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Systematic Review/Meta-analysis

Cardiac Rehabilitation Programs for Chronic Heart Disease: A Bayesian Network Meta-analysis

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ABSTRACT

Background: Cardiac rehabilitation is a medically supervised program after coronary events that involves exercise and dietary modification. We evaluated the comparative benefits and harms of cardiac rehabilitation strategies via a network meta-analysis.

Methods: We followed a pre-specified protocol (PROSPERO: CRD42018094998). We searched Embase, MEDLINE, and Cochrane Central Register of Randomized Trials databases for randomized controlled trials that evaluated cardiac rehabilitation vs a second form of rehabilitation or standard/usual care in adults after myocardial infarction or stroke.

Results: We identified 29 randomized, controlled trials with a total of 14,649 patients. Cardiac rehabilitation reduced the risk of non-fatal myocardial infarction (relative risk 0.71; 95% confidence interval 0.57–0.88) and total mortality (relative risk 0.74; 95% confidence interval 0.62–0.88) compared with standard or usual care.

Conclusion: Cardiac rehabilitation significantly reduces the risk of non-fatal myocardial infarction and total mortality compared with standard or usual care.

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infarction, coronary artery bypass grafting, percutaneous coronary intervention, or angiography. Risk of bias and evidence quality was evaluated using the Cochrane tool and Grading of Recommendations Assessment, Development and Evaluation (GRADE), respectively. Pairwise and Bayesian network meta-analyses were performed for 11 clinical outcomes.

Results: We included 134 randomized controlled trials involving 62,322 participants. Compared with standard care, exercise-only cardiac rehabilitation reduced the odds of cardiovascular mortality (odds ratio [OR], 0.70; 95% credibility interval [Cr], 0.51–0.96; moderate-quality evidence), major adverse cardiovascular events (OR, 0.74; 95% Cr, 0.54–0.98; moderate-quality evidence), and cardiovascular hospitalization (OR, 0.69; 95% Cr, 0.51–0.88; moderate-quality evidence). Exercise-only cardiac rehabilitation was associated with lower cardiovascular hospitalization risk relative to cardiac rehabilitation without exercise (OR, 0.68; 95% Cr, 0.48–0.97; moderate-quality evidence).

Conclusions: Cardiac rehabilitation programs containing exercise might provide broader cardiovascular benefits compared with those without exercise.

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Therefore, controlling the CHD epidemic requires approaches that target modifiable risk factors for the disease. Cardiac rehabilitation is a medically supervised program for patients after MI, coronary artery bypass grafting (CABG), or percutaneous coronary intervention (PCI) that involves adopting heart-healthy lifestyle changes to address key CHD risk factors. Cardiac rehabilitation programs have been recognized as integral to comprehensive CHD patient care by several clinical authorities. A pairwise meta-analysis of exercise-based cardiac rehabilitation consisting of 63 studies with 14,486 participants showed that exercise-based cardiac rehabilitation reduced cardiovascular mortality and hospital admissions compared with usual care. However, these conclusions were derived from a subset of the overall randomized controlled trial (RCT) evidence base and might represent bias because of selective outcome reporting.

More recently, researchers have applied network meta-analytical techniques to comparatively analyze cardiac rehabilitation strategies. However, these previous network meta-analyses have focused solely on assessing quality of life outcomes, by comparing the core components of cardiac rehabilitation against each other, or investigating exercise-based cardiac rehabilitation while excluding non-exercise-based cardiac rehabilitation modalities, such as nutritional counselling, risk factor modification, psychosocial management, and patient education. To address these limitations, we performed a network meta-analysis to evaluate the comparative effects of all major cardiac rehabilitation strategies across a broad array of mortality and cardiovascular outcomes for adults with CHD.

### Methods

#### Study overview

We conducted a Bayesian network meta-analysis of RCTs reported according to the EQUATOR, reporting guidelines, including Meta-analysis of Observational Studies in Epidemiology (MOOSE) and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Network Meta-Analyses (NMA) statement (PRISMA NMA file: Supplemental Table S1). We followed a pre-specified protocol (PROSPERO number: CRD42018094998).

#### Electronic searches

We searched for parallel-group RCTs that evaluated cardiac rehabilitation vs a second form of cardiac rehabilitation or standard/usual care in CHD-confirmed adults after MI, CABG, PCI, or angiography. We searched Embase, MEDLINE, and the Cochrane Central Register of Randomized Trials (CENTRAL). See Supplemental Appendix A for search terms used in strategies in this review. The search strategy was designed by an information specialist without language or date restriction.
Selection of studies

Titles and abstracts of retrieved records were screened independently by 2 authors (provide initials), who discarded studies that did not meet the eligibility criteria. The same 2 authors reviewed the full text of potentially eligible studies to determine which studies satisfy the inclusion criteria.

We only included randomized trials that evaluated 1 cardiac rehabilitation strategy vs a second cardiac rehabilitation strategy or standard/usual care as follows: exercise-only cardiac rehabilitation vs comprehensive cardiac rehabilitation (exercise with education, counselling, risk factor modification, and/or psychosocial management) vs cardiac rehabilitation without exercise (only education, counselling, risk factor modification, and/or psychosocial management) vs standard/usual care. If a randomized intervention common to 2 or more arms in the trial was evaluated (for example, exercise-only cardiac rehabilitation vs comprehensive cardiac rehabilitation), we coded the intervention comparison as is. The comparator could include a second cardiac rehabilitation approach or standard/usual care. We recorded and report all treatments administered as cointerventions in the eligible trials. We considered “standard/usual care” interventions separately within the network. We included trials in which allocation to treatment was not adequately concealed but considered this risk of bias in our analyses. We only included studies with adult patients (18 years old or older) who had non-heart failure CHD (MI, had undergone revascularization [CABG or PCI], or who had angina pectoris or CHD confirmed using angiography). We excluded studies in people with heart failure and other forms of vascular disease (cerebrovascular disease, stroke, peripheral vascular disease, etc). We assumed that any participant who met the inclusion criteria was, in principle, equally likely to be randomized to any of the eligible interventions.

Because short-term follow-up periods limit assessment of the effects on mortality and morbidity outcome measures, all eligible RCTs must have a minimum follow-up period of at least 6 months. We did not include quasirandomized trials (RCTs in which allocation to treatment was obtained using alternation, use of alternate medical records, date of birth, or other predictable methods) or crossover trials.

Outcome measures

The primary outcome measures were all-cause mortality, cardiovascular mortality, major adverse cardiovascular events (MACE), nonfatal MI, heart failure, and nonfatal stroke or TIA. The secondary outcome measures were PCI revascularization, CABG revascularization, all-cause hospitalization, cardiovascular hospitalization, and depression.

Data extraction and management

Data extraction was carried out independently by 2 authors using Microsoft Excel spreadsheets (Microsoft Corp, Redmond, WA). We extracted data for: date of publication (before the year 2000 vs year 2000 and after), CHD population type (post-MI patients only, angina patients only, postrevascularization only, mixed CHD patient population, etc), setting (home-based, centre-based, combination of home-based and centre-based, etc), sample size (n < 100 vs n > 100), duration of cardiac rehabilitation program (< 3 months vs > 3 months), duration of follow-up (< 12 months vs > 12 months), mean age (younger than 50 years vs older than 50 years), proportion of men (< 50% vs > 50%), source of funding (government vs industry vs other), study design, intervention strategies, risks of bias, outcomes, the duration of the intervention, the number of patients experiencing the event (for binary outcomes), the value of any continuous measure on a standardized scale if necessary, and the interventions being compared. Arm-level data were extracted. We used an empirical continuity correction of 0.01 for 0 event trials.

We used the Template for Intervention Description and Replication (TIDieR) checklist, which contains 12 items that enable completeness of reporting for RCT interventions, to extract intervention data to describe the rehabilitation interventions in sufficient detail. The 12 TIDieR checklist items include: brief description of the intervention, rationale, materials, what (procedure), who (provider), how (delivery, individual, or group, and duration), where (location), when and how much (intensity and frequency), tailoring, modifications, planning (fidelity assessment), and adherence to plan (fidelity outcomes). We extracted from each included study data on the following additional information: randomized cardiac rehabilitation intervention(s) and comparator(s), name of cardiac rehabilitation, type of cardiac rehabilitation, frequency of cardiac rehabilitation sessions, duration of cardiac rehabilitation sessions, intensity of each cardiac rehabilitation session (percent of maximal heart rate, percent of maximal oxygen uptake, Borg rating, etc), nonrandomized or randomized cointerventions (administered to all treatment groups). Data were cross-checked between authors and any discrepancies were resolved through discussion and if necessary with a third author. Studies reported in non-English language journals were electronically translated before assessment. When more than 1 publication of 1 study was found, reports were grouped together and the publication with the complete data was used in the analyses. When relevant outcomes were only published in earlier versions those data were used. Any discrepancy between published versions was highlighted. When studies reported outcomes separately for groups on the basis of patient characteristics, data were entered separately into analyses, designated by a suffix after the study name to identify the subgroup. Any disagreements in data extraction were highlighted and discussed with a third author.

Assessment of risk of bias in included studies

Eight domains were assessed in all included RCTs using the risk of bias assessment tool described in the Cochrane Handbook. For each RCT, each domain was graded as yes (low risk of bias), no (high risk of bias), or unclear. The sum of yes scores was taken as an overall quality score. RCTs with an overall quality score of 0-2 were deemed to have a high risk of bias, an overall quality score of 3-5 were deemed to have a moderate risk of bias, and an overall quality score of 6-8 were deemed to have a low risk of bias.

Evaluation of evidence quality

We applied the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group’s
rating of evidence quality for specific comparisons included in a network meta-analysis. 20,21 According to the GRADE Working Group, the GRADE rating is not a rating of certainty or confidence in the effect estimates; rather, it is an assessment of evidence quality on the basis of several factors: limitations in study design and/or execution, imprecision, heterogeneity, incoherence, indirectness, and publication bias. 22 The first 5 items are rated at 3 levels (ie, no concerns, some concerns, or major concerns), whereas publication bias is rated as undetected or suspected. We used the GRADE Working Group’s 4-step approach to assess evidence quality in each evidence network: (1) present direct and indirect treatment estimates for each comparison; (2) rate the evidence quality of each direct and indirect effect estimate; (3) present the network meta-analysis estimate for each comparison; and (4) rate the evidence quality of each network meta-analysis effect estimate. 21

Data synthesis

The methods for data synthesis are fully detailed in Supplemental Appendix B. Briefly, results from the pairwise and Bayesian network meta-analyses (PRISMA NMA file: Supplemental Boxes S1 and S3) are presented as summary relative effect sizes (ie, Hedges’ adjusted g standard mean differences or odds ratios [ORs]) for each possible pair of treatments. We conducted effect modifier analyses to evaluate the assumption to transitivity (PRISMA NMA file: Supplemental Box S2). For each outcome, we assessed statistical heterogeneity and inconsistency (PRISMA NMA file: Supplemental Box S4) and provided a network graph detailing the network geometry (PRISMA NMA file: Supplemental Box S5, Supplemental Figures S1 and S2). We also estimated the ranking probabilities for all treatments and obtained a treatment hierarchy using a surface under the cumulative ranking curve analysis (SUCRA; PRISMA NMA file: Supplemental Box S6, Supplemental Figure S3). The SUCRA score is reported as a percentage and represents the cumulative probability of a particular treatment being the top-ranking treatment among a set of n treatments; thus, the closer the SUCRA score is to 100%, the higher ranking the treatment in the hierarchy. 3

Role of the funding source

The funders of this study had no role in study design, data collection, data analysis, data interpretation, writing of the report, or in the decision to submit for publication. All co-authors had full access to all the data, and Giovanni F.M. Strippoli was responsible for the decision to submit for publication.

Results

Study selection and characteristics of included studies

One hundred thirty-four RCTs were eligible for inclusion. These were published between 1975 and 2017. The interventions were comprehensive cardiac rehabilitation, cardiac rehabilitation without exercise, and exercise-only cardiac rehabilitation or standard care. The characteristics of the 134 included RCTs are summarized in Supplemental Appendix C. All of the included RCTs were 2-arm parallel-group RCTs, and 90.3% (121/134) were standard/usual care-controlled RCTs. The total population consisted of 62,322 participants. The median sample size per RCT was 171 participants (SD, 1165; range, 28-12,245). The mean participant age was 81.8 years (SD, 13.2 years; range, 44.0-100.0 years), and 85% of the sample population was male. The median follow-up duration was 1.0 years (interquartile range, 1.0-3.0 years).

Cochrane risk of bias assessment

The results of the Cochrane risk of bias assessment across the 8 domains are detailed in Supplemental Appendix C. According to this assessment, 62 (46%) of the 134 RCTs reported on randomization, 52 (39%) trials had allocation concealment, 57 (43%) had a blinding assessment, 81 (60%) adequately described drop-outs/withdrawals, 78 (58%) used an intention to treat analysis, 111 (83%) were deemed to have low risk of selective reporting bias, 100 (75%) showed participant similarity at baseline, and 80 (60%) adequately controlled for interventions. The definitions of these domain terms have been detailed in the Cochrane Handbook. 19

Outcomes

Pairwise forest plots, SUCRA scores, and league tables of effect estimates are shown in Supplemental Appendix D and E. Model fit, heterogeneity data, and inconsistency data are shown in Supplemental Appendix F. Assessments of small-study effects are presented in Supplemental Appendix G. GRADE assessments of evidence quality are presented in Supplemental Appendix H.

All-cause mortality. The network plot of eligible comparisons for all-cause mortality is shown in Figure 2A. Only comprehensive cardiac rehabilitation was associated with lower all-cause mortality risk relative to standard care (OR, 0.80; 95% CrI, 0.64-0.97; moderate-quality evidence; Figure 2B, Supplemental Appendix D), but it did not show superiority over the other rehabilitation interventions (Supplemental Appendix E). There was no evidence of significant network heterogeneity ($I^2 = 4.96%$; Supplemental Appendix F). In addition, no inconsistency between direct and indirect comparisons was identified ($P = 0.66$). Evaluation of the goodness of fit indicated a good fit with a posterior mean residual deviance of 112.53 (data points = 203).

Cardiovascular mortality. The network plot of eligible comparisons for cardiovascular mortality is shown in Figure 2C. Cardiac rehabilitation without exercise (OR, 0.64; 95% CrI, 0.45-0.82; low-quality evidence) and exercise-only cardiac rehabilitation (OR, 0.70; 95% CrI, 0.51-0.96; moderate-quality evidence) were associated with lower cardiovascular mortality risk relative to standard care (Figure 2D, Supplemental Appendix D), but neither of them showed superiority over each other or the comprehensive program (Supplemental Appendix E). SUCRA showed that comprehensive cardiac rehabilitation without exercise ranked first (SUCRA = 83.3%), followed by exercise-only cardiac rehabilitation (SUCRA = 66.0%). No evidence of significant network heterogeneity was detected ($I^2 = 0%$; Supplemental Appendix F).
Appendix F). No evidence of inconsistency between direct and indirect comparisons was detected ($P = 0.97$). Egger’s test showed evidence of small-study effects ($P = 0.03$; Supplemental Appendix G).

**MACE.** The network plot of eligible comparisons for MACE is shown in Figure 3A. Compared with standard care, comprehensive cardiac rehabilitation (OR, 0.52; 95% CrI, 0.35-0.75; low-quality evidence) and exercise-only cardiac rehabilitation (OR, 0.57; 95% CrI, 0.40-0.78; low-quality evidence) were associated with lower MACE risk (Figure 3B, Supplemental Appendix D), but neither of them showed superiority over each other or the comprehensive program (Supplemental Appendix E). SUCRA showed that exercise-only cardiac rehabilitation without exercise ranked first (SUCRA = 85.4%), followed by comprehensive cardiac rehabilitation without exercise (SUCRA = 59.3%). No evidence of significant network heterogeneity was detected ($I^2 = 44.47$%; Supplemental Appendix F). There was no evidence of inconsistency between direct and indirect comparisons ($P = 0.20$).

**Nonfatal MI.** The network plot of eligible comparisons for nonfatal MI is shown in Figure 3C. Exercise-only cardiac rehabilitation (OR, 0.71; 95% CrI, 0.54-0.93; moderate-quality evidence) and cardiac rehabilitation without exercise (OR, 0.78; 95% CrI, 0.59-0.99; moderate-quality evidence) were associated with lower nonfatal MI risk relative to standard care (Figure 3D, Supplemental Appendix D), but neither of them showed superiority over each other or the comprehensive program (Supplemental Appendix E). SUCRA showed that exercise-only cardiac rehabilitation without exercise ranked first (SUCRA = 76.5%), followed by cardiac rehabilitation without exercise (SUCRA = 59.3%). No evidence of significant network heterogeneity was detected ($I^2 = 5.84$%; Supplemental Appendix F). There was no evidence of inconsistency between direct and indirect comparisons ($P = 0.88$). Egger’s test showed evidence of small-study effects ($P = 0.05$).

**Heart failure.** The network plot of eligible comparisons for heart failure is shown in Figure 4A. No intervention was superior to standard care in reducing heart failure risk (Figure 4B, Supplemental Appendix D). There was neither evidence of significant network heterogeneity ($I^2 = 28.43$%) nor inconsistency between direct and indirect comparisons ($P = 0.95$; Supplemental Appendix F).

**Nonfatal stroke/TIA.** The network plot of eligible comparisons for nonfatal stroke/TIA is shown in Supplemental Appendix E. Exercise-only cardiac rehabilitation was associated with lower nonfatal stroke/TIA risk compared with standard care (OR, 0.00; 95% CrI, 0.00-0.50; very
low-quality evidence; Supplemental Appendix D), comprehensive cardiac rehabilitation (OR, 0.00; 95% CrI, 0.00-0.70; very low-quality evidence), and cardiac rehabilitation without exercise (OR, 0.00; 95% CrI, 0.00-0.92; very low-quality evidence; Supplemental Appendix E). It should be noted that the very low-quality evidence across all comparisons underlying this outcome reduces the reliability of this particular set of results. There was neither evidence of significant network heterogeneity ($I^2 = 0\%$) nor inconsistency between direct and indirect comparisons ($P = 0.45$; Supplemental Appendix F). Egger’s test showed evidence of small-study effects ($P = 0.01$).

**PCI revascularization.** The network plot of eligible comparisons for PCI revascularization is shown in Supplemental Appendix E. Only comprehensive cardiac rehabilitation was associated with lower PCI revascularization risk relative to standard care (OR, 0.74; 95% CrI, 0.54-0.91; moderate-quality evidence; Supplemental Appendix D), but it did not show superiority over the other rehabilitation interventions (Supplemental Appendix E). No evidence of significant network heterogeneity was detected ($I^2 = 0\%$; Supplemental Appendix F). Additionally, there was no evidence of inconsistency between direct and indirect comparisons ($P = 0.17$).
CABG revascularization. The network plot of eligible comparisons for CABG revascularization is shown in Supplemental Appendix E. Only comprehensive cardiac rehabilitation was associated with lower CABG revascularization risk relative to standard care (OR, 0.78; 95% CrI, 0.59-0.97; moderate-quality evidence; Supplemental Appendix D), but it did not show superiority over the other rehabilitation interventions (Supplemental Appendix E). There was no evidence of significant network heterogeneity ($I^2 = 9.26\%$) nor inconsistency between direct and indirect comparisons ($P = 0.11$; Supplemental Appendix F).

All-cause hospitalization. The network plot of eligible comparisons for all-cause hospitalization is shown in Supplemental Appendix E. Only exercise-only cardiac rehabilitation was associated with lower all-cause hospitalization risk relative to standard care (OR, 0.74; 95% CrI, 0.54-0.98; moderate-quality evidence; Supplemental Appendix D), but it did not show superiority over the other rehabilitation interventions (Supplemental Appendix E). Moderate network heterogeneity was detected ($I^2 = 59.59\%$; Supplemental Appendix F). No evidence of inconsistency between direct and indirect comparisons was identified ($P = 0.22$). Egger’s test showed evidence of small-study effects ($P = 0.05$).

Cardiovascular hospitalization. The network plot of eligible comparisons for cardiovascular hospitalization is shown in Supplemental Appendix E. Exercise-only cardiac rehabilitation was associated with lower cardiovascular hospitalization risk relative to standard care (OR, 0.69; 95% CrI, 0.50-0.95; moderate-quality evidence; Supplemental Appendix D).

Figure 3. Network meta-analysis of eligible comparisons for major adverse cardiovascular events (MACE) and nonfatal myocardial infarction (MI). (A, C) Network plot of eligible comparisons for (A) MACE and (C) nonfatal MI. The size of the nodes (circles) corresponds to the number of trials of the treatments. Comparisons are linked with a line, the thickness of which corresponds to the number of trials in which the comparison was assessed. Numbers next to every line joining 2 treatments correspond to the number of studies in which the treatments were compared. (B, D) Forest plots of network meta-analysis of all randomized controlled trials for (B) MACE and (D) nonfatal MI. Cardiac rehabilitation (CR) interventions were compared against standard/usual care (SC), which was the reference intervention. COMP, comprehensive; CrI, credibility interval; OR, odds ratio; w/o, without.
Depression. The network plot of eligible comparisons for depression is shown in Supplemental Appendix E. Only cardiac rehabilitation without exercise was associated with lower depression risk relative to standard care (standard mean difference, −1.01; 95% CrI, −1.68 to −0.41; moderate-quality evidence; Supplemental Appendix D). No evidence of network heterogeneity was detected ($I^2 = 26.72%$; Supplemental Appendix F). In addition, no evidence of inconsistency between direct and indirect comparisons was identified ($P = 0.54$).

Our analysis showed that cardiac rehabilitation programs containing exercise (ie, exercise-only and comprehensive cardiac rehabilitation) had a positive effect on the greatest number of investigated outcomes. The finding is not surprising, because exercise has traditionally been considered a cornerstone component of cardiac rehabilitation.23 This is in agreement with the findings of Anderson et al., in their meta-analysis of 14,486 participants,24 who reported significant reductions in cardiovascular mortality risk and all-cause hospitalization risk in patients using an exercise-based rehabilitation protocol compared with those given standard care.10 Consistent with our findings, they also reported no significant effect for exercise-based rehabilitation on all-cause mortality or revascularization. Moreover, Sagar et al., in their meta-analysis consisting of 4740 heart failure patients,25 reported that exercise-based cardiac rehabilitation reduced the risk of all-cause hospitalization and heart failure-specific hospitalization. Here, we also determined that exercise-only cardiac rehabilitation produced significant reductions in all-cause and cardiovascular hospitalization risk compared with standard care. It should be noted that most candidates for exercise-based cardiac rehabilitation programs do not attend or complete conventional exercise-based cardiac rehabilitation programs because of long commuting times, poor access to transportation, infrastructural limitations, insufficient capacity, and other issues.26-28 Therefore, remote exercise-based cardiac rehabilitation programs, such as home-based, internet-based, and local community-based models, are needed as alternatives to conventional programs.29-34

This network meta-analysis has strengths and limitations. Most previous conventional reviews and meta-analysis on cardiac rehabilitation have focused on mortality, hospitalization, psychological well-being/quality of life, and cardiovascular risk profile metrics.10 Our network meta-analytic approach better enabled us to robustly analyze less
commonly reported outcomes such as MACE, nonfatal MI, and PCI revascularization and reveals that cardiac rehabilitation programs with exercise might provide broader cardiovascular benefits compared with those without exercise. With regard to limitations, the current meta-analysis included imprecision and heterogeneity in several outcomes, which downgraded the levels of evidence quality for these outcomes. To address this shortcoming, future trials should follow more standardized protocols of cardiac rehabilitation. Second, in the nonfatal stroke/TIA risk outcome, we paradoxically found that exercise-only cardiac rehabilitation was associated with lower risk compared with comprehensive cardiac rehabilitation; however, the very low-quality evidence across all comparisons underlying the nonfatal stroke/TIA outcome reduces the reliability of these findings. Third, in some outcomes such as cardiovascular mortality and MACE, there were major concerns regarding incoherence between direct and indirect evidence. Fourth, several patient factors—such as peak metabolic equivalents, sex, age, obesity, diabetes, and smoking status—have been shown to be predictive of post-cardiac rehabilitation cardiorespiratory fitness levels. Clinical researchers are encouraged to focus on collecting and reporting these data to enable analysis of their effects on outcomes. Fourth, a recent meta-analysis attempt by Ghisi et al. revealed that, of 80 comprehensive cardiac rehabilitation trials initially identified, only 1 trial reported women-specific data. Indeed, the current meta-analysis only included 1 RCT with specific data on women participants, even though the selection criteria for this meta-analysis were not sexually-biased. This indicates the lack of women-specific cardiac rehabilitation data and should encourage clinical researchers to focus on cardiac rehabilitation programs targeting women with women-specific reporting. Fifth, investigators should also provide more data on quality of life and cost-effectiveness outcomes to better tailor specific rehabilitation programs.

In conclusion, this network meta-analysis provides evidence that cardiac rehabilitation programs containing exercise might provide broader cardiovascular benefits compared with those without exercise. These results should guide evidence-based practice and inform decision-makers on the relative merits of the different cardiac rehabilitation approaches. More broadly, because physical inactivity is a leading modifiable risk factor underlying mortality and physically active individuals of all ages show lower risks for developing chronic CHD relative to inactive individuals, the development and implementation of community programs to increase physical activity among individuals of all ages should be encouraged.

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**Disclosures**

The authors have no conflicts of interest to disclose.

**Uncited Figure**

Figure 1.

**References**


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Supplementary Material
To access the supplementary material accompanying this article, visit the online version of the Canadian Journal of Cardiology at www.onlinecjc.ca and at https://doi.org/10.1016/j.cjca.2020.02.072.