relevant, high-quality outcomes.

Roadblock 4: inadequate workforce standardization, training and diversification of expertise

- Ensure access and availability of high-quality training and education;
- Implement at least the minimum composition and expertise of staff required to deliver high-quality programmes;
- Facilitate learning and skill building through success stories and networking.

Roadblock 5: inadequate advocacy and policy

- Collaborate with a united, international ‘voice’ to advocate for policies that support high-quality programmes;
- Integrate lifelong cardiovascular health into clinical practice guidelines;
- Identify and implement effective methods to lobby policymakers for resourcing and investment.

Solutions to increase the emphasis on lifelong cardiovascular health

Reframing the terminology from ‘cardiac rehabilitation’ to a ‘cardiovascular health programme’ aims to emphasize a longer-term approach to care for lifelong well-being. Henceforth, the target population for the recommendations in this Roadmap is not limited to individuals with coronary artery disease but also includes other manifestations of CVD, such as peripheral vascular disease, heart failure, stroke, atrial fibrillation and myocardial infarction with non-obstructive coronary arteries. Therefore, we have broadened the scope of the 1993 WHO definition³⁴ of cardiac rehabilitation, with the aim of placing a greater emphasis on each individual’s journey towards lifelong cardiovascular health as follows: ‘A cardiovascular health programme is the systematic provision of ongoing care and support for individuals with, or at elevated risk of, CVD, which in combination with all aspects of evidence-based prevention and rehabilitation will lead to lifelong cardiovascular well-being. Care should be person-centred and encompass all aspects of lifestyle optimization, clinical management of risk factors, psychosocial support, and adherence to guideline-directed medical therapy’.

Reimagining and promoting cardiovascular health programmes as an entry point to lifelong cardiovascular health is important for the future. We propose that programmes should include consistent messaging and education about starting an ongoing self-management journey. This change creates an opportunity to expand the awareness and meaningfulness of programmes to more individuals and beyond the finite period of rehabilitation. The reframing should ideally be promoted by all members of the care team (including physicians) and stakeholders, including patient-led groups. That is, support and care should continue after the completion of traditional programmes

through community-based programmes, peer-support groups and the inclusion of caregivers. Importantly, messaging should also take a family-based approach, particularly in collectivist cultures in which dietary and lifestyle choices are shared within households.

Structured, lifelong cardiovascular health programmes should be integrated into the management of chronic diseases, and indications for programmes should be extended to include all individuals with CVD¹⁸. Rather than treating these programmes as isolated interventions, governments and ministries of health should invest in scalable models, such as community-led support groups, workplace-based health promotion and health system digital follow-up tools (see the case study from Malawi (Box 2)). Health-care services should consider incorporating the WHO ‘Best Buys’ (proven health-promoting actions that the WHO considers save the most lives for the lowest cost)³⁵ for lifestyle interventions at the national and programme levels – for example, harmonized national public health and policy campaigns targeting tobacco control, physical activity and psychosocial well-being. Other practical examples include embracing community initiatives involving peer-support and community-led exercise groups, such as ParkRun³⁶ and HealthPark³⁷, whereby healthy living behaviours are adopted through public parks.

Applying marketing principles to cardiovascular health programmes could support the reframing to expanded indications with a lifelong focus³⁸. A key principle is connecting with the target audience – patients might be influenced by patient success stories, whereas health system leaders might be influenced by evidence of improved patient satisfaction or return on investment³⁹. Marketing toolkits for programmes could leverage social media, storytelling (such as via podcasts), patient testimonials (shared via brochures, infographics

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and news articles) and community ambassadors. Marketing strategies should highlight the potential benefit compared with the use of medications⁴⁰ and the cost-effectiveness⁴¹. The US-based Million Hearts Cardiac Rehabilitation Collaborative⁴² offers a practical example whereby linked but customizable marketing materials advocate for greater support from health system leaders and encourage clinicians (including cardiologists and primary care clinicians) both to refer patients to programmes and to endorse participation.

Roadblock 2: missed opportunities to identify, refer and engage eligible patients

Early periods after diagnosis or during an episode of cardiovascular care offer a valuable ‘teachable moment’ for time-sensitive engagement⁴³. After a cardiovascular event, many patients are not referred to, or made aware of, management strategies that could improve their cardiovascular health and reduce the risk of future events²⁰. Language barriers, culture, poor health literacy and comorbidities can also complicate health education and uptake of the programme during a short-term period of care^{43,44}. Moreover, physicians often do not refer patients to programmes because of time constraints and a lack of awareness of the benefits and importance of participating in a cardiovascular health programme^{45,46}. At a system level, shorter stays in hospital (because of contemporary strategies such as percutaneous coronary intervention), a lack of integrated referral systems and the absence of standardized electronic records present challenges for initiating education and planning for comprehensive discharge from hospital⁴⁷.

Solutions to increase engagement with programmes

Well-informed, face-to-face clinician referrals and educational engagement with patients and their families during admission to hospital provide effective methods to overcome a lack of awareness, knowledge and understanding of the benefits of participation in a structured programme after the acute care period⁴⁶. Creating structured clinical pathways (see the case study from India (Box 3)) that leverage automated processes can overcome clinical inertia caused by short stays in hospital and varied levels of awareness by health-care professional (including knowledge of programme effectiveness as well as language and cultural discordance)⁴⁷. Furthermore, the inclusion of referral and enrolment rates as quality metrics and mandatory reimbursement reporting would facilitate systematic incentivization⁴⁸.

Capacity building and workforce strengthening (further addressed in roadblock 4) will improve training and awareness of programmes and optimize messaging to patients early after diagnosis and during acute care. This approach includes activating nursing and allied health staff to be able to refer patients and initiate access to a cardiovascular health programme through task-shifting to non-physician staff for delivery of patient education and timely referral. Importantly, identifying and engaging patients to ensure lifelong cardiovascular health is at the forefront during all stages of care and should be the responsibility of the entire cardiac care team. Strengthening interdisciplinary links, engagement and communication between hospital staff and outpatient programmes is also crucial to improve awareness and integration of care throughout the patient journey.

Building clinician awareness about the importance of lifelong cardiovascular health beyond an inpatient admission – and for eligible individuals who are not admitted to hospital – is vital. Awareness should be enhanced via the continuous education of physicians (including interventional cardiologists and primary care providers), nursing, allied health staff and students^{49,50}. Education should also

include training in telehealth technologies, emphasizing the importance of flexible delivery, as outlined in roadblock 3. This education should also be incorporated into local and national guidelines combined with undergraduate and postgraduate curriculums (including medical, nursing and allied health). Collection and sharing of data on local patient outcomes after an episode of cardiovascular care can also increase physician awareness and their understanding of the benefits.

Building of patient awareness via structured educational sessions, videos or apps to initiate engagement with a cardiovascular health programme during hospital stays could help to overcome knowledge barriers to enrolment^{51,52}. These awareness-building strategies should be tailored to different language and health literacy levels to ensure clarity and meaningfulness. Practical strategies for raising awareness could include educational posters, pamphlets, media (such as radio, television and social media) and community events and support groups by leveraging community volunteers. Importantly, public messaging should be contextualized to target various cultural and potentially disadvantaged groups⁴⁴.

Roadblock 3: failure to evolve into models with embedded personalization

Numerous barriers contribute to the low uptake of traditional cardiac rehabilitation programmes. These include, but are not limited to, individual factors (such as age, sex and gender, motivation, comorbidities

Box 2 | Case study from Malawi

Combining hospital-based and home-based or community-based care into an integrated cardiovascular health programme using a train-the-trainer approach

Malawi introduced a structured approach to cardiovascular health in 2020, with a combined hospital-based and home-based programme⁵⁹.

- With minimal resources, informal caregivers (typically household family members of individual patients) were trained to deliver exercise using sandbags, resistance bands and stepping boxes or similar, as well as lifestyle advice on healthy eating, being active and being less sedentary. Patients accessed hospital-based exercise sessions once weekly, coupled with two home-based sessions for 12 weeks.
- In parallel, advocacy and championing of the programmes are ongoing by Ministry of Health-employed health surveillance assistants, who serve as community-based facilitators. The goal is to better integrate hospital-based and home-based components, allowing patients to attend occasional hospital visits for assessment and treatment review, while fostering peer support and regular engagement in their own communities.
- Similar models have also been established for individuals with respiratory disease or infection with human immunodeficiency virus, many of whom also have cardiovascular disease.
- Following its initial success, the Ministry of Health in Malawi has since trained and continues to support nearly 60 additional health-care workers (physiotherapists, clinicians, nurses and social workers) nationwide on this model, delivering >15 new programmes.

Box 3 | Case study from India

Introducing a management algorithm for myocardial infarction

In 2017, the Cardiology Society of India created management algorithms for patients with ST-segment elevation myocardial infarction as part of the national guidelines to improve cardiovascular care⁸⁹.

- The clinical algorithm supports referral to a local cardiovascular health programme, with sequential progression of care during the inpatient stage of acute care. This algorithm ends with important functional assessments and risk stratification being performed.
- The algorithm also includes an option for a home-based or supervised outpatient programme.
- The algorithm was found to be feasible to implement and achieved functional goals safely at a tertiary care teaching hospital⁹⁰. The treatment algorithm did not place an undue burden of time on the treating health-care professional and had good acceptance among low-risk to moderate-risk patients undergoing percutaneous coronary intervention⁹⁰.

and personal preference), environmental challenges (such as low social support and rural location), logistical issues (such as distance, transportation and scheduling) and systemic obstacles (such as cost, insurance coverage and referral processes)^{44,53–56}. Programmes often overlook language, culture, health literacy and flexible delivery formats, resulting in inequities and suboptimal reach. System-level issues such as fragmented care, inadequate resources, limited funding and poor technology infrastructure impede personalized delivery. Greater emphasis on personalization and person-centred care through flexibility is needed (addressing several of the 5Ps – personalization, process improvement and patient-centred care)³.

Solutions to emphasize person-centredness and flexibility and new models of care

Cardiovascular health programmes should ideally deliver personalized care and adopt a case-management approach to ensure a person-centred approach to cardiovascular health⁵⁷. This approach should involve a multidisciplinary team⁵⁸ and enable patient choice in care planning^{59,60}. Leveraging community resources and embracing cultural adaptation will help to optimize access and relevance for all who can benefit^{47,61}. Practical examples include exercise being delivered via yoga or dance that can be practised at home without equipment, instead of via gym-based sessions using equipment such as treadmills and exercise bikes⁶². Importantly, personalized care planning should equally consider all the relevant risk factors for CVD for each individual (rather than exercise alone), including psychosocial health and social determinants of health³. Collection and utilization of patient-reported outcome and experience measures (with real-time feedback loops) can align care plans with an individual's life context, health literacy and cultural background, as well as enhance shared decision-making and improve the overall quality of care^{3,63}.

Accelerating new models of care includes offering varied formats and structures, which include offering telehealth, digital and home-based models, or a combination (hybrid) approach that combines in-person and digital components to increase

flexibility and engagement^{18,60,64–66}. Importantly, digital delivery and any potential use of artificial intelligence require the inclusion of core components¹⁸, access to a multidisciplinary team⁵⁸ and consideration of digital literacy, including the availability of suitable equipment^{64,67,68}. The secondary prevention for all in need (SPAN) framework offers an approach to deliver the standardized components of care: assessment, education, personalized care planning and follow-up⁶⁹. Establishment of 'hub-and-spoke' models also offers a new approach in which large tertiary centres (hubs) with a full complement of multidisciplinary staff support regional satellite centres (spokes) with fewer resources. The spoke centres are supported through training placements, case meetings and support consultations that can be delivered in person or using digital technology (see the case study from Argentina (Box 4)).

Simple and accessible data-capture systems and processes should be made available to enable consistent, user-friendly and locally adaptable data collection that informs quality indicators^{5,39,70}. Systems require the implementation of standardized protocols, digital reporting dashboards, and education and training for staff and patients to optimize data collection, reporting and usability^{71,72}. Systems should meet relevant regulatory requirements, consider culture⁷³ and include reporting and feedback loops between outpatient programmes and clinicians in various health-care settings (such as primary and community care)⁷⁰. Frameworks such as plan–do–study–act⁷⁴ and lean⁷⁵ could be used to guide data-driven improvement. The National Audit of Cardiac Rehabilitation (NACR) in the UK offers an example of successful improvement⁷⁶. The NACR is now a key part of the UK Government Research Excellence Framework. NACR promotes best practice and improves service quality by providing local and national planners and policymakers with data about service

Box 4 | Case study from Argentina

The Tucumán Provincial Cardiovascular Health Network

Despite being the smallest and most densely populated province in Argentina, Tucumán had no structured public cardiovascular health programmes until 2024. With the aim of making this service more accessible, the provincial government launched the provincial programs, not only in the capital city but also throughout the province⁹¹. By the end of 2024, three of the five planned centres were operational, with the other two in development.

- Cardiovascular programmes were established in three high-complexity hospitals (the 'hubs' in the hubs-and-spokes model of care) with greater resource availability, and in two peripheral nodes (the 'spokes') with more limited infrastructure. A working model was initially proposed, but each node was given the flexibility to adapt the model based on available resources, professional preferences and patient needs.
- To improve referrals and ensure a timely transition after discharge from hospital, a series of educational talks were introduced for medical staff, supported by social media and press outreach. Emphasis was also placed on starting programmes during hospitalization.
- The outpatient phase includes 8 weeks of supervised exercise and psychosocial support. To improve adherence, incoming patients were provided with temporary disability certificates, granting them free access to public transportation.

quality, inequalities, workforce requirements and achievement of key performance standards.

Roadblock 4: inadequate workforce standardization, training and diversification of expertise

Fundamental to the delivery of comprehensive cardiovascular health programmes is having a multidisciplinary team that includes clinicians with expertise in cardiovascular care and in subspecialty areas⁵⁸. These areas of expertise include capability in behaviour change, exercise, nutrition, psychosocial well-being and pharmacotherapy. Inevitably, there will be new and less-experienced staff employed, turnover of staff and changes in expertise needed (for example, in response to new technology and evidence); therefore, capacity building is essential. Barriers are multidimensional and might include geographical limitations, a lack of standardization and recognized training, and/or a lack of data that establishes the workload need, combined with a widespread shortage of dedicated funding for staff compared with those working in acute care.

Solutions to promote workforce and capability strengthening

Health systems should offer access to, and availability of, training related to cardiovascular health. This training could include the implementation and monitoring of national standards for workforce training. Clinicians already working in the field should receive adequate training in processes to ensure skill maintenance and in flexible delivery models, including remote, digital and culturally competent care^{77,78}. Training should also include education about the importance of personalization, lifelong cardiovascular health³, telehealth and digital options, and other solutions proposed in roadblocks 1–3. Success has been achieved in Australia, where the Australian Cardiovascular Health and Rehabilitation Association together with the SOLVE-CHD research programme are rolling out national clinician certification⁷⁸, with the aim of having at least one staff member with minimal or foundation qualifications at ≥50% of programmes.

Depending on local resources, clinical teams should be as multidisciplinary and complete as possible (see the case study from Barbados (Box 5)). In low-resource settings, programmes should include a nurse and physiotherapist trained in structured cardiovascular health, supported by a general practitioner (or physician), with referral available to other expertise (such as a dietitian or psychologist) as needed. In intermediate-resource settings, programmes should involve a medical specialist, registered nurse, and staff capable of exercise training and evaluation⁷⁹. In high-resource settings, programmes should include a full multidisciplinary team with suitable training, including a cardiologist, nurse, and physiotherapist or exercise physiologist, together with direct access to team members from other relevant fields, such as dietetics, psychology, social work, pharmacy and occupational therapy⁵. Expanding programme capacity to include trained community health workers or peer mentors can further support follow-up care and sustainability⁷⁹. Across all settings, staff should be trained in cardiopulmonary resuscitation⁷⁹.

Learning and skill-building should be ongoing. Strategies include establishing regular national and regional workshops to discuss issues, developing and disseminating case study success stories and celebrating successes. Workshops should include clinicians, consumers, carers, lay health workers, stakeholders (such as hospital administrators and policymakers) and insurers. Shared learning could include collaborating with teams working in different health areas, such as stroke,

Box 5 | Case study from Barbados

Development of a cardiovascular health programme through collaboration

The cardiovascular health programme in Barbados was developed through collaboration with a USA-based rehabilitation specialist⁹². The programme is nurse-directed, with cardiologist oversight. Understanding of care principles grew as the team gained experience with the protocols, and with continuous education.

- The team comprises nurses and/or nurse assistants, a dietitian and a fitness trainer. The initial assessment and supervision of exercise sessions are performed by the nurse or nurse assistant, followed by risk stratification by the physician.
- Specific, clear protocols have been provided to support on-the-job training and decision-making, with clear guidance on exercise training based on the level of risk.
- In the absence of specialized knowledge, order sets with options support decision-making by physicians.
- Formulaic, individualized treatment plans provide a framework for case management.
- A fitness trainer prepares the exercise routines, and patients meet with the dietitian at least once during the programme.

diabetes and chronic respiratory disease, to promote efficiency. Ideally, health services and leaders should identify and support clinical career pathways that facilitate interdisciplinary teamwork, with consideration of flexibility for staff (for example via part-time work and/or varied geographical locations). Other strategies include mentoring and linkage of teams in high-resource settings with those in low-resource settings, engaging students and individuals with lived experience.

Roadblock 5: inadequate advocacy and policy

Advocacy and policy are crucial to ensure that participation in a cardiovascular health programme is seen as a central part of the long-term management for all individuals with CVD. As alluded to in earlier roadblocks, there is a potential lack of future-focused advocacy and policy that considers optimization at the patient, clinician and systems levels. Stronger partnerships with unified advocacy are needed (addressing partnership and unity from the 5Ps)³.

Solutions to support strong advocacy and policy

Collective advocacy with a 'united voice' that is aligned to local and global priorities is needed to improve engagement, funding and systems reform⁸⁰; for example, positioning cardiovascular health programmes as a strategy to support the implementation and achievement of both the United Nations' Sustainable Development Goal of a 33% reduction in CVD mortality by the year 2030 (ref. 28) and the World Rehabilitation Alliance's Rehabilitation 2030 Initiative⁸¹. Engaging individuals with lived experience will enable amplification of consumer voices, whereby individuals with lived experience are key advocates for health transformation and implementation. Various global groups are developing advocacy training systems and accreditation processes for consumers to ensure well-versed advocacy^{3,82}. Collection and availability of robust system-level and patient-level data combined with endorsement and advocacy from national cardiology societies, rehabilitation and preventive health associations, foundations and other professional organizations and stakeholders is important³⁵.

Box 6 | Case study from the Republic of Ireland

Leveraging policy to deliver cardiovascular health programmes in an integrated way

A shift in health policy in Ireland enabled a reframing away from traditional cardiac rehabilitation, resulting in the sector being prioritized within the new National Framework for the Integrated Prevention and Management of Chronic Disease in Ireland (2020–2025)^{93,94}. The framework represents an integrated, whole-of-system approach to chronic disease (cardiovascular disease, chronic respiratory disease and type 2 diabetes mellitus) across a continuum of health promotion, disease prevention, diagnosis, treatment, disease management and rehabilitation. At the core of this national framework is ensuring universal and equitable access to health care and adequate funding for health-care staffing.

- The government invested in new community chronic disease hubs (one per 150,000 of the general population) and advocacy-enabled integration, expansion and investment in cardiovascular health programmes.
- To advance implementation, a national model of care was developed, followed by a needs analysis, with key outcomes indicating the need to standardize delivery of cardiovascular health programmes with increased levels of staffing.
- A clinical action guide is under development as a practical resource to guide the implementation of evidence-based, comprehensive care that is personalized and offers choice in how, where and when patients can participate in programmes.

Integrating programmes with lifelong cardiovascular health at their core into guidelines is important to support prioritization, advocacy and resource allocation⁸³. Guidelines should highlight the importance of individualized care planning, cultural adaptation (including the language spoken) and the availability of varied models of care (such as telehealth, digital and home-based)^{60,64–66,68}, as mentioned in roadblock 3. Guidelines should have corresponding lay language and visual summaries to ensure readability, meaningfulness and relevance to all relevant parties⁸³. Importantly, many low-resource settings rely on recommendations from international guidelines; in these scenarios, it is important to contextualize evidence and recommendations for the local settings^{84,85}.

A clear vision, together with government lobbying for investment and resourcing, is needed to highlight the value of cardiovascular health programmes for society and health systems (see the case studies from Malawi (Box 2) and the Republic of Ireland (Box 6)). Advocacy priorities include improving access to person-centred care, lifelong cardiovascular health and universal health coverage for all who can benefit. Successes in Cameroon and Senegal highlight how governments can be successfully lobbied to reimburse local services. In Cameroon, frontline financing that included structured cardiovascular health programmes was prioritized to improve equity in spending and expanded primary care. In Senegal, a national health financing strategy was established to achieve universal health coverage. Both countries used promotional resources featuring scientific publications and the use of data to drive successful advocacy. An example of successful research funding advocacy is the Cardiovascular Health Mission in Australia, which resulted in approximately \$AUD 220 million in research

funding dedicated to the CVD sector as part of the Medical Research Future Fund⁸⁶. Such advocacy combined with stakeholder leadership of position statements such as the Australian Cardiovascular Health and Rehabilitation Association Core Components will also facilitate policy implementation⁸⁷.

Conclusions

Ongoing support and advocacy from the WHF and WHO, with local and global championing, are needed if the reach and quality of cardiovascular health programmes and the goal of lifelong cardiovascular health are to be optimized. This Roadmap provides the foundation for a new era and provides a new definition and reframed terminology (that is more inclusive of all CVD indications and with a lifelong approach), together with a series of solutions to roadblocks and real-world examples of success in the form of case studies. A shift to systems, policy and advocacy thinking is crucial for the sector, with a view to long-term investment to meet growing demands and achieving the ultimate objective of lifelong cardiovascular health for all. The importance of patient involvement, interdisciplinarity, unity and collaboration is also fundamental to ensuring equitable access and value-based health care, thereby also addressing the 5Ps for improvement.

The next steps are to facilitate local and regional implementation and evaluation strategies at patient, clinician and system levels⁸⁸. We encourage regional-level and country-level groups to prepare and publish implementation strategies to facilitate the delivery of potential solutions that are future-focused and feasible. Ongoing research is warranted to evaluate new models of care (including hybrid strategies, as summarized in some of the case studies presented) to understand the value and benefit of the use of data and artificial intelligence in driving programme quality and to explore the most effective advocacy strategies. Launching a unified global cardiovascular health awareness campaign, led by the WHF and with a focus on lifelong health, will increase widespread engagement with, and understanding of, these programmes.

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Author contributions

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Competing interests

The authors declare no competing interests.

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¹Institute for Evidence-Based Healthcare, Bond University, Robina, Queensland, Australia. ²Susan Wakil School of Nursing and Midwifery, Faculty of Medicine and Health, University of Sydney, Sydney, New South Wales, Australia. ³Mayo Clinic, Rochester, MN, USA. ⁴University of Western Australia, Perth, Western Australia, Australia. ⁵Centre for Cardiovascular Prevention and Rehabilitation, Nairobi, Kenya. ⁶National Institute for Prevention and Cardiovascular Health, University of Galway, Galway, Republic of Ireland. ⁷Cardiovascular Institute, Brown University Health, Providence, RI, USA. ⁸University of California, San Francisco, CA, USA. ⁹University Health Network, University of Toronto, Toronto, Ontario, Canada. ¹⁰Kamuzu University of Health Sciences, Blantyre, Malawi. ¹¹The University of The West Indies, Bridgetown, Barbados. ¹²Department of Physiotherapy, Manipal College of Health Professions, Manipal Academy of Higher Education, Manipal, India. ¹³Brazilian Association of Respiratory, Cardiovascular and Intensive Care Physiotherapy, São Paulo, Brazil. ¹⁴Beijing Anzhen Hospital, Capital Medical University, National Clinical Research Center for Cardiovascular Diseases, Beijing, China. ¹⁵Sir HN Reliance Foundation Hospital, Mumbai, India. ¹⁶Lisbon Medical School, University of Lisbon & ULSSM, Lisbon, Portugal. ¹⁷Ministerio de Salud, Tucumán, Argentina. ¹⁸Global Heart Hub, Galway, Republic of Ireland. ¹⁹Peking University People's Hospital, Beijing, China. ²⁰National Institute for Prevention and Cardiovascular Health, Galway, Republic of Ireland. ²¹University of North Carolina, Chapel Hill, NC, USA.