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# The promise and challenge of telerehabilitation in cardiac

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**This editorial refers to ‘Effectiveness of home-based cardiac telerehabilitation as an alternative to Phase 2 cardiac rehabilitation of coronary heart disease: a systematic review and meta-analysis’, by H.J. Ramachandran *et al.*, doi:10.1093/eurjpc/zwab106**

Despite the clear benefits of cardiac rehabilitation (CR), participation rates are stubbornly low across the globe.<sup>1</sup> Cardiac telerehabilitation and home-based CR are important alternatives to traditional centre-based models of provision that can increase adherence and participation.<sup>2</sup> During the SARS-CoV-2 coronavirus pandemic, such delivery alternatives have never been more important to ensure safety by preventing transmission and further serious disease in patients with cardiovascular disease by supporting lock down, social distancing guidance, and shielding at home, especially in those with high clinical vulnerability. A recent international survey found that nearly half of all CR programmes were suspended as the result the pandemic restrictions, with a rapid parallel increase in the adoption of technology to enable patients’ remote CR access.<sup>3</sup>

There have been several recently published systematic reviews of cardiac telerehabilitation.<sup>4,5</sup> However, given the fast-moving nature of technological innovation and the ongoing need for new evidence with the continuance of the pandemic, the paper in this issue by Joann *et al.*<sup>4</sup> provides a timely contemporary update of the evidence base. This systematic review and meta-analysis of cardiac telerehabilitation in patients with coronary heart disease addresses two questions (i) the efficacy of home-based cardiac telerehabilitation ('HBCTR') vs. no CR and (ii) the (relative) efficacy of HBCTR vs. centre-based CR ('CBCR'). The authors conclude (i) HBCTR has superior efficacy vs. no CR in terms of exercise capacity, physical activity levels, health-related quality of life, and coronary risk factors and (ii) HBCTR and CBCR have similar efficacy. However, it is important to note that the volume of evidence was small, especially 'head-to-head' evidence, i.e., two randomized controlled trials (in a total of 282 patients) directly comparing HBCTR and CBCR,<sup>6,7</sup> only one of these studies being formerly powered for non-inferiority.<sup>6</sup>

The findings of Joann *et al.* raises three key questions about the practical implementation of cardiac telerehabilitation going forward. First, how do we best employ telerehabilitation within our existing CR services? Whilst the review of Joann *et al.* focused on the use of cardiac telerehabilitation as either an addition to usual care or as an alternative to centre-based CR, it is important to acknowledge the wide range of ways in which cardiac telerehabilitation can be employed. Hybrid models of CR, including components from both centre and home-based CR, are increasingly being promoted.<sup>8</sup> Such models can allow patients to start with a supervised centre-based CR programme that may be supplemented with home-based sessions or that switches entirely to home after a given period. Home-based CR can in turn be supplemented with e-technology that can include the use of wearables (e.g. heart rate monitors, accelerometers), providing real-time/asynchronous feedback (to the patient themselves and/or a remotely located healthcare practitioner) as well as systems that facilitate the remote communication with/support from healthcare professionals (including telephone, videoconference, and email). The choice of CR delivery model is likely to depend on the individual patient, especially their level of clinical risk/safety and their related need for direct supervision and monitoring.

Second, how do we overcome the barriers to telerehabilitation access for our cardiac patients? The recently published *European Association of Preventative Cardiology* call for action identified several barriers to the implementation of cardiac telerehabilitation (i) variation in digital literacy of patients and healthcare staff, (ii) reimbursement, (iii) integration in electronic medical records, (iv) lack of face-to-face interaction, (v) data safety and privacy, (vi) lack of legal principles, and (vii) lack of social interaction.<sup>9</sup> Other notable cardiac telerehabilitation considerations include remote clinical assessment (e.g. exercise capacity)<sup>2</sup> and regulatory issues.<sup>10</sup> The developers of future clinical guidelines for secondary cardiovascular prevention and CR need to carefully consider these issues and provide guidance and direction as to how to best incorporate telerehabilitation into practice.<sup>11</sup> The COVID-19 pandemic has had a disproportionate impact on ethnic minorities exposing significant inequities among

patients in accessing necessary telemedicine care. A large observational study from the USA demonstrated inequitable access to telemedical care, reporting that older age, Asian race, and non-English language as the patient's preferred language were independently associated with fewer completed telemedicine encounters.

Third, how do we further develop the evidence base to inform the future implementation of telerehabilitation? Whilst appropriately powered randomized trials provide high-quality evidence of efficacy and safety, given the many practical uncertainties in the implementation of telerehabilitation (which patients? what model of telerehabilitation or hybrid CR? what level of staff supervision? etc.) innovative models of evaluation are also needed. Such evaluative approaches include real-world observational designs leveraging on the use of data routinely collected by healthcare systems.<sup>12,13</sup> As summed up by the 2019 Scientific Statement of the American Association of Cardiovascular and Pulmonary Rehabilitation, the American Heart Association, and the American College of Cardiology, although models of home-based telerehabilitation 'appears to hold promise in expanding the use of CR to eligible patients, additional research and demonstration projects are needed to clarify, strengthen, and extend the evidence base for....key subgroups, including older adults, women, underrepresented minority groups, and other higher-risk and understudied groups'.<sup>14</sup>

**Conflict of interest:** R.S.T. is chief investigator for two publicly funded ongoing evaluations of home-based cardiac rehabilitation: REACH-HFpEF trial (ISRCTN47894539) and SCOTREACH-HF studies (ISRCTN53784122). Other authors declare no conflicts of interest. [AQ4](#)

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