

Cost-effectiveness of different models of cardiac telerehabilitation

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Kardiologia Pol. 2021;
79 (5): 489–490;
DOI: 10.33963/KP.2021.0022

Received:

April 40, 2021

Revision accepted:

April 30, 2021

Published online:

May 31, 2021

Both European and American guidelines recommend cardiac rehabilitation (CR) as a priority in the secondary prevention and follow-up of both ischemic heart disease and heart failure [1, 2]. Despite the clear benefits of CR, the participation rates are disappointingly low across the globe [3]. Cardiac telerehabilitation and home-based CR are often considered as novel methods to increase adherence and participation. However, it is currently not proven that providing cardiac telerehabilitation can increase participation rates. On the other hand, it is well-established in multiple (small sample size) trials that telerehabilitation could be as effective as center-based CR with similar healthcare costs [4]. It is important to recognize that almost all previous studies used different models of cardiac telerehabilitation, and cost-effectiveness studies are rare.

Telerehabilitation models can have a hybrid approach where patients first start with center-based CR for several sessions and then start with a telerehabilitation program [5]. Other studies have examined the effectiveness of a combination of center-based CR and telerehabilitation [6]. The third approach is replacing center-based CR with telerehabilitation [7]. For all these telerehabilitation models, studies have shown that the results are non-inferior in comparison with standard care, but no study compared the different models [5–7]. The way of delivering cardiac telerehabilitation can have a significant impact on the effectiveness and especially on the costs [4]. Two methods of delivery can be distinguished synchronous and asynchronous. Synchronous cardiac telerehabilitation

refers to real-time interaction between the patient and healthcare provider. This has the advantage of very close follow-up and better personalization. However, it is also associated with a higher workload for the healthcare professionals and therefore also higher costs, especially when providing individual synchronous cardiac telerehabilitation. This type of telerehabilitation is therefore probably best indicated in high-risk populations such as heart failure. In asynchronous telerehabilitation, there is no real-time interaction or follow-up between the patient and healthcare providers. Patients send their data to the hospital and are only monitored intermittently at fixed moments or if alerts occur. The advantage of asynchronous monitoring is that it is less labor-intensive and less costly providing the opportunity to follow-up large groups of patients simultaneously. However, most studies using this approach focused on stable low-risk patients.

The TELEREH-HF trial used a hybrid and synchronous telerehabilitation program for heart failure patients. The trial revealed a significant impact on quality of life but no impact on cardiovascular or overall mortality [5]. Niewada et al. [8] demonstrated that the TELEREH-HF approach was cost-effective in comparison with standard care in the Polish healthcare setting. It is important to note that most patients (88%) in the standard care group did not participate in any form of CR, it remains to be studied if the TELEREH-HF approach is cost-effective compared to center-based CR. However, it is encouraging to see that a very elaborated telerehabilitation approach in

high-risk patients is cost-effective in the Polish setting. This again highlights the enormous potential value of cardiac telerehabilitation as an alternative to center-based CR.

The different models of cardiac telerehabilitation have all demonstrated effectiveness and value as alternatives for center-based CR. In the future, it will be important to choose the right model for the right patients to further improve the cost-effectiveness of telerehabilitation interventions. A simple approach such as asynchronous telerehabilitation with only a few devices could be safe and cost-effective in low-risk patients, whereas a more complex approach with real-time exercise and electrocardiogram monitoring is needed to ensure safe remote exercise in high-risk patients. Further research is needed to create recommendations for risk assessment and level of supervision before cardiac telerehabilitation. Other factors will also play a role in the determination of the right model for an individual patient such as the preferences of the patient, the motivation level of the patients, the moments that patients want to exercise, or even the presence of kinesiophobia.

To conclude, evidence suggest that different models of cardiac telerehabilitation are effective and also cost-effective. In the future, it will be important to choose the right model of cardiac telerehabilitation for an individual patient from an economic and a safety perspective.

Article information

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Conflict of interest: None declared.

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How to cite: Scherrenberg M, Falter M, Dendale P. Cost-effectiveness of different models of cardiac telerehabilitation. *Kardiol Pol.* 2021; 79(5): 489–490, doi: 10.33963/KP.2021.0022.

REFERENCES

1. Piepoli MF, Hoes AW, Agewall S, et al. 2016 European Guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts) Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EACPR). *Eur Heart J.* 2016; 37(29): 2315–2381, doi: 10.1093/eurheartj/ehw106, indexed in Pubmed: 27222591.
2. Thomas RJ, Balady G, Banka G, et al. 2018 ACC/AHA Clinical Performance and Quality Measures for Cardiac Rehabilitation: A Report of the American College of Cardiology/American Heart Association Task Force on Performance Measures. *Circ Cardiovasc Qual Outcomes.* 2018; 11(4): e000037, doi: 10.1161/HCQ.0000000000000037, indexed in Pubmed: 29599285.
3. Kotseva K, De Backer G, De Bacquer D, et al. Lifestyle and impact on cardiovascular risk factor control in coronary patients across 27 countries: Results from the European Society of Cardiology ESC-EORP EUROASPIRE V registry. *Eur J Prev Cardiol.* 2019; 26(8): 824–835, doi: 10.1177/2047487318825350, indexed in Pubmed: 30739508.
4. Scherrenberg M, Falter M, Dendale P. Cost-effectiveness of cardiac telerehabilitation in coronary artery disease and heart failure patients: systematic review of randomized controlled trials. *European Heart Journal - Digital Health.* 2020; 1(1): 20–29, doi: 10.1093/ehjdh/ztaa005.
5. Piotrowicz E, Pencina MJ, Opolski G, et al. Effects of a 9-week hybrid comprehensive telerehabilitation program on long-term outcomes in patients with heart failure: the Telerehabilitation in Heart Failure Patients (TELEREH-HF) Randomized Clinical Trial. *JAMA Cardiol.* 2020; 5(3): 300–308, doi: 10.1001/jamacardio.2019.5006, indexed in Pubmed: 31734701.
6. Frederix I, Solmi F, Piepoli MF, et al. Cardiac telerehabilitation: A novel cost-efficient care delivery strategy that can induce long-term health benefits. *Eur J Prev Cardiol.* 2017; 24(16): 1708–1717, doi: 10.1177/2047487317732274, indexed in Pubmed: 28925749.
7. Kraal JJ, Van den Akker-Van Marle ME, Abu-Hanna A, et al. Clinical and cost-effectiveness of home-based cardiac rehabilitation compared to conventional, centre-based cardiac rehabilitation: Results of the FIT@Home study. *Eur J Prev Cardiol.* 2017; 24(12): 1260–1273, doi: 10.1177/2047487317710803, indexed in Pubmed: 28534417.
8. Niewada M, Tabor B, Piotrowicz E, et al. Cost-effectiveness of telerehabilitation in patients with heart failure in Poland: an analysis based on the results of the Telerehabilitation in Heart Failure Patients (TELEREH-HF) randomized clinical trial. *Kardiol Pol.* 2021, 79(5): 510–516, doi: 10.33963/KP.15885, indexed in Pubmed: 33750085.