

A review of the cost-effectiveness of home-based cardiac rehabilitation

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Search strategies

Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions(R) <1946 to October 29, 2021>

Search Strategy:

-
- 1 (cardiac adj rehab\$).mp.
 - 2 exp cardiovascular diseases/rh
 - 3 exp myocardial infarction/
 - 4 mi.tw.
 - 5 myocardial ischemia/
 - 6 exp angina pectoris/
 - 7 exp heart failure, congestive/
 - 8 exp heart defects, congenital/
 - 9 exp heart valve diseases/
 - 10 rheumatic heart disease/
 - 11 exp heart transplantation/
 - 12 angioplasty, transluminal, percutaneous coronary/
 - 13 ptca.tw.
 - 14 coronary disease/
 - 15 cardiovascular diseases/
 - 16 heart diseases/
 - 17 coronary artery bypass/
 - 18 cabg.tw.
 - 19 (heart adj disease\$).mp.
 - 20 (myocard\$ adj infarct\$).mp.
 - 21 coronary artery disease/
 - 22 acute coronary syndrome/
 - 23 percutaneous coronary intervention/

- 24 PCI.tw.
- 25 stent.tw.
- 26 unstable angina/
- 27 chronic heart failure/
- 28 CHF.tw.
- 29 implantable cardiac defibrillat\$.mp.
- 30 ICD.tw.
- 31 or/3-30
- 32 rehabilitation/
- 33 rehabilitation cent&.mp.
- 34 rehabilitation nursing/
- 35 rehab\$.tw.
- 36 or/32-35
- 37 1 or 2 or (31 and 36)
- 38 Economics/
- 39 exp "costs and cost analysis"/
- 40 Economics, Dental/
- 41 exp economics, hospital/
- 42 Economics, Medical/
- 43 Economics, Nursing/
- 44 Economics, Pharmaceutical/
- 45 (economic\$ or cost or costs or costly or costing or price or prices or pricing or pharmacoeconomic\$).ti,ab.
- 46 (expenditure\$ not energy).ti,ab.
- 47 value for money.ti,ab.
- 48 budget\$.ti,ab.
- 49 or/38-48
- 50 ((energy or oxygen) adj cost).ti,ab.
- 51 (metabolic adj cost).ti,ab.
- 52 ((energy or oxygen) adj expenditure).ti,ab.
- 53 or/50-52

- 54 49 not 53
- 55 letter.pt.
- 56 editorial.pt.
- 57 historical article.pt.
- 58 or/55-57
- 59 54 not 58
- 60 exp animals/ not humans/
- 61 59 not 60
- 62 limit 61 to yr="2006 -Current"
- 63 37 and 62**

Database: Embase <1974 to 2021 October 29>

Search Strategy:

-
- 1 (cardiac adj rehab\$).mp.
- 2 exp cardiovascular diseases/rh
- 3 exp myocardial infarction/
- 4 mi.tw.
- 5 myocardial ischemia/
- 6 exp angina pectoris/
- 7 exp heart failure, congestive/
- 8 exp heart defects, congenital/
- 9 exp heart valve diseases/
- 10 rheumatic heart disease/
- 11 exp heart transplantation/
- 12 angioplasty, transluminal, percutaneous coronary/
- 13 ptca.tw.
- 14 coronary disease/

- 15 cardiovascular diseases/
- 16 heart diseases/
- 17 coronary artery bypass/
- 18 cabg.tw.
- 19 (heart adj disease\$.mp.
- 20 (myocard\$ adj infarct\$.mp.
- 21 coronary artery disease/
- 22 acute coronary syndrome/
- 23 percutaneous coronary intervention/
- 24 PCI.tw.
- 25 stent.tw.
- 26 unstable angina/
- 27 chronic heart failure/
- 28 CHF.tw.
- 29 implantable cardiac defibrillat\$.mp.
- 30 ICD.tw.
- 31 or/3-30
- 32 rehabilitation/
- 33 rehabilitation cent&.mp.
- 34 rehabilitation nursing/
- 35 rehab\$.tw.
- 36 or/32-35
- 37 1 or 2 or (31 and 36)
- 38 Health Economics/
- 39 exp Economic Evaluation/
- 40 exp Health Care Cost/
- 41 pharmacoeconomics/
- 42 38 or 39 or 40 or 41
- 43 (econom\$ or cost or costs or costly or costing or price or prices or pricing or pharmacoeconomic\$.ti,ab.
- 44 (expenditure\$ not energy).ti,ab.

- 45 (value adj2 money).ti,ab.
- 46 budget\$.ti,ab.
- 47 43 or 44 or 45 or 46
- 48 42 or 47
- 49 letter.pt.
- 50 editorial.pt.
- 51 note.pt.
- 52 49 or 50 or 51
- 53 48 not 52
- 54 (metabolic adj cost).ti,ab.
- 55 ((energy or oxygen) adj cost).ti,ab.
- 56 ((energy or oxygen) adj expenditure).ti,ab.
- 57 54 or 55 or 56
- 58 53 not 57
- 59 animal/
- 60 exp animal experiment/
- 61 nonhuman/
- 62 (rat or rats or mouse or mice or hamster or hamsters or animal or animals or dog or dogs or cat or cats or bovine or sheep).ti,ab,sh.
- 63 59 or 60 or 61 or 62
- 64 exp human/
- 65 human experiment/
- 66 64 or 65
- 67 63 not (63 and 66)
- 68 58 not 67
- 69 conference abstract.pt.
- 70 68 not 69
- 71 limit 70 to yr="2006 -Current"
- 72 37 and 71

Database: APA PsycInfo <1806 to October Week 4 2021>

Search Strategy:

-
- 1 (cardiac adj2 rehab\$.ti,ab.
 - 2 (cardiovascular adj2 diseas\$.ti,ab.
 - 3 myocardial infarction.ti,ab.
 - 4 mi.mp.
 - 5 myocardial ischemia.ti,ab.
 - 6 angina pectoris.ti,ab.
 - 7 congestive heart failure.ti,ab.
 - 8 congenital heart defects\$.ti,ab.
 - 9 heart valve diseases.ti,ab.
 - 10 rheumatic heart disease.ti,ab.
 - 11 heart transplantation.ti,ab.
 - 12 angioplasty, transluminal, percutaneous coronary.ti,ab.
 - 13 ptca.mp.
 - 14 coronary disease.ti,ab.
 - 15 cardiovascular diseases.ti,ab.
 - 16 heart diseases.ti,ab.
 - 17 coronary artery bypass.ti,ab.
 - 18 cabg.mp.
 - 19 (heart adj2 disease\$.ti,ab.
 - 20 (myocard\$ adj2 infarct\$.ti,ab.
 - 21 coronary artery disease.ti,ab.
 - 22 acute coronary syndrome.ti,ab.
 - 23 percutaneous coronary intervention.ti,ab.
 - 24 PCI.mp.
 - 25 Stent.mp.
 - 26 unstable angina.ti,ab.

- 27 chronic heart failure.ti,ab.
- 28 CHF.mp.
- 29 implantable cardiac defibrillat\$.ti,ab.
- 30 ICD.mp.
- 31 or/3-30
- 32 rehabilitation.mp.
- 33 rehabilitation cent&.ti,ab.
- 34 rehabilitation nursing.ti,ab.
- 35 rehab\$.mp.
- 36 or/32-35
- 37 1 or 2 or (31 and 36)
- 38 "costs and cost analysis"/
- 39 "Cost Containment"/
- 40 (economic adj2 evaluation\$).ti,ab.
- 41 (economic adj2 analy\$).ti,ab.
- 42 (economic adj2 (study or studies)).ti,ab.
- 43 (cost adj2 evaluation\$).ti,ab.
- 44 (cost adj2 analy\$).ti,ab.
- 45 (cost adj2 (study or studies)).ti,ab.
- 46 (cost adj2 effective\$).ti,ab.
- 47 (cost adj2 benefit\$).ti,ab.
- 48 (cost adj2 utili\$).ti,ab.
- 49 (cost adj2 minimi\$).ti,ab.
- 50 (cost adj2 consequence\$).ti,ab.
- 51 (cost adj2 comparison\$).ti,ab.
- 52 (cost adj2 identificat\$).ti,ab.
- 53 (pharmacoeconomic\$ or pharmaco-economic\$).ti,ab.
- 54 or/38-53
- 55 (task adj2 cost\$).ti,ab,id.
- 56 (switch\$ adj2 cost\$).ti,ab,id.

- 57 (metabolic adj cost).ti,ab,id.
- 58 ((energy or oxygen) adj cost).ti,ab,id.
- 59 ((energy or oxygen) adj expenditure).ti,ab,id.
- 60 or/55-59
- 61 (animal or animals or rat or rats or mouse or mice or hamster or hamsters or dog or dogs or cat or cats or bovine or sheep or ovine or pig or pigs).ab,ti,id,de.
- 62 editorial.dt.
- 63 letter.dt.
- 64 dissertation abstract.pt.
- 65 or/61-64
- 66 54 not (60 or 65)
- 67 limit 66 to yr="2006 -Current"
- 68 37 and 67

CHEERS checklist

Topic	No.	Item	Frederix (2016)	Frederix (2017)	Hwang (2019)	Kidholm (2016)	Kraal (2017)	Niewada (2021)	Taylor (2007)	Maddison (2015)	Maddison (2019)
Title	1	Identify the study as an economic evaluation and specify the interventions being compared.	Fully reported	Not reported	Fully reported	Partially reported	Fully reported	Partially reported	Fully reported	Partially reported	Partially reported
Abstract	2	Provide a structured summary that highlights context, key methods, results, and alternative analyses.	Partially reported	Partially reported	Fully reported	Fully reported	Fully reported	Fully reported	Partially reported	Partially reported	Partially reported
Introduction											
Background and objectives	3	Give the context for the study, the study question, and its practical relevance for decision making in policy or practice.	Fully reported	Fully reported	Fully reported	Partially reported	Fully reported	Partially reported	Fully reported	Fully reported	Fully reported
Methods											
Health economic analysis plan	4	Indicate whether a health economic analysis plan was developed and where available.	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported
Study population	5	Describe characteristics of the study population (such as age range, demographics, socioeconomic, or clinical characteristics).	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported	Not reported	Fully reported	Fully reported
Setting and location	6	Provide relevant contextual information that may influence findings.	Fully reported	Fully reported	Fully reported	Partially reported	Partially reported	Fully reported	Partially reported	Fully reported	Partially reported
Comparators	7	Describe the interventions or strategies being compared and why chosen.	Fully reported	Partially reported	Fully reported	Partially reported	Fully reported	Fully reported	Fully reported	Fully reported	Partially reported
Perspective	8	State the perspective(s) adopted by the study and why chosen.	Partially reported	Partially reported	Partially reported	Fully reported	Partially reported	Fully reported	Partially reported	Not reported	Partially reported
Time horizon	9	State the time horizon for the study and why appropriate.	Partially reported	Partially reported	Partially reported	Partially reported	Partially reported	Fully reported	Partially reported	Partially reported	Partially reported
Discount rate	10	Report the discount rate(s) and reason chosen.	NA	Not reported	NA	NA	NA	Fully reported	NA	NA	NA
Selection of outcomes	11	Describe what outcomes were used as the measure(s) of benefit(s) and harm(s).	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported

Measurement of outcomes	12	Describe how outcomes used to capture benefit(s) and harm(s) were measured.	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported	Not reported	Fully reported	Fully reported	Fully reported
Valuation of outcomes	13	Describe the population and methods used to measure and value outcomes.	Fully reported	Partially reported	Fully reported	Fully reported	Fully reported	Partially reported	Partially reported	Fully reported	Fully reported
Measurement and valuation of resources and costs	14	Describe how costs were valued.	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported	Partially reported	Fully reported	Partially reported	Fully reported
Currency, price date, and conversion	15	Report the dates of the estimated resource quantities and unit costs, plus the currency and year of conversion.	Partially reported	Partially reported	Fully reported	Fully reported	Fully reported	Partially reported	Fully reported	Fully reported	Fully reported
Rationale and description of model	16	If modelling is used, describe in detail, and why used. Report if the model is publicly available and where it can be accessed.	NA	NA	NA	NA	NA	Not reported	NA	NA	NA
Analytics and assumptions	17	Describe any methods for analysing or statistically transforming data, any extrapolation methods, and approaches for validating any model used.	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported	Not reported	Partially reported	Fully reported	Fully reported
Characterising heterogeneity	18	Describe any methods used for estimating how the results of the study vary for subgroups.	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported
Characterising distributional effects	19	Describe how impacts are distributed across different individuals or adjustments made to reflect priority populations.	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported
Characterising uncertainty	20	Describe methods to characterise any sources of uncertainty in the analysis.	Not reported	Not reported	Fully reported	Fully reported	Fully reported	Partially reported	Partially reported	Partially reported	Partially reported
Approach to engagement with patients and others	21	Describe any approaches to engage patients or service recipients, the general public, communities, or stakeholders (such as clinicians or payers) in the design of the study.	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported

affected by the study											
Results											
Study parameters	22	Report all analytic inputs (such as values, ranges, references) including uncertainty or distributional assumptions.	Partially reported	Partially reported	Fully reported	Fully reported	Partially reported	Partially reported	Fully reported	Partially reported	Partially reported
Summary of main results	23	Report the mean values for the main categories of costs and outcomes of interest and summarise them in the most appropriate overall measure.	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported	Partially reported	Fully reported	Partially reported	Partially reported
Effect of uncertainty	24	Describe how uncertainty about analytic judgments, inputs, or projections affect findings. Report the effect of choice of discount rate and time horizon, if applicable.	Partially reported	Partially reported	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported	Partially reported	Partially reported
Effect of engagement with patients and others affected by the study	25	Report on any difference patient/service recipient, general public, community, or stakeholder involvement made to the approach or findings of the study	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported
Discussion											
Study findings, limitations, generalisability, and current knowledge	26	Report key findings, limitations, ethical or equity considerations not captured, and how these could affect patients, policy, or practice.	Partially reported	Fully reported	Fully reported	Fully reported	Partially reported	Partially reported	Partially reported	Partially reported	Partially reported
Other relevant information											
Source of funding	27	Describe how the study was funded and any role of the funder in the identification, design, conduct, and reporting of the analysis	Partially reported	Partially reported	Partially reported	Partially reported	Fully reported	Fully reported	Partially reported	Partially reported	Fully reported
Conflicts of interest	28	Report authors conflicts of interest according to journal or International Committee of Medical Journal Editors requirements.	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported	Fully reported	Not reported	Fully reported	Fully reported
NA – not applicable											

From: Husereau D, Drummond M, Augustovski F, et al. Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) Explanation and Elaboration: A Report of the ISPOR CHEERS II Good Practices Task Force. *Value Health* 2022;25. doi:10.1016/j.jval.2021.10.008

Drummond checklist

Figure 15.5.a: Drummond checklist (Drummond 1996)		Frederix (2016)	Frederix (2017)	Hwang (2019)	Kidholm (2016)	Kraal (2017)	Niewada (2021)	Taylor (2007)	Maddison (2015)	Maddison (2019)
Study design										
1	The research question is stated.	Not clear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	The economic importance of the research question is stated.	Yes	Yes	Yes	Not clear	Yes	Yes	No	Yes	No
3	The viewpoint(s) of the analysis are clearly stated and justified.	Not clear	Not clear	Yes	Yes	Yes	Yes	Not clear	No	Not clear
4	The rationale for choosing alternative programmes or interventions compared is stated.	Yes	Not clear	Yes	Not clear	Yes	Yes	Yes	Yes	Yes
5	The alternatives being compared are clearly described.	Yes	Yes	Yes	Not clear	Yes	Yes	Yes	Yes	Partly
6	The form of economic evaluation used is stated.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
7	The choice of form of economic evaluation is justified in relation to the questions addressed.	Not clear	Not clear	Not clear	Not clear	Yes	Yes	Yes	Yes	Yes
Data collection										
8	The source(s) of effectiveness estimates used are stated.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	Details of the design and results of effectiveness study are given (if based on a single study).	Yes	Yes	Yes	Yes	Yes	Partly	No	Yes	Yes
10	Details of the methods of synthesis or meta-analysis of estimates are given (if based on a synthesis of a number of effectiveness studies).	Not appropriate	Not appropriate	Not appropriate	Not appropriate	Not appropriate	Not appropriate	Not appropriate	Not appropriate	Not appropriate
11	The primary outcome measure(s) for the economic evaluation are clearly stated.	Not clear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12	Methods to value benefits are stated.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
13	Details of the subjects from whom valuations were obtained were given.	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
14	Productivity changes (if included) are reported separately.	Not appropriate	Not appropriate	Not appropriate	Not appropriate	Yes	Not appropriate	Not appropriate	Not appropriate	Not appropriate

15	The relevance of productivity changes to the study question is discussed.	Yes	Yes	No	No	Yes	Not appropriate	Not appropriate	Not appropriate	Not appropriate
16	Quantities of resource use are reported separately from their unit costs.	Yes	Yes	No	Yes	Not clear	No	Yes	No	No
17	Methods for the estimation of quantities and unit costs are described.	Yes	Yes	Yes	Yes	Not clear	No	Yes	Not clear	Not clear
18	Currency and price data are recorded.	Yes	Not clear	Yes	Yes	Yes	Partly	Yes	Yes	Yes
19	Details of currency of price adjustments for inflation or currency conversion are given.	Not appropriate	No	No	Yes	Not appropriate	No	Yes	Yes	Yes
20	Details of any model used are given.	Not appropriate	Not appropriate	Yes	Not appropriate	Not appropriate	Not appropriate	Not appropriate	Not appropriate	Not appropriate
21	The choice of model used and the key parameters on which it is based are justified.	Not appropriate	Not appropriate	Yes	Not appropriate	Not appropriate	Not appropriate	Not appropriate	Not appropriate	Not appropriate
Analysis and interpretation of results										
22	Time horizon of costs and benefits is stated.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
23	The discount rate(s) is stated.	Not appropriate	No	Not clear	Not appropriate	Not appropriate	Yes	Not appropriate	Not appropriate	Not appropriate
24	The choice of discount rate(s) is justified.	Not appropriate	No	Yes	Not appropriate	Not appropriate	No	Not appropriate	Not appropriate	Not appropriate
25	An explanation is given if costs and benefits are not discounted.	No	No	Not appropriate	No	No	Yes	Yes	No	Yes
26	Details of statistical tests and confidence intervals are given for stochastic data.	Yes	Yes	Yes	Yes	Yes	Not clear	Yes	Not clear	Not clear
27	The approach to sensitivity analysis is given.	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
28	The choice of variables for sensitivity analysis is justified.	No	No	Yes	Yes	Not clear	Not clear	Yes	Not clear	No
29	The ranges over which the variables are varied are justified.	Not appropriate	Not appropriate	Not clear	Yes	Yes	Yes	Not appropriate	Yes	Not clear
30	Relevant alternatives are compared.	Not clear	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
31	Incremental analysis is reported.	Yes	Yes	Yes	Yes	Not clear	Yes	Yes	Yes	Not clear

32	Major outcomes are presented in a disaggregated as well as aggregated form.	Yes	Yes	Yes	Yes	Not clear	Not clear	Not clear	Not clear	Not clear
33	The answer to the study question is given.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Not clear
34	Conclusions follow from the data reported.	Yes	Yes	Yes	Yes	Yes	Yes	Not clear	No	Not clear
35	Conclusions are accompanied by the appropriate caveats.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Included costs

	Frederix et al. (2016)	Frederix et al. (2017)	Hwang et al. (2019)	Kidholm et al. (2016)	Kraal et al (2017)	Niewada et al. (2021)	Taylor et al. (2007)	Maddison et al. (2015)	Maddison et al. (2019)	Proportion of studies
Healthcare costs										
Intervention	✓	✓	✓	✓	✓	✓	✓	✓	✓	100% (9/9)
Hospitalisation	✓	✓	✓	✓	✓		✓		✓	78% (7/9)
Outpatient	✓	✓	✓	✓	✓				✓	56% (5/9)
Primary/ community care				✓	✓		✓			33% (3/9)
Medication				✓	✓		✓		✓	33% (3/9)
Other costs										
Patient out of pocket	✓	✓					✓			22% (2/9)
Productivity losses					✓					11% (1/9)
Informal care					✓					11% (1/9)