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HOME-BASED VERSUS CENTRE-BASED CARDIAC REHABILITATION OR USUAL CARE IN ELDERLY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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ABSTRACT

Objectives: To evaluate the impact of home-based cardiac rehabilitation (CR) compared to centre-based CR or usual care (UC) on exercise capacity, health-related quality of life (HRQoL), cardiovascular events, and mortality in elderly patients. **Methods:** This study included randomised controlled trials comparing home-based CR against centre-based CR or UC in elderly patients with coronary heart disease or heart failure. PubMed, EMBASE, CENTRAL, WHO ICTRP and ClinicalTrials.gov were searched systematically on 27 August 2021. Cochrane RoB 2 tools was used for risk of bias assessment. For the meta-analysis, data were pooled using a random-effects model. **Results:** 19 studies were included, comprising 2,287 participants, contributed to 4 comparisons for home-based CR to centre-based CR, and 17 comparisons to UC. Compared to centre-based CR, the outcomes showed similar effects in terms of exercise capacity (SMD -0.02, 95% CI -0.33 to 0.29, P = 0.90) and HRQoL (SMD -0.25, 95% CI -0.67 to 0.17 P = 0.25). Compared to UC, home-based CR significantly improved exercise capacity (SMD 0.32, 95% CI 0.16 to 0.47, P < 0.0001) and HRQoL (SMD -0.26, 95% CI -0.40 to -0.11, P = 0.0005). For the secondary outcomes, home-based CR significantly improved the all-cause hospitalisation (RR 0.67, 95% CI 0.51 to 0.87, P = 0.003). **Conclusion:** Provision of home-based CR to elderly patients significantly improved exercise capacity and HRQoL compared to UC, and the effects of home-based CR was similar to centre-based CR. However, there is still limited evidence on the long-term impact of home-based CR in the elderly.

KEYWORDS: Exercise training, coronary heart disease, heart failure, cardiovascular diseases, older adults.

INTRODUCTION

Age plays a critical role in the declining function of the cardiovascular system in older adults, as a consequence, increases the risk of cardiovascular diseases (CVDs).[1] CVDs are prevalent and rapidly increased in rising population of older adults as peoples are having a longer lifespan and CVDs are strongly correlated with age.[2,3] Population around the world is aging rapidly that one never previously imagined. As stated by WHO in 2021, the ratio of people worldwide aged more than 60 years is estimated a total of 2.1 billion by year 2050.[4] The proportion of people aged more than 65 years in global population is predicted to be increased from 9.3% to 16.0% by year 2050 compared to year 2019.[5,6] The importance of an effective prevention of CVDs, maintenance of physical well-being, and preserving quality of life in the elderly patients has been shown by these statistics and influences in the development of CVDs.

CR services are an essential part of care for patients with CVDs, including elderly.[7,8] The beneficial effects of CR are noticeable and well-recognised.[9] As the world population is aging, patients requiring CR are gradually older with higher risk of CVDs, and comorbidities. Despite the existence of chronic diseases and disabilities in elderly, most of the older adults are capable of following CR programs personalised to their physiologic capacities, behavioural needs, and comorbidities.[10] Generally, CR programs are implemented in the hospital or rehabilitation centre since it is safer as patients are supervised during the programs.[11] However, it has been noted that the effects from lifestyle modifications developed during centre-based CR would diminish after the programs are withdrawn.[12]

As time passed, home-based CR performed in the residents of patients or other nonclinical settings, were developed to make CR available to patients who were unable to attend or benefit from centre-based CR. Difficulties in travelling is the main concerns for nonparticipation and therefore causes a lower rate of CR in older patients.[13–15] In addition, implementation of CR is impeded due to COVID-19.[16] There are lots of evidence showing that rehabilitation centres had been required to close or limited their services since keeping social distancing is compulsory to prevent and to help reduce the spread of COVID-19 infection.[16–20]

Therefore, the importance and the needs of further development of home-based CR had been shown in this new era.

Although there are a variety of components included in the home-based CR, mounting evidence showing home-based CR is superior to usual care and appear to be safe and effective as the centre-based CR for patients with CVDs.[21–32] However, the elderly are rarely focused in the previous studies, and the effectiveness of home-based CR in this population is poorly understood.[12] Therefore, the objectives of this study is to evaluate the impact of home-based CR compared to centre-based CR or usual care on exercise capacity, health-related quality of life (HRQoL), cardiovascular events, and mortality in elderly patients with coronary heart disease or heart failure.

METHODS

This study was registered in PROSPERO (CRD42021274226), and was implemented and reported in accordance to the Cochrane Handbook and the updated PRISMA statement.[33,34]

Eligibility Criteria

Studies: Randomised controlled trials (RCTs).

Participants: Participants with mean age of ≥ 65 years who were diagnosed with coronary heart disease, or who have had a myocardial infarction, or who have had experience percutaneous coronary intervention or coronary artery bypass graft, or who were diagnosed with heart failure. Studies were excluded if they included participants who had previously received any CR. If the studies included participants with a variety of CVDs, studies were included when most participants were in the categories eligible for inclusion.

Intervention: Home-based CR was defined as an exercise program performed in patient's home. The program could be a part of comprehensive CR, or used alongside with the education program, or exercise training alone. Home-based CR could include some contacts with the health care team or the research staffs. The comparators could be centre-based CR or UC. Centre-based CR was defined as a supervised exercise program carried out in a hospital or rehabilitation centre or in the community environments (public gym or sports centre). UC was defined as standard medical care with usual lifestyle, in which educational program or other components of a comprehensive CR could be included, that did not include exercise training. Studies were excluded if the home-based CR were hybridized with centre-based program, either with an initial period of centre-based program followed by home-based training or in a setting of concurrent home and centre-based program.

Outcome measures: Primary outcomes of this study were exercise capacity and HRQoL. The outcomes for exercise capacity should be assessed with a validated measure such as the six-minute walk test (6MWT), incremental shuttle walk test (ISWT), and peak oxygen uptake (VO2 peak). For the HRQoL outcomes, a validated generic or disease-specific questionnaire such as Minnesota Living with Heart Failure Questionnaire (MLHFQ), 36-Item Short Form Survey (SF-36), and Sickness Impact Profile should be used for the assessment of outcomes. Secondary outcomes included all-cause mortality, cardiovascular-related mortality, all-cause hospitalisation, and cardiovascular-related hospitalisation.

Information Sources and Search Strategy

A systematic search for relevant studies was conducted by searching the following electronic databases: PubMed, EMBASE, and CENTRAL in the Cochrane Library. ClinicalTrials.gov and WHO ICTRP were also searched for additional trials. All searches were performed on 27 August 2021 with no restrictions on language, no limitation to the sample size, and no date restrictions. To identify additional references, reference lists of any relevant systematic review and included studies were examined manually. If necessary, the main authors were contacted to request for any missing data which is unavailable in the published manuscript. The search strategy for databases used a combination of MeSH terms and relevant free text words. MeSH terms included "coronary disease", "myocardial infarction", "myocardial revascularization", "coronary artery bypass", "heart failure", "cardiac rehabilitation", "exercise", and "exercise therapy". Alternatives keywords and spellings were also searched to identify all eligible studies.

Study Selection and Data Collection Process

Two authors independently screened the titles and abstracts, unrelated studies were excluded. Full-text reports of potentially eligible studies were retrieved and assessed for inclusion. Data were obtained from included studies by two authors independently with a structured data collection form. Data on primary and secondary outcomes were collected as defined earlier, with any reported time points. Data from graphs were extracted using the WebPlotDigitizer where the data were only presented graphically and the numerical data were unable to obtain from the authors.[35] Disagreements between authors were resolved by consensus.

Risk of Bias Assessment

Two authors assessed risk of bias independently in all included studies using the August 2019 version of revised Cochrane RoB 2 tools.[36,37] Effect of interest for this review is the effect of assignment to the intervention. The assessment of bias was managed and implemented using the RoB2 Excel tool.[37] There are five domains in the RoB 2 tools for consideration of risk of bias: randomisation process, deviations from intended interventions, missing outcome data, measurement of outcome, and selection of the reported result.[36,37] The overall risk for each studies was judged as low risk, some concerns, or high risk of bias based on the guidance for

RoB 2.[37,38] Disagreements between authors were resolved by consensus.

Effect Measures and Synthesis Method

All data were handled based on guidance of the Cochrane Handbook.[38] Continuous variables for outcomes of exercise capacity and HRQoL were analysed as mean difference (MD) with 95% confidence intervals (CIs), and standardised mean difference (SMD) with 95% CIs when the outcomes were assessed and reported in a variety of ways. As a consequence of the difference in mean changes from baseline and the related standard deviation (SD) were reported in only a few studies, the mean and SD at follow-up were used. Dichotomous data were analysed as risk ratio (RR) with 95% CIs for the mortality and hospitalisation outcomes. Given the studies were conducted by independent researchers and it was unlikely that all studies included were functionally equivalent, a random-effects model were chosen. Inverse variance and Mantel-Haenszel statistical method was applied for the calculation of pooled effects for continuous and dichotomous data, respectively. Where applicable, stratified results were provided to show effect estimates based on the comparator.

For HRQoL outcomes, the direction inconsistencies of scales were adjusted when necessary. When more than one outcome reported or measured in the HRQoL results, priority was given to disease-specific over the generic questionnaire, and mean of overall or total score were preferred. When a study contributed more than one related comparisons, to overcome a unit of analysis error as per recommendation in the Cochrane Handbook, all relevant groups were combined into a single intervention and comparator groups so a single pairwise comparison was created, or alternatively, the shared group was divided into two groups with smaller sample size for inclusion of two comparisons independently.[39] For outcomes not appropriate to be included in the meta-analysis, a qualitative description was presented.

To assess between-study heterogeneity, the Chi^2 test of heterogeneity and I^2 statistic were calculated. When a value of $P \leq 0.10$ from the Chi^2 test and $I^2 \geq 50$ % were obtained, substantial heterogeneity was considered. If a statistical heterogeneity was indicated, subgroup analysis and sensitivity analyses was performed to deal with the issues, where applicable. Data synthesis were performed by using the Review Manager 5.4.1 software.[40]

Reporting Bias Assessment

Funnel plots were created for each outcome when there were at least 10 studies contributing data in the meta-analysis. If asymmetry was detected visually, characteristics of the included studies were reassessed to evaluate the causes of asymmetry.

Certainty Assessment

Certainty of the evidence were assessed independently by two authors using GRADE approach and performed in accordance to recommendations described in GRADE handbook.[41] Disagreements between authors were resolved by consensus.

Patient and Public Involvement

No patients and public involvement in this systematic review and meta-analysis.

RESULTS

Study Retrieved

A total of 19 RCTs were included, involving 2,287 participants (Table 1). Mean age was 70 years (range 66 to 81). Most included studies were single centre in setting, but six of the studies were multicentre with a range from two to ten centres.[42–47] Home-based CR in most studies comprised of a program of exercise training only, whereas 7 studies had included educational program and/or psychological management.[42–44,48–51] Duration of exercise training differed from 6 weeks to 12 months, with 2 to 6 sessions per week, 10 to 60 minutes per session, and an intensity of 40 to 75% of peak heart rate or an intensity with 9 to 15 on the Borg scale. Since most home-based programs were individually personalised, the exercise performed was hard to evaluate precisely.

All included studies provided data as a single comparison, with the exception of 3 studies. One study was a 4-arm trial, the exercise only and the combination of cognitive exercise therapy and exercise were united as one intervention group while the UC and cognitive behaviour therapy were united as one comparator group, then the data was contribute as a single pairwise comparison in this study.[52] Two studies contributed two independent comparisons, where the home-based CR group served as the shared intervention group for both centre-based CR and UC.[53,54] As a result, there are 4 comparisons for home-based versus centre-based CR, and 17 comparisons against UC.

Table 1: Characteristics of included studies.

Study, country	Mean age	Diagnosis	N (I/C)	Duration	Intervention	Comparator	Follow-up
Bernocchi 2018, Italy[42]	71	Combined COPD and chronic heart failure	112 (56/56)	4 months	Home-based telerehabilitation	Standard care program	4 months, 6 months
Chen 2018, China[45]	70	NYHA Class I-II	80 (39/41)	12 weeks	Home-based exercise program	Usual care with no intervention	4, 8, 12 weeks
Cowie 2012, UK[53]	66	NYHA Class II-III	60 (20/20 +20)	8 weeks	Home training program	Hospital training program or usual care	8 weeks
Dalal 2019, UK[43]	70	HFrEF (LVEF < 45%)	216 (107/109)	12 weeks	REACH-HF manual	Usual care	4, 6, 12 months
Gary 2004, US[48]	68	NYHA Class II or III DHF, ejection fraction of ≥ 45%	32 (16/16)	12 weeks	Home-based walking program	Education only	12 weeks
Gary 2007, US[49]	68	NYHA Class II and III heart failure, ejection fraction of ≥ 45%	23 (13/10)	12 weeks	Home-based walking program	Usual care with educational program	12 weeks
Gary 2010, US[52]	66	NYHA Class II and III heart failure, LVEF of ≥ 15%	74 (38/36)	12 weeks	Home-based walking program with/without CBT intervention	CBT intervention or usual care group	12 weeks, 24 weeks
Hwang 2017, Australia[44]	68	Chronic heart failure	53 (24/29)	12 weeks	Home-based telerehabilitation	Center-based rehabilitation program	12, 24 weeks
Jaarsma 2021, Sweden[46]	67	NYHA Class I-IV	605 (305/300)	3 months	Exergame group	Motivational support	3, 6, 12 months
Jolly 2009, UK[55]	68	LVEF ≤ 40% and had at least NYHA Class II	169 (84/85)	6 months	Home exercise program	Specialist heart failure nurse care	6, 12 months
Lang 2018, UK[50]	74	HFpEF (LVEF ≥ 45%)	50 (25/25)	12 weeks	REACH-HF manual	Usual care	4, 6 months
Li 2015, China[56]	81	Angina, acute MI, heart failure	77 (37/40)	12 weeks	Home-based exercise program	Usual care after discharge	12 weeks
Marchionni 2003, Italy[54]	69	MI	270 (90/90 +90)	8 weeks	Home-based CR	Hospital-based CR or no CR	2, 8, 14 months
Oerkild 2011, Denmark[57]	75	Coronary heart disease (MI, PCI, CABG)	75 (36/39)	6 weeks	Home-based individualized exercise program	Center program with group-based supervised exercise training	3, 12 months
Oerkild 2012, Denmark[58]	77	Previous MI, PCI, CABG, heart failure LVEF ≤ 45%	40 (19/21)	12 months	Individualized home-based exercise program	Usual care	3, 12 months
Peng 2018, China[59]	66	NYHA Class I-III	98 (49/49)	8 weeks	Home-based telehealth exercise	Usual care	2, 6 months

					training program		
Snoek 2021, Netherlands[47]	73	Acute coronary syndrome, coronary revascularization, surgical or percutaneous treatment for valvular disease, or documented coronary artery disease	179 (89/90)	6 months	Home-based mobile guided CR program	Standard care	6, 12 months
Suskin 2007, Canada[60]	66	Coronary artery disease	55 (29/26)	12 weeks	Home-based exercise training	Usual activity	12 weeks
Wall 2010, US[51]	70	NYHA Class I-III, LVEF ≤ 60%	19 (9/10)	12 months	Home-based exercise program with comprehensive disease management program	Comprehensive disease management program	6, 12 months

Risk of Bias

Risk of bias assessment was performed for primary outcomes using the RoB 2 tools. Overall risk of bias in exercise capacity outcomes was judged as some concerns for studies included in meta-analysis. For HRQoL outcomes, an overall risk of bias was judged to be at high risk of bias in all studies considering the characteristics of self-reported questionnaires, and nature of intervention, since it was impossible to blind the participants, care givers and personnel delivering the intervention.

Primary Outcomes

Exercise capacity: Exercise capacity was reported in all included studies, with one exception.[45] Four studies[42,57,58,60] were excluded from the SMD analysis as suggested in the Cochrane Handbook, because these studies reported only the change value, whereas the final values were reported in all other included studies.[61] Compared to centre-based CR, pooled data showed no significant difference (SMD -0.02, 95% CI -0.33 to 0.29, P = 0.90; I^2 = 4%, Chi^2 = 2.09, P = 0.35), but a significant effect was showed in home-based CR when compared to UC (SMD 0.32, 95% CI 0.16 to 0.47, P < 0.0001; I^2 = 38%, Chi^2 = 19.45, P = 0.05). Compared to centre-based CR, pooled 6MWT outcomes showed no significant difference (MD -22.56, 95% CI -50.89 to 5.76, P = 0.12; I^2 = 0%, Chi^2 = 0.33, P = 0.56), however, a significant effect was showed in home-based CR when compared to UC (MD 28.37, 95% CI 10.23 to 46.52, P = 0.002; I^2 = 59%, Chi^2 = 17.27, P = 0.02). One study reported the change value of VO2 peak, which was excluded from the SMD analysis and inappropriate to be included in the MD analysis, also showed improvement in the home-based CR compared to UC.[60]

HRQoL: Following the advice in the Cochrane Handbook, four studies[42,51,57,58] were excluded from the SMD analysis, since these studies reported only the change value, while final values were reported in all other included studies.[61] Comparing to centre-based CR, pooled analysis found no significant difference (SMD -0.25, 95% CI -0.67 to 0.17 P = 0.25; I^2 = 39%, Chi^2 = 3.27, P = 0.19), but a significant effect was showed in home-based CR when compared to UC (SMD -0.26, 95% CI -0.40 to -0.11, P = 0.0005; I^2 = 18%, Chi^2 =13.42, P = 0.27). The pooled analysis of MLHFQ outcomes reported a significant effect in the home-based CR (MD -3.45, 95% CI -5.69 to -1.21, P = 0.003; I^2 = 7%, Chi^2 = 9.72, P = 0.37). Notably, there are only one study comparing with centre-based CR reported on HRQoL using MLHFQ. Moreover, there was three studies which were excluded from the SMD analysis and inappropriate to be included in the MD analysis. One study compared with centre-based CR reported the change value of 12-Item Short Form Survey (SF-12) showed no significant difference.[57] In the two studies compared with UC, one reported the change value of SF-12 and another reported the change value of Chronic Heart Failure Questionnaire, both reported no significant effect.[51,58]

Secondary Outcomes

All-cause mortality: All-cause mortality was reported in ten studies, involving 1,495 participants.[43–47,51,52,55,57,58] Only two studies comparing with centre-based CR reported on this outcome.[44,57] One of these studies reported no outcomes for both home-based and centre-based CR.[44] The pooled data showed no significant difference in reducing all-cause mortality (RR 0.92, 95% CI 0.56 to 1.50, P = 0.73; I^2 = 0%, Chi^2 = 3.52, P = 0.90).

Cardiovascular-related mortality: Only three studies reported on cardiovascular-related mortality, involving 445 participants.[43,47,50] There are no studies comparing with centre-based CR reported on this outcome. The pooled data showed no significant difference in reducing cardiovascular-related mortality (RR 0.58, 95% CI 0.12 to 2.84, P = 0.50; I^2 = 0%, Chi^2 = 1.37, P = 0.50).

All-cause hospitalisation: All-cause hospitalisation was reported among five studies, involving 627 participants.[42,43,45,50,55] There are no studies comparing with centre-based CR reported on this outcome. The pooled data showed statistically significant effect in reducing all-cause hospitalisation in the intervention group (RR 0.67, 95% CI 0.51 to 0.87, P = 0.003; I^2 = 0%, Chi^2 = 1.72, P = 0.79).

Cardiovascular-related hospitalisation: Cardiovascular-related hospitalisation was reported in five studies, involving 726 participants.[42,43,47,50,55] There are no studies comparing with centre-based CR reported on this outcome. The pooled data showed no significant difference in reducing cardiovascular-related hospitalisation (RR 0.70, 95% CI 0.38 to 1.27, P = 0.24; I^2 = 46%, Chi^2 = 7.34, P = 0.12).

Sensitivity Analyses

Sensitivity analyses with classic take-one-out strategy was performed to deal with the heterogeneity issues in the exercise capacity outcomes comparing with UC. After excluding the study by Snoek et al. and Peng et al., the heterogeneity was reduced significantly.[47,59] The heterogeneity reduced significantly after exclusion of study by Bernocchi et al. and Peng et al. for the pooled 6MWT outcomes. Other outcomes were not subjected to such sensitivity analyses since none of them had significant heterogeneity issues.[42,59]

Reporting Biases

No evidence of funnel plot asymmetry observed for primary. The potential publication bias in secondary outcomes could not be assessed since only a limited amount of data reported.

Certainty of Evidence

The certainty of evidence across all outcomes was ranged from very low to moderate.

DISCUSSION

This is, to the best of our knowledge, the first systematic review and meta-analysis evaluating effects of home-based CR focusing on elderly patients considering evidence from RCTs. The results showed home-based CR significantly improved exercise capacity and HRQoL compared to UC, and had similar improvements for exercise capacity and HRQoL compared to centre-based CR. In our meta-analysis, the risk of overall hospitalisation was reduced with home-based CR, however, there was no significant difference in the impact on all-cause mortality, cardiovascular-related mortality, and cardiovascular-related hospitalisation. By obtaining current best evidence, home-based CR appears to be effective and safe for elderly patients, indicates that this approach is not inferior to, and is as effective as the centre-based CR for the elderly patients.

Notably, the contents of prescribed exercise for the home-based CR in the included studies varied significantly. Even though the exercise training program varied between studies, the exercise training program was favourably accepted and implemented safely without causing any complications for the participants. Hence, the exercise strategies in the home-based CR may increase the accessibility and beneficial for the elderly comparing to centre-based CR.[3]

Our findings in this study were consistent with previous Cochrane review which compared the effect of home-based CR with supervised centre-based CR, which primarily included studies with middle-aged participants, reported home-based and centre-based CR appears to be equally effective in terms of improving the outcomes of exercise capacity, HRQoL, and mortality.[32] Our results also similar with a previous systematic review comparing home-based CR in patients with heart failure, reported home-based CR were identical to the centre-based CR on exercise capacity and HRQoL, and had improvement in both exercise capacity and HRQoL compared to UC, but in contrast, they reported no significant reduction in the risk of hospitalisation.[30] Our results also consistent with a recent systematic review which focused on the outcomes of functional capacity and HRQoL in home-based CR alone and hybrid model with centre-based CR in patients with heart failure, which found no differences between home-based and centre-based CR, and significant improvement when compared to UC.[24]

Our findings also consistent with several previous studies focused on exercise-based CR, which showed no significant effects in reduction of all-cause and cardiovascular-related mortality.[21–23,31] However, some reviews reported long-term cardiovascular-related mortality was found to be significantly reduced.[21,31] To a certain extent, this could be caused by the non-random nature of intervention, as elderly are generally considered as high-risk patients and are less likely to be involved in CR. The outcomes of HRQoL, cardiovascular-related mortality and hospitalisation in this study also similar with a recent systematic review evaluating the effects of eHealth CR compared with UC or an active comparator such as the centre-based CR, but they reported no statistically significant effect on exercise capacity.[26]

CR with mobile or internet-based technologies proven to be useful and effectively utilised, particularly in increasing participation rate, improving exercise capacity and HRQoL, and eventually reducing risk of hospitalisation and mortality.[28,62–67] Even there are challenges for adoption to these technologies, evidence

shows these technologies are appealing and the elderly are motivated to adopt these.[64] Besides, there are also some evidence indicating education intervention showed a positive relationship with physical activity, improved HRQoL, and reduced hospitalisation.[68–70] It is clear that technological advancements in which the method of interaction used and utilisation of education intervention during CR affects participation rate, motivation of participants, and effectiveness in home-based CR.

Strengths and limitations

Briefly, there are some important strengths in this study. This study was performed following the recommendation of guidelines, and we searched the databases with no date and language restrictions. Furthermore, the certainty of evidence in this study was evaluated using the GRADE approach. Most importantly, this is the first systematic review and meta-analysis that evaluates the impact of home-based CR in the elderly patients who are rarely focused in the previous studies, which indicating an important research gap, and this study provided evidence to reduce the gap in the implementation of home-based CR in this population.

There are a few limitations in this study that should be noted. Firstly, broad range of intervention can make a substantial contribution to diversity in outcomes between studies. Thus, a direct comparison of intervention is particularly challenging due to varied characteristics of exercise and other supporting intervention, it is difficult to interpret which component primarily responsible for the observed differences. Secondly, considering the ultimate objective of CR is long-term adaptations, the duration of intervention and period of follow-up in most studies are relatively short. Additionally, due to short and inconsistent period of follow-up, outcomes on adverse events such as death and hospitalisation was poorly reported. Due to limitation of reported information, most included studies was judged some concern for risk of bias. The certainty of evidence mostly downgraded due to methodological limitations, and imprecision of results. It is important to interpret these findings carefully.

Implications for practice

The results of our meta-analysis supports the recommendation that exercise-based CR should be provided to patients with coronary heart disease or heart failure.[71–75] The most typical delivery of CR is centre-based program. However, our findings suggest home-based CR could be an alternative to centre-based CR for elderly patients who frequently have special demands that make participation difficult. Nevertheless, preference of patients may be considered when making decision for selection of home-based or centre-based CR.

Implications for research

Further efforts are needed to fully understand the impact of home-based CR in elderly patients. Future RCTs should designed to assess the long-term effects of home-based CR on clinical and behavioural outcomes in the elderly patients. These findings will increase the feasibility of an individualised model of home-based CR for the older population.

CONCLUSION

Briefly, provision of home-based CR to elderly patients with coronary heart disease or heart failure significantly improved exercise capacity and HRQoL compared to UC, and there is no evidence of an increased risk of mortality or hospitalisation. The impact of home-based CR was similar to centre-based CR in terms of exercise capacity and HRQoL. Taken together, home-based CR is safe and effective as the centre-based CR, hence, should be promoted as an alternative strategy among elderly patients with coronary heart disease or heart failure who have difficulties in participation of centre-based CR.

AUTHORS CONTRIBUTION

All authors contributed equally to the concept, methodology, data collection, data analysis, composing the draft or revising the article, as well as giving final approval of the version to be published, and agree to be accountable for all aspects of the work.

DATA AVAILABILITY

Data supporting this study are included in article. Supplemental materials are available upon reasonable request.

ETHICAL APPROVAL

Ethical approval not required since this is a systematic review and meta-analysis. Data was retrieved and synthesised from published studies.

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DISCLOSURE

The authors have no conflict of interest to declare.

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