



## Cardiac rehabilitation services: A global perspective on performance and barriers

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Cardiovascular disease remains the leading cause of morbidity and mortality. However, mortality rates for coronary artery disease have decreased significantly in the last three decades and mainly in high-income countries. At the same time, and potentially driven by the aging population, multiple 'modern' risk factors such as obesity and diabetes mellitus have increased substantially. Cardiovascular disease prevention and rehabilitation is therefore crucial and defined as 'a coordinated set of actions, at the population level or targeted at an individual, that are aimed at eliminating or minimising the impact of cardiovascular disease and related disabilities' [1]. There are significant benefits of secondary prevention and cardiac rehabilitation (CR) programs for reducing cardiovascular mortality, and preventing the recurrence of cardiac events and thus hospital admissions [2]. In line with this, international initiatives, supported by the World Heart Federation, have been undertaken to improve secondary prevention strategies [3]. A diversity of CR program options exists to suit patient circumstances and resource contexts, ranging from in-hospital and outpatient services or home-based rehabilitation with the use of telehealth and telemonitoring [4]. Telehealth options have demonstrated reductions in total cholesterol, low-density lipoprotein and smoking [5], and recent studies report the specific benefits of text-messaging. In addition to outpatient CR, participants received 3–5 text messages per week with a focus on healthy advice and adherence to their lifestyle modification program, which resulted in improved outcomes and compliance and also more patients completing the rehabilitation program, albeit with low participant enrolments in the text messaging group [6]. Improvements in multiple cardiovascular risk factors were demonstrated when participants received 4 text messages per week tailored to their individual risk factor profile in an Australian study including 710 participants with documented coronary heart disease [7]. Despite the benefits of different models of CR services and improved outcomes in those who attend, such models are not widely available in practice yet and inflexibility of current CR models may contribute to poor referral and participation rates, and significant opportunity to further improve outcomes.

In the current edition of the Journal, Ghanbari-Firoozabadi et al. report on the experience with CR in Iran. In 2004 the first CR service was started as an outpatient program in the province of Yazd, central

Iran. In the early days the service faced many limitations such as lack of resources and health insurance coverage. However, since late 2014, the organisational aspects have improved, with the evolution of improved insurance coverage for a range of cardiovascular conditions including acute coronary syndrome (ACS) as well as the development of procedures and guidelines for the delivery of these services. Despite these improvements, referral rates are less than ideal at 60%, enrolment rate of 55% and a minimal participation rate of only 6.9%. In total, over the last three years, 57% of patients completed the program [8].

Besides this example of Iran, also Western countries struggle with poor referral and attendance rates for CR whilst facing increasing prevalence rates and burden of cardiac disease. In Australia, the prevalence of cardiac disease is high, with approximately 625,000 individuals having long-term cardiac conditions (2014–15), associated 160,000 hospital admissions and total health care burden of \$1.5 billion [9]. CR is crucial to prevent recurrent events and manage risk factors in these patients, whilst at the same time these risk factors will be of influence on the success of CR [10], and may result in improved exercise capacity and a favourable effect on kidney function [11]. CR programs have been operating for many decades, yet Australia faces remarkably similar issues to Iran. A recent study of approximately 50,000 hospital admissions eligible for CR between 2013 and 2015 demonstrated that only 30% were referred for CR and that the attendance rates of patients was 28%, despite the evidence that those who did attend CR had significantly less cardiovascular readmissions [12].

The available evidence on preventing cardiovascular disease has been translated in guideline recommendations for secondary prevention and referral to CR [2,13]. The 2016 European Society of Cardiology guidelines on cardiovascular disease prevention in clinical practice state that participation in a CR program for patients after a coronary event or revascularization, and for patients with heart failure, is recommended to improve patient outcomes [1]. However, despite the availability of guidelines and important practice recommendations, barriers exist to participation of CR services, whether or not country or region specific. Cultural and linguistic barriers as well as socioeconomic, transportation and logistical issues for those patients living remotely, may limit attendance [14]. CR is also underutilised in the female population with strategies including automatic referral and assisted enrolment demonstrating an improved likelihood of participation [15]. Given that participation may also be hampered by factors such as comorbid burden and socioeconomic status [16], the need for alternative models of care with the ability to cater to diverse populations is of paramount importance.

In Australia, the Australian Cardiovascular Health and Rehabilitation Association (ACRA) developed a core components model for Australian cardiac rehabilitation services, to overcome referral and participation

barriers and promote appropriate diversity of CR services across Australia. The model consists of five core components including i) referral and access to services; ii) assessment and short-term monitoring; iii) recovery and longer term maintenance; iv) lifestyle/behavioural modification and medication adherence; and v) evaluation and quality improvement [17]. The model aims to guide clinicians and support decision making in the field of secondary prevention and CR, and may potentially serve as a framework for implementing and utilising CR programs around the globe.

In conclusion, the value of CR programs in relation to improved clinical and patient outcomes has been globally demonstrated, yet significant room for improvement exists. Despite clinical guideline recommendations and standardised practice models, gaps remain in referral to CR services and attendance rates remain low. Although alternative CR models are available, widespread use of telehealth is scarce, whilst demonstrated that mobile technology, tailored to target users, is crucial in improving patient access to preventive care [18]. Interestingly this applies to western as well as developing countries. Given that Iran had 53 million mobile internet users (with a 110.53% active mobile phone penetration rate) in 2018, indicates significant opportunities to implement telehealth as part of CR services, to improve referral and completion rates. Clinical audits may reveal limiting barriers and patient characteristics to further intervene, and drive awareness and service improvements. Together this data supports a worldwide call to action for CR with a view towards improved utilisation of this service, in addition to the application and evaluation of novel, tailored models of care as well as to improve outcomes in cardiovascular conditions.

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#### Declaration of competing interest

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