Original research

Shared decision making in cardiology: a systematic review and meta-analysis

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ABSTRACT

Objectives To evaluate the effectiveness of interventions to improve shared decision making (SDM) in cardiology with particular focus on patient-centred outcomes such as decisional conflict.

Methods We searched Embase (OVID), the Cochrane library, PubMed and Web of Science electronic databases from inception to January 2021 for randomised controlled trials that investigated the effects of interventions to increase SDM in cardiology. The primary outcomes were decisional conflict, decisional anxiety, decisional satisfaction or decisional regret; a secondary outcome was knowledge gained by the patients.

Results Eighteen studies which reported on at least one outcome measure were identified, including a total of 4419 patients. Interventions to increase SDM had a significant effect on reducing decisional conflict (standardised mean difference (SMD) −0.211, 95% CI −0.316 to −0.107) and increasing patient knowledge (SMD 0.476, 95% CI 0.351 to 0.600) compared with standard care.

Conclusions Interventions to increase SDM are effective in reducing decisional conflict and increasing patient knowledge in the field of cardiology. Such interventions are helpful in supporting patient-centred healthcare and should be implemented in wider cardiology practice.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Shared decision making (SDM) is a joint process in which a healthcare professional works together with a person to reach a decision about care. The effectiveness of interventions to increase SDM in various specialties has been demonstrated. SDM has been applied in cardiology, and there are a number of randomised controlled trials (RCTs) testing its effects on a variety of clinical situations.

WHAT THIS STUDY ADDS

⇒ We perfomed a systematic review and meta-analysis of the RCTs that examine the application of SDM in cardiology and more specifically its effects on decisional conflict, decisional anxiety, decisional regret, decisional satisfaction and knowledge. This is the first meta-analysis to address this question. Overall, we showed that interventions which aim to increase SDM are effective in cardiology.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Evidence for the effectiveness of SDM in cardiology may help change attitudes towards this patient-centred framework and facilitate its recommendation in clinical guidelines.

INTRODUCTION

Shared decision making (SDM) has been defined as 'an approach where clinicians and patients share the best available evidence when faced with the task of making decisions, and where patients are supported to consider options, to achieve informed preference'.[1]

SDM is considered desirable and effective as a policy choice to facilitate the right of involvement for patients, to allow patients to take an active role in decisions regarding their health, to reduce overuse of treatment options without clear benefit, to reduce healthcare practice variations, as well as to improve sustainability of the healthcare system by supporting patient ownership of their care.[2]

Although SDM is specifically recommended for certain clinical scenarios in cardiology, such as implantable cardioverter defibrillator (ICD) insertion,[3] the uptake in cardiac clinical guidelines is uneven,[4 5] presumably at least partly due to lack of evidence of its effect across the spectrum of cardiology.

We conducted this systematic review and meta-analysis of randomised controlled clinical trials to investigate the effectiveness of interventions to facilitate SDM in cardiology. Accumulating evidence on the effectiveness of SDM in cardiology may help inform clinical guidelines in cardiology and thereby help change attitudes towards this patient-centred approach.

METHODS

Protocol

A protocol for this study explicitly stating defined objectives, criteria for study selection, assessment criteria for included studies and data extraction was developed. The protocol was prospectively registered with the International Prospective Register of Systematic Reviews and has been allocated the registration number CRD42021290164 (www.crd.york.ac.uk/prospero). We present our findings according to the reporting guidelines for meta-analyses and systematic reviews of randomised controlled trials

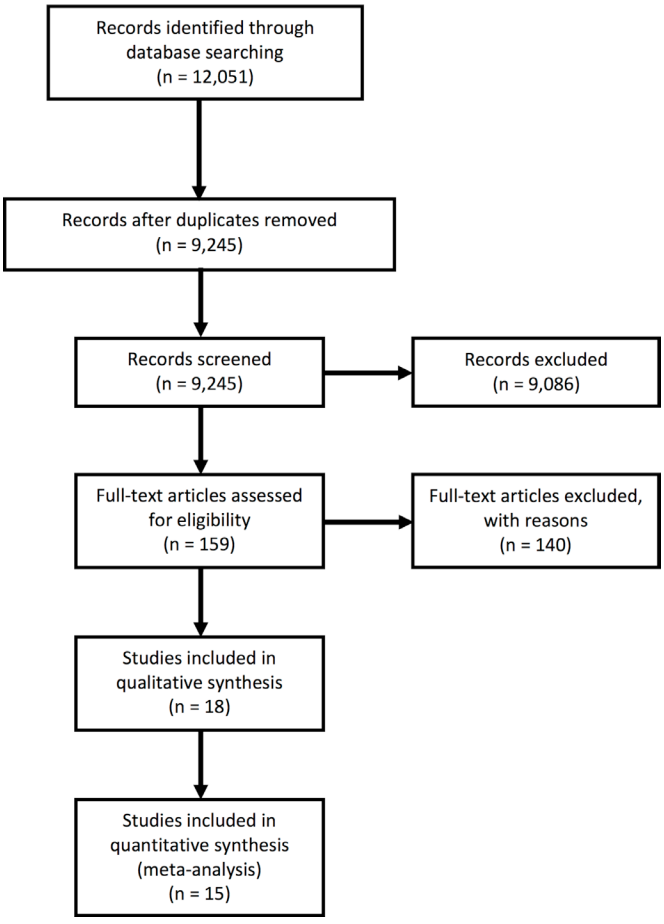

Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram.

(RCTs) as outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (online supplemental file).

Database search

We searched Embase (OVID), the Cochrane library, Pubmed and Web of Science from Inception to January 2021. Search strategies were adapted from Légaré *et al*[2] for the SDM aspect of the search, modified to make the search cardiology specific, and adjusted according to requirements of each database (online supplemental file). The search strategy for Embase, as a representative example, is shown as follows:

1. (shared decision or sharing decision or informed decision or informed choice or decision aid).ti,ab. or ((share* or sharing* or informed*) and (decision* or deciding* or choice*)).ti. (22530).
2. exp clinical decision making/ or exp decision making/ or exp decision support system/ or exp ethical decision making/ or exp family decision making/ or exp medical decision making/ or exp patient decision making/ or (decision making or decision support or choice behaviour).ti,ab. or ((decision* or choice*) and (making* or support* or behaviour*)).ti. (477532).
3. exp patient participation/ or (patient participation or consumer participation or patient involvement or consumer involvement).ti,ab. or ((patient* or consumer*) and (involvement* or involving* or participation* or participating*)).ti. (43913).
4. exp doctor patient relation/ or exp nurse patient relationship/ or exp nurse/ or exp physician/ or (nurse* or physician* or clinician* or doctor* or general practitioners or gps or healthcare professionals or healthcare professionals or healthcare providers or healthcare providers or resident*).ti,ab. (2129607).
5. exp patient/ or (patient* or consumer* or people*).ti. (4653143).
6. 4 and 5 (587332).
7. 1 or (2 and 3) or (2 and 6) or (3 and 6) (66880).
8. "random*".ab,kw,ti. (1632000).
9. (Myocard* or Arrhythm* or Valv* or Fibrill* or Tachycard* or Bradycard* or Heart or Angin* or Coronar* or Ischaemi* or Ischemi* or Card* or Aort* or Mitral or Vascular or Infarct* or Conduction or Channelopathy or "Diastolic dysfunction" or "Systolic dysfunction" or Atri* or Ventric* or Palpitatio* or Arter* or Hypertensi* or Cardiac pac* or Pacemaker or Endocarditis or electrocardiogra* or electrophysiolog*).ab,kw,ti. (4990709).
10. 7 and 8 and 9 (1300).

Study selection and data extraction

Two reviewers (PM and NG-H) independently screened titles and abstracts. Relevant studies were retrieved in full text and assessed for eligibility. Studies which were only available as abstract were excluded. Discrepancies between the two reviewers were resolved by discussion or through involvement of up to two further reviewers (JR and CP). Only RCTs assessing the effects of an intervention to increase SDM in cardiology were included.

Two reviewers used a data collection form to extract available data (PM and NG-H) including clinical setting, study population and geographical location, clinical condition, details on intervention under investigation, as well as endpoints and their associated collection time points. Study methodological quality was assessed independently by two reviewers (PM and NG-H) using a standardised tool.[6] Potential bias was classed as high, low or unclear, and discrepancies were resolved through discussion between reviewers.

The primary outcomes of decisional conflict, decisional anxiety, decisional regret and decisional satisfaction were chosen as patient-centred outcome measures as preliminary searches showed these to be the most coherently reported. A summary of the instruments used to assess these outcomes is provided in online supplemental tables S6 and S7. If primary outcomes were reported at multiple follow-ups, data from the last follow-up were used for the meta-analysis. A predefined secondary outcome was knowledge gained by the patient, assessed at the earliest opportunity following intervention. Studies that only reported on the secondary outcome without investigating effects on the primary outcomes were excluded.

Data analysis

Data were analysed in OpenMeta(Analyst) software V.10.12 (developed by the Center for Evidence Synthesis, Brown University, School of Public Health, Rhode Island State, USA) and Meta-Essentials tool for Microsoft excel[7] and plotted using GraphPad Prism. A continuous random-effects model was used to calculate summary estimates, and data were presented as standardised mean differences (SMDs) with 95% CIs. Only data available from published studies were used. If studies reported on means with CIs, corresponding SDs were calculated to generate SMDs. Where studies reported only on means and estimation of SD was not possible, data were excluded. Interstudy heterogeneity was

Table 1 Characteristics of included studies

Reference	Clinical setting	Participants (n)	Location	Length of follow-up	Intervention	Condition/therapy
Allen *et al*[10]	Hospital, multicentre (total 6)	248	USA	6 months	Clinician education, printed decision aid and video decision aid	LVAD
Carroll *et al*[19]	Hospital, single centre	82	Canada	3 months	Printed decision aid	ICD
Case *et al*[11]	Hospital, single centre	99	USA	Not stated	Web-based application decision aid	CAD
Coylewright *et al*[12]	Hospital, single centre	124	USA	3 months	Printed decision aid	CAD
Doll *et al*[13]	Hospital, single centre	203	USA	3 months	Web-based application decision aid	CAD
Fraenkel *et al*[14]	Primary care clinics	135	USA	Not stated	Computer-based application decision aid	AF
Hess *et al*[15]	Hospital, single centre	204	USA	30 days	Printed decision aid	CAD
Hess *et al*[8]	Hospital, multicentre (total 6)	898	USA	45 days	Printed decision aid	CAD
Holbrook *et al*[20]	Family practices (total 4) and geriatric day clinic (total 1)	98	Canada	Not stated	Assessed impact of decision aid format: (1) printed, (2) printed+audiotape and (3) interactive computer program	AF
Kostick *et al*[16]	Hospital, multicentre	98	USA	1 month	Printed decision aid	LVAD
Kunneman *et al*[9]	Hospital, multicentre	922	USA	Not stated	Web-based application decision aid	AF
Lewis *et al*[21]	Cardiac device clinic	29	Canada	12 months	Printed decision aid and nurse-led coaching	ICD
McAlister *et al*[23]	Primary care practices (total 102)	434	Canada	12 months	Printed and audiotape decision aid	AF
Man-Son-Hing *et al*[22]	Hospital, multicentre (total 14)	287	Canada	6 months	Printed and audiotape decision aid	AF
Morgan *et al*[24]	Hospital, single centre	240	Canada	6 months	Printed and video decision aid	CAD
Schwalm *et al*[25]	Hospital, single centre	150	Canada	No follow-up	Printed decision aid	CAD
Thomas *et al*[17]	Hospital, multicentre (total 3)	59	USA	3 months	Video decision aid	ICD
Thomson *et al*[18]	General practice	109	UK	3 months	Computer-based application decision aid	AF

AF, atrial fibrillation; CAD, coronary artery disease; ICD, implantable cardioverter defibrillator; LVAD, left ventricular assist device.

assessed using the I^2 statistics, where values above 50% were considered significant. We planned to assess publication bias visually and by funnel plot if at least 10 studies reported on any outcome measure.

The following predefined subgroup analyses were planned on the primary outcome decisional conflict if sufficient data were available: (1) different cardiac condition or subspecialty, for example, atrial fibrillation, cardiac device implantation and chest pain/intervention; and (2) different strategies to improve SDM, for example, video format, computer/online information sheets and printed patient information. We planned to conduct sensitivity analyses to test the robustness of the data.

Patients and the public have not been involved in the design and conduct of this systematic review and meta-analysis.

RESULTS

Our search identified 9245 titles and abstracts for screening, of which 159 articles were assessed in full text (figure 1). Eighteen RCTs reporting on 4419 patients were included in this systematic review and meta-analysis (tables 1 and 2, online supplemental table S5). The included trials were modest in size with the exception of Hess *et al*[8] and Kunneman *et al*,[9] reporting on 898 and 922 patients, respectively. Trials were conducted exclusively in high-income countries, including the USA (Allen *et al*,[10] Case *et al*,[11] Coylewright *et al*,[12] Doll *et al*,[13] Fraenkel *et al*,[14] Hess *et al*,[15] Hess *et al*,[8] Kostick *et al*,[16] Kunneman *et al*[9] and Thomas *et al*[17]), UK (Thomson *et al*[18]) and Canada (Carroll *et al*,[19] Holbrook *et al*,[20] Lewis *et al*,[21] Man-Son-Hing *et al*,[22] McAlister *et al*,[23] Morgan *et al*[24] and Schwalm *et al*[25]). No trials were conducted in low-income or middle-income countries.

A broad range of clinical conditions in cardiology were covered, including atrial fibrillation and anticoagulation (Fraenkel *et al*,[14] Hoolbrook *et al*,[20] Kunneman *et al*,[9] Man-Son-Hing *et al*,[22] McAlister *et al*[23] and Thomson *et al*[18]), chest pain and coronary artery disease (Case *et al*,[11] Coylewright *et al*,[12] Doll *et al*,[13] Hess *et al*,[15] Hess [8]*et al* and Morgan *et al*[24]), cardiac devices and pacemakers (Carroll *et al*,[19] Lewis *et al*[21] and Thomas *et al*[17]), as well as advanced treatment options, including left ventricular assist devices (Allen *et al*[10] and Kostick *et al*[16]). Included trials used a variety of formats in patient decision aids to improve SDM, including printed aids (Allen *et al*,[10] Carroll *et al*,[19] Coylewright *et al*,[12] Hess *et al*,[15] Hess *et al*,[8] Holbrook *et al*,[20] Kostick *et al*,[16] Lewis *et al*,[21] McAlister *et al*,[23] Man-Son-Hing *et al*,[22] Morgan *et al*[24] and Schwalm *et al*[25]), audiotapes (Holbrook *et al*,[20] McAlister *et al*[23] and Man-Son-Hing *et al*[22]), video (Allen *et al*,[10] Morgan *et al*[24] and Thomas *et al*[17]), coaching (Lewis *et al*[21]) and online/computer programs (Case *et al*,[11] Doll *et al*,[13] Fraenkel *et al*,[14] Holbrook *et al*,[20] Kunneman *et al*[9] and Thomson *et al*[18]). Details of reviewers' structured assessment of methodological quality of included studies[6] are shown in table 3.

Thirteen RCTs reported data from 3738 patients on decisional conflict using a decision conflict scale that could be included in the meta-analysis. None of the included studies was considered as having low risk of bias across the domains assessed (table 3). Interventions to increase SDM had a significant effect on reducing decisional conflict (SMD −0.211, 95% CI −0.316 to −0.107) compared with standard care (figure 2). A moderate degree of heterogeneity was observed (I^2=49.02%), which in part may be explained by the wide range of cardiac conditions and interventions to improve SDM that were included. The largest effects were observed in studies reported by Hess *et al*[15] and Carroll *et al*[19] reporting on the use of decision aids in decision making concerning chest pain and ICD insertion, respectively, driving the degree of overall heterogeneity. However, no

Table 2 Outcomes of included studies

Reference	Decisional conflict	Decisional regret, decisional satisfaction, decisional anxiety	Knowledge
Allen *et al*[10]	Favours intervention	Decisional regret: favours control	Favours intervention
Carroll *et al*[19]	Favours intervention		Favours intervention
Case *et al*[11]	Favours intervention	Decisional satisfaction: 'high' in both groups	Favours intervention
Coylewright *et al*[12]	Favours intervention		Favours intervention
Doll *et al*[13]	Favours intervention		Favours intervention
Fraenkel *et al*[14]	Favours intervention		Favours intervention
Hess *et al*[15]	Favours intervention		Favours intervention
Hess *et al*[8]	Favours intervention		Favours intervention
Holbrook *et al*[20]	Mean total DCS (5-point scale)=2.1 (SD 0.4), no UC group for comparison in this study		Significant improvement in knowledge of AF after PtDA regardless of format (p<0.01), no UC group for comparison in this study
Kostick *et al*[16]	Favours intervention	Decisional regret: favours UC Decisional satisfaction: favours intervention	Favours intervention
Kunneman *et al*[9]	Favours intervention		Favours intervention
Lewis *et al*[21]	Favours UC		Favours intervention
McAlister *et al*[23]	Favours intervention		
Man-Son-Hing *et al*[22]	Favours intervention	Decisional satisfaction: favours intervention	Favours intervention
Morgan *et al*[24]		Decisional satisfaction: favours intervention	Favours intervention
Schwalm *et al*[25]	Favours intervention		Favours intervention
Thomas *et al*[17]	Favours UC		Favours intervention
Thomson *et al*[18]	Favours UC	Decisional anxiety: reduced in both groups	No difference

AF, atrial fibrillation; DCS, decisional conflict scale; PtDA, patient decision aid; UC, usual care.

single clinical condition or intervention to improve SDM was identified that could explain the heterogeneity across studies. Prespecified subgroup analysis, stratified based on clinical condition and examining different formats of patient decision aids suggest effectiveness of SDM across the broad spectrum of cardiology and through the use of various modalities (online supplemental file). Leave-one-out sensitivity analysis confirmed the robustness of the reported data (online supplemental file). Funnel plot analysis did not suggest significant publication bias (figure 3).

Eleven RCTs reported data on 2210 patients on patient knowledge assessed through use of various questionnaires with relevance to the cardiology condition under investigation. There was modest heterogeneity (I^2=37.61%) in the included studies, and a significant increase of knowledge was reported (SMD 0.476, 95% CI 0.351 to 0.600, figure 4; funnel plot, figure 3).

Decisional regret was quantitatively reported in only two RCTs and decisional satisfaction in three RCTs (table 2 and online supplemental table S5) and meta-analysis was therefore not performed.

Table 3 Risk of bias assessment of included studies

Reference	Random sequence generation	Allocation concealment	Performance bias	Detection bias	Attrition bias	Reporting bias
Allen *et al*[10]	Unclear	Unclear	High	Unclear	High	Low
Carroll *et al*[19]	Low	Low	High	Low	Low	Low
Case *et al*[11]	Low	Low	High	Unclear	Unclear	High
Coylewright *et al*[12]	Low	Low	High	Unclear	Unclear	Low
Doll *et al*[13]	Unclear	Unclear	High	Unclear	Low	Low
Fraenkel *et al*[14]	High	Unclear	High	Unclear	Unclear	High
Hess *et al*[15]	Low	Low	High	Low	Low	Low
Hess *et al*[8]	Low	Low	High	Low	Low	Low
Holbrook *et al*[20]	Low	Low	High	Unclear	Low	High
Kostick *et al*[16]	Low	Low	Low	Unclear	High	Low
Kunneman *et al*[9]	Low	Low	High	High	Low	Low
Lewis *et al*[21]	Low	Low	Low	Unclear	Unclear	High
McAlister *et al*[23]	low	low	High	Low	Low	low
Man-Son-Hing *et al*[22]	Low	Low	High	Unclear	Unclear	Low
Morgan *et al*[24]	Unclear	Unclear	High	High	High	Low
Schwalm *et al*[25]	Low	Low	High	Unclear	Low	Low
Thomas *et al*[17]	Low	Low	Unclear	Unclear	Low	High
Thomson *et al*[18]	Low	Low	High	Unclear	High	High

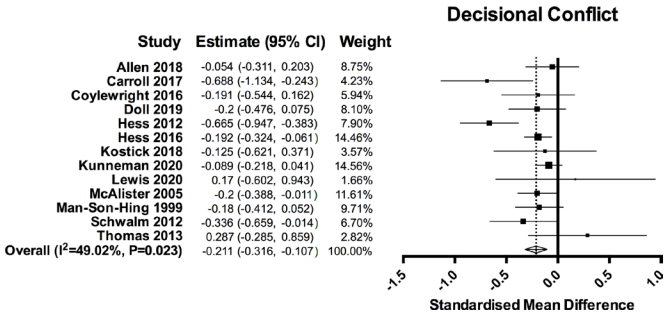

Figure 2 Effect of interventions to increase shared decision making on decisional conflict. Standardised mean difference of decisional conflict score is shown. Weights are derived from the random-effects model.

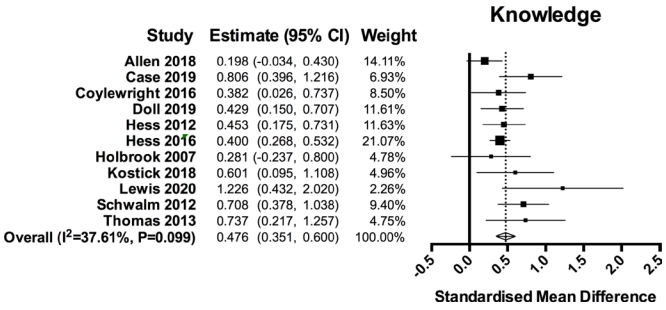

Figure 4 Effect of interventions to increase shared decision making on patient knowledge. Standardised mean difference of knowledge score is shown. Weights are derived from the random-effects model.

DISCUSSION

We found considerable evidence to support the use of interventions to improve SDM in cardiology (figure 5). Use of such interventions reduced decisional conflict and increased patient knowledge. There was not enough evidence to conclude on the effects of such interventions on patient satisfaction or decisional regret.

In this protocol-driven, prospectively registered systematic review, we conducted a comprehensive search strategy and included only randomised controlled clinical trials allowing us to report on the highest level of evidence. A broad range of cardiology topics was included in the clinical trials assessed, and we aimed to analyse multiple outcomes with relevance to SDM, thus making the findings of our study relevant to the full clinical spectrum in cardiology. We have analysed and reported our finding according to the PRISMA guidelines.

Despite the methodological design, this systematic review and meta-analysis is not without limitations. Most of the 18 studies included in this systematic review and meta-analysis were modest in size, underpowered to detect potentially small differences between groups, and often included only one or two outcome measures. There was significant heterogeneity in the trials included in this study, which could partly be explained by different cardiac conditions under study. However, no singular cardiac condition or strategy to improve SDM emerged that could explain the heterogeneity alone. Furthermore, despite this heterogeneity, the effect of interventions to increase SDM on one of the main outcome measures (decisional conflict) was consistent across the cardiac conditions studied. Leave-one-out sensitivity analysis supports this conclusion.

The robustness of the present study is supported by the prespecified subgroup analysis, stratified according to clinical condition, demonstrated the effectiveness of SDM across various domains such as chest pain/coronary artery disease/coronary intervention, arrhythmias/atrial fibrillation and cardiac device implantation. The robustness of the effects of the interventions on SDM underscores the generalisability of our findings to the wider field of cardiology and is consistent with findings of similar analyses in other medical and surgical specialties.[26–28] It is also noteworthy that the findings of this meta-analysis were robust in a subgroup analysis investigating various formats to support SDM such as printed media, computer aids and other formats. It is, however, less clear whether the findings of our study are also applicable to lower-income and middle-income countries as all included studies were conducted in high-income countries (see table 1). Furthermore, there may also be important effects of culture and language affecting the effectiveness of interventions to improve SDM. Since all our included studies were conducted in the USA, Canada and the UK, our findings may not necessarily be applicable to other high-income countries, for example, in Asia or Europe.

Despite the effectiveness of SDM in improving patient outcomes in general,[2] several challenges have been encountered during implementation.[29] Major barriers to implementation, both from patients and clinicians, were found to be (1) lack of knowledge and skills, (2) lack of tools and, most importantly, (3) opposing attitudes. Nevertheless, the Making Good Decisions in Collaboration programme also identified possible solutions that may also help in implementation of SDM in cardiovascular care.[29] For example, dedicated interactive skills workshops may be used to challenge clinicians' attitude and highlight the gap between current practice and SDM. Tools to aid decision making could be developed locally, making appropriate information

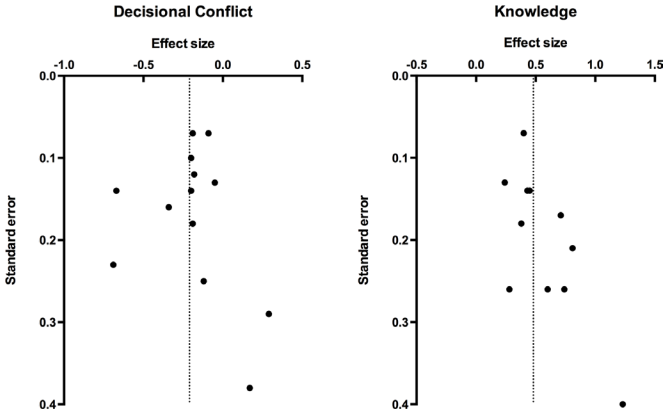

Figure 3 Funnel plots for decisional conflict and knowledge.

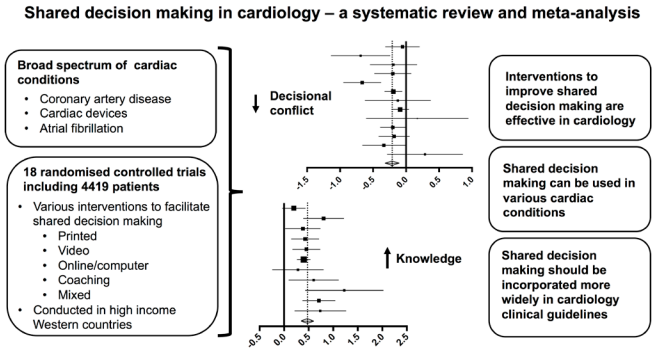

Figure 5 Graphical summary.

available with relevance to local management pathways and further engaging clinicians with SDM. Similarly, preparing patients to participate in SDM through raising awareness of this method may increase their engagement in this process. Through measurement of decision quality, an improvement in care may be demonstrated following implementation of SDM. Importantly, success of implementation depends on both a collaborative and facilitated approach in each clinical team as well as senior-level support, demonstrating this to be an organisational priority.

Evidence for the effectiveness of SDM in cardiology may help change attitudes towards this patient-centred framework and facilitate its recommendation in clinical guidelines. While this systematic review and meta-analysis adds to the growing evidence of the effectiveness of interventions to increase SDM on patient-centred outcomes, further research on strategies for implementation is urgently needed.

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Contributors PM and NG-H: conceptualisation, methodology, validation, investigation, writing (review and editing), and contributed equally to this paper; JR: conceptualisation, methodology, validation, investigation and writing (original draft), project administration and guarantor; CP: conceptualisation, methodology, validation, investigation, writing (review and editing), project administration and supervision; PM and NG-H: contributed equally to this paper; JR and CP: contributed equally to this paper.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, conduct, reporting or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as supplementary information.

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Shared decision making in cardiology – a systematic review and meta-analysis

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Supplementary material

Table S1 PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Title
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Abstract
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Introduction
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Introduction
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Methods
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Methods
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Methods
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Methods
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Methods
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Methods
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Methods
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Methods, Table 3
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Methods, Figures 2-4
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Methods

Section and Topic	Item #	Checklist item	Location where item is reported
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Methods
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Methods
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Methods
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Methods
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Methods
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Methods, Figure 4
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Methods
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Results
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Figure 1
Study characteristics	17	Cite each included study and present its characteristics.	Results, Table 1-2
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Table 3
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Table 2
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Figure 2-3, Table 3
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Results, Figure 2-3
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	N/A
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Supplement
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Figure 4

Section and Topic	Item #	Checklist item	Location where item is reported
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Results
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Discussion
	23b	Discuss any limitations of the evidence included in the review.	Discussion
	23c	Discuss any limitations of the review processes used.	Discussion
	23d	Discuss implications of the results for practice, policy, and future research.	Discussion
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Methods
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Methods
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	N/A
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Title page
Competing interests	26	Declare any competing interests of review authors.	Title page
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	N/A

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: http://www.prisma-statement.org/

Tables S2-S4: Search strategy for Cochrane database, PubMed and Web of Science

Table S2: Cochrane database

ID	Search	Hits
#1	((shar* or inform*) near/3 (decision* or aid* or deciding* or choice*)):ti,ab,kw (Word variations have been searched)	4748
#2	((decision* or choice*) near/3 (making* or support* or behaviour*)):ti,ab,kw (Word variations have been searched)	17061
#3	((patient* or consumer*) near/3 (involvement* or involving* or participation* or participating*)):ti,ab,kw (Word variations have been searched)	12970
#4	((nurse* or physician* or clinician* or doctor* or general practitioner* or gps or health care professional* or healthcare professional* or health care provider* or healthcare provider* or resident*) near/3 (patient* or consumer* or people*)):ti,ab,kw (Word variations have been searched)	86035
#5	#1 or (#2 and #3) or (#2 and #4) or (#3 and #4)	10673
#6	(random*):ti,ab,kw (Word variations have been searched)	1037720
#7	((Myocard* or Arrhythm* or Valv* or Fibrill* or Tachycard* or Bradycard* or Heart or Angin* or Coronar* or Ischaemi* or Ischemi* or Card* or Aort* or Mitral or Vascular or Infarct* or Conduction or Channelopathy or "Diastolic dysfunction" or "Systolic dysfunction" or Atri* or Ventric* or Palpitatio* or Arter* or Hypertensi* or Cardiac pac* or Pacemaker or Endocarditis or electrocardiogra* or electrophysiolog*)):ti,ab,kw (Word variations have been searched)	507265
#8	#5 AND #6 AND #7	3759

Table S3: Pubmed

Search	Query	Results
#8	Search: **#5 AND #6 AND #7**	3,132
#7	Search: **(Myocard* or Arrhythm* or Valv* or Fibrill* or Tachycard* or Bradycard* or Heart or Angin* or Coronar* or Ischaemi* or Ischemi* or Card* or Aort* or Mitral or Vascular or Infarct* or Conduction or Channelopathy or "Diastolic dysfunction" or "Systolic dysfunction" or Atri* or Ventric* or Palpitatio* or Arter* or Hypertensi* or Cardiac pac* or Pacemaker or Endocarditis or electrocardiogra* or electrophysiolog*)**	8,612,598
#6	Search: **random***	1,428,482
#5	Search: **#1 OR (#2 AND #3) OR (#2 AND #4) OR (#3 AND #4)**	42,918
#4	Search: **(professional-patient relations[mh] or ((nurses[mh] or physicians[mh] or nurse*[ti] or physician*[ti] or clinician*[ti] or doctor*[ti] or general practitioner*[ti] or gps[ti] or health care professional*[ti] or healthcare professional*[ti] or health care provider*[ti] or healthcare provider*[ti] or resident*[ti]) and (patients[mh] or patient*[ti] or consumer*[ti] or people*[ti])))**	183,732
#3	Search: **(patient participation[mh] or patient participation*[tiab] or consumer participation*[tiab] or patient involvement*[tiab] or consumer involvement*[tiab] or ((patient*[ti] or consumer*[ti]) and (involvement*[ti] or involving*[ti] or participation*[ti] or participating*[ti])))**	38,488
#2	Search: **(decision making[mh:noexp] or decision support techniques[mh:noexp] or decision support systems, clinical[mh] or choice behaviour[mh:noexp] or decision making*[tiab] or decision support*[tiab] or choice behaviour*[tiab] or ((decision*[ti] or choice*[ti]) and (making*[ti] or support*[ti] or behaviour*[ti])))**	262,949
#1	Search: **(shared decision*[tiab] or sharing decision*[tiab] or informed decision*[tiab] or informed choice*[tiab] or decision aid*[tiab] or ((share*[ti] or sharing*[ti] or informed*[ti]) and (decision*[ti] or deciding*[ti] or choice*[ti])))**	22,933

Table S4: Web Of Science:

Set	Results	
		Web Of Science Core Collection, search performed on 25/01/2021
# 8	3,877	#5 AND #6 AND #7
		Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC *Timespan=All years*

# 7	4,694,446	TI=(Myocard* or Arrhythm* or Valv* or Fibrill* or Tachycard* or Bradycard* or Heart or Angin* or Coronar* or Ischaemi* or Ischemi* or Card* or Aort* or Mitral or Vascular or Infarct* or Conduction or Channelopathy or "Diastolic dysfunction" or "Systolic dysfunction" or Atri* or Ventric* or Palpitatio* or Arter* or Hypertensi* or Cardiac pac* or Pacemaker or Endocarditis or electrocardiogra* or electrophysiolog*) OR AB=(Myocard* or Arrhythm* or Valv* or Fibrill* or Tachycard* or Bradycard* or Heart or Angin* or Coronar* or Ischaemi* or Ischemi* or Card* or Aort* or Mitral or Vascular or Infarct* or Conduction or Channelopathy or "Diastolic dysfunction" or "Systolic dysfunction" or Atri* or Ventric* or Palpitatio* or Arter* or Hypertensi* or Cardiac pac* or Pacemaker or Endocarditis or electrocardiogra* or electrophysiolog*) OR KP=(Myocard* or Arrhythm* or Valv* or Fibrill* or Tachycard* or Bradycard* or Heart or Angin* or Coronar* or Ischaemi* or Ischemi* or Card* or Aort* or Mitral or Vascular or Infarct* or Conduction or Channelopathy or "Diastolic dysfunction" or "Systolic dysfunction" or Atri* or Ventric* or Palpitatio* or Arter* or Hypertensi* or Cardiac pac* or Pacemaker or Endocarditis or electrocardiogra* or electrophysiolog*)
		Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC *Timespan=All years*
# 6	1,939,078	TI=random* OR AB=random* OR KP=random*

		Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC *Timespan=All years*
# 5	233,699	#1 OR (#2 AND #3) OR (#2 AND #4) OR (#3 AND #4)
		Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC *Timespan=All years*

# 4	594,976	TI=(professional-patient relations OR ((nurses OR physicians OR nurse* OR physician* OR clinician* OR doctor* OR general practitioner* OR gps OR health care professional* OR healthcare professional* OR health care provider* OR healthcare provider* OR resident*) AND (patients OR patient* OR consumer* OR people*))) OR AB=(professional-patient relations OR ((nurses OR physicians OR nurse* OR physician* OR clinician* OR doctor* OR general practitioner* OR gps OR health care professional* OR healthcare professional* OR health care provider* OR healthcare provider* OR resident*) AND (patients OR patient* OR consumer* OR people*))) OR KP=(professional-patient relations OR ((nurses OR physicians OR nurse* OR physician* OR clinician* OR doctor* OR general practitioner* OR gps OR health care professional* OR healthcare professional* OR health care provider* OR healthcare provider* OR resident*) AND (patients OR patient* OR consumer* OR people*)))
		Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC *Timespan=All years*

# 3	326,204	TI=(patient participation OR patient participation* OR consumer participation* OR patient involvement* OR consumer involvement* OR ((patient* OR consumer*) AND (involvement* OR involving* OR participation* OR participating*))) OR AB=(patient participation OR patient participation* OR consumer participation* OR patient involvement* OR consumer involvement* OR ((patient* OR consumer*) AND (involvement* OR involving* OR participation* OR participating*))) OR KP=(patient participation OR patient participation* OR consumer participation* OR patient involvement* OR consumer involvement* OR ((patient* OR consumer*) AND (involvement* OR involving* OR participation* OR participating*))) *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC* *Timespan=All years*

# 2	703,259	TI=(decision making OR decision support techniques OR decision support systems, clinical OR choice behaviour OR decision making OR decision support* OR choice behaviour*OR ((decision* OR choice*) AND (making*OR support*OR behaviour*))) OR AB=(decision making OR decision support techniques OR decision support systems, clinical OR choice behaviour OR decision making OR decision support* OR choice behaviour*OR ((decision* OR choice*) AND (making*OR support*OR behaviour*))) OR KP=(decision making OR decision support techniques OR decision support systems, clinical OR choice behaviour OR decision making OR decision support* OR choice behaviour*OR ((decision* OR choice*) AND (making*OR support*OR behaviour*)))
		Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC *Timespan=All years*
# 1	155,420	TI=(shared decision* OR sharing decision* OR informed decision* OR informed choice* OR decision aid* OR ((share* OR sharing* OR informed*) AND (decision* OR deciding* OR choice*))) OR AB=(shared decision* OR sharing decision* OR informed decision* OR informed choice* OR decision aid* OR ((share* OR sharing* OR informed*) AND (decision* OR deciding* OR choice*))) OR KP=(shared decision* OR sharing decision* OR informed decision* OR informed choice* OR decision aid* OR ((share* OR sharing* OR informed*) AND (decision* OR deciding* OR choice*)))

		Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC *Timespan=All years*
		Timespan
		All years (1900 - 2021)
		Web of Science Core Collection: Citation Indexes
		Science Citation Index Expanded (SCI-EXPANDED) --1900-present
		Social Sciences Citation Index (SSCI) --1900-present
		Arts & Humanities Citation Index (A&HCI) --1975-present
		Conference Proceedings Citation Index- Science (CPCI-S) --1990-present
		Conference Proceedings Citation Index- Social Science & Humanities (CPCI-SSH) --1990-present
		Book Citation Index– Science (BKCI-S) --2008-present

		Book Citation Index– Social Sciences & Humanities (BKCI-SSH) --2008-present
		Emerging Sources Citation Index (ESCI) --2015-present
		Web of Science Core Collection: Chemical Indexes
		Current Chemical Reactions (CCR-EXPANDED) --1985-present
		(Includes Institut National de la Propriete Industrielle structure data back to 1840)
		Index Chemicus (IC) --1993-present

Table S5: Outcomes of included studies - expanded

Reference		Decisional conflict (mean (SD), unless stated otherwise; 100 point scale unless stated otherwise)	Decisional regret (mean (SD), unless stated otherwise)	Decisional satisfaction (mean (SD), unless stated otherwise)	Decisional anxiety (mean (SD), unless stated otherwise)	Knowledge / Specified SDM scale (mean (SD), unless stated otherwise)
Allen	2018	Control (UC), mean (SE):	Control (UC),			Control (UC), mean% (SE):

		- BL1 20.2 (1.99) - BL2 16.5 (1.95) - 1mo 15.5 (1.89) - 6mo 15.4 (1.89) Intervention (PtDA), mean (SE): - BL1 23.4 (2.24) - BL2 18.4 (2.23) - 1mo 17.9 (2.17) - 6mo 14.2 (2.21)	mean (SE): 1mo = 14.3 (2.15) 6mo 12.1 (2.28); Intervention (PtDA), mean (SE): 1mo 17.9 (2.84) 6mo 19.1 (2.96)			- BL1 59.5 (1.9) - BL2 64.9 (1.8) - 1mo 67.8 (1.9) - 6mo 68.6 (1.8) Intervention (PtDA), mean% (SE): - BL1 59.1 (2.2) - BL2 70.0 (2.1) - 1mo 66.4 (2.3) - 6mo 67.1 (2.2)
Carroll	2017	Pre consult, mean (SD): - UC = 49.4 (18.6) - PtDA = 27.3 (18.4) Post implant, mean (SD): - UC = 29.9 (13.3) - PtDA = 21.2 (11.7)				The number (%) of participants scoring greater than 3/5 of the knowledge questions correct - PtDA = 19 (47.5) - UC = 9 (23.1)
Case	2019	PtDA group had increased medical knowledge of CAD ($p<0.001$) and decreased decisional conflict ($p<0.001$); specific values		Both groups reported high satisfaction with decision		Performance on questionnaire devised by authors: - PtDA 81 % (mean 8.05+/-1.29) - UC 70% (mean 6.94+/-

		not provided.				1.44)
Coylewright	2016	PtDA = 18.5 (CI 14.8 to 22.3) UC = 21.5 (CI 17.4 to 25.7)				PtDA = 60.3% (CI 47.5 to 73.2) UC = 39.6% (CI 25.5 to 53.7)
Doll	2019	UC = 24.3 (15.8) PtDA = 21.3 (14.0)				Performance on 6-item survey: - UC = 2.2 (1.0) - PtDA = 2.7 (1.3)
Fraenkel	2012	Informed subscale of DCS (no SE provided for values): - PtDA = 13.0 - UC =24.8 Values clarity subscale of DCS (no SE provided for values): - PtDA = 6.4 - UC = 21.0				Performance on questionnaire assessing knowledge of medications (no SE provided for values): - PtDA = 61% - UC = 31% Performance on questionnaire assessing knowledge of medication side effects (no SE provided for values): - PtDA = 49% - UC = 37%
Hess	2012	PtDA = 22.3 (CI 18.1 - 26.4) UC 43.3 (CI 32.2 - 39.6)				Seven knowledge questions: - PtDA = 3.6 (CI 3.4-3.9) - UC = 3.0 (CI 2.7-3.2) Correctly assessed 45-d risk for ACS: - PtDA = 24 patients

						(25%) - UC = 1 patient (1%) OPTION scale: - PtDA 26.6 (CI 24.9 - 28.2) - UC 7.0 (CI 5.9 - 8.1)
Hess	2016	PtDA = 43.5 (15.3) UC = 46.4 (14.8)				Eight knowledge questions: - PtDA = 4.2 (1.5%) - UC = 3.6 (1.5%) Correctly assessed 45 day risk for ACS: - PtDA = 10 patients (2.2%) - UC = 2 patients (0.4%) Correctly assessed 45 day risk for ACS within 10%: - PtDA = 293 patients (65.0%) - UC = 81 patients (18.1%) OPTION scale: - PtDA = 18.3(9.4) - UC = 7.9(5.4)

Holbrook	2007	Mean total DCS (5 point scale) = 2.1 (SD 0.4); no UC group for comparison in this study				Significant improvement in knowledge of AF after PtDA regardless of format (p<0.01); no UC group for comparison in this study
Kostick	2018	PtDA: - Baseline = 23.1 (20.7) - 1-week = 15.7 (11.8) UC: - Baseline = 29.3 (19.3) - 1-week= 17.4 (14.7)	PtDA = 11.5 (13.3) UC = 12.9 (16.6)	PtDA = 82.5 (13.8) UC = 82.8 (16.1)		Questionnaire with total sum 100 points PtDA: - Baseline = 45.6 (22.2) - 1-week = 67.8 (15.6) - 1-month = 64.3 (14.0) UC: - Baseline = 43.8 (18.3) - 1-week = 59.3 (12.4) - 1-month = 60.6 (12.0) CollaboRATE PtDA - 1-week = 88.4 (19.3) - 1-month = 90.4 (14.3) UC - 1-week = 90.0 (15.6) - 1-month = 89.8 (17.2)

						SDM-9: PtDA - 1-week = 84.8 (16.8) - 1-month = 87.5 (12.8) UC - 1-week = 84.3 (13.6) - 1-month = 85.2 (15.0)
Kunneman	2020	PtDA = 16.6 (14.4) UC = 17.9 (14.9) Difference -1.2 (-3.2 to 0.6).				Scoring 5 or 6 correct of total 6 questions about anticoagulation treatment for AF: - PtDA = 77.5% - UC = 72.5% - No significant difference; P = 0.15 OPTION-12: - PtDA = 33 (10.8) - UC = 29.1 (13.1) - Adjusted mean difference 4.2 (2.8 and 5.6) points
Lewis	2020	2-4 Weeks: - PtDA = 8.0 (13.8) - UC = 14.3 (18.4) - Group difference = -6.2 (CI -18.7 to 6.2)				Knowledge only assessed at 2-4 weeks, assessed using 6 true or false questions: - PtDA = 77.4% (16.8) - UC = 51.1% (24.0)

		6 Months: - PtDA = 16.2 (13.5) - UC = 14.6 (16.1) - Group difference = 1.6 (CI -10 to 13.3) 12 Months: - PtDA = 14.1 (17.1) - UC = 11.4 (13.7) - Group difference = 2.7 (-9.8 to 15.1)				- Group difference = 26.3% (CI 10.4 to 42.1)
McAlister	2005	5 Point Scale - PtDA = 1.6 (SD 0.5) - UC = 1.7 (SD 0.5) - p=0.05				
Man-Son-Hing	1999	5-Point Scale - PtDA = 1.65 (0.45) - UC = 1.74 (0.54) - No statistically significant difference (P=0.14)		PtDA = 96.4% UC = 95.3% Difference 1.1 (no CI provided)		Assessed with 24 knowledge questions. AF and stroke related (6 questions): - PtDA = 93.4% - UC = 90.2% - Difference = 3.2 (CI -4.5 to 10.9) Aspirin- related (9 questions): - PtDA = 68.3% - UC = 52.4% - Difference = 15.9 (CI 4.6 to 27.2)

						Warfarin-related (9 questions): - PtDA = 78.4 % - UC = 63.5% - Difference = 14.9 (CI 4.6 to 25.2)
Morgan	2000			PtDA vs UC: 71% vs 70% (CI -3% to 7%, p = 0.5)		20 true/false questions (15 for patients not eligible for angioplasty). Reported on mean percentage score. PtDA vs UC: 75% vs 62% (CI 8% to 18%, p<0.001)
Schwalm	2012	PtDA = 14.8 (10.5) UC = 19.5 (16.7) p=0.04				Assessed with 5 questions. - PtDA = 3.0/5 (1.5) - UC = 2.0/5 (1.3) - p<0.01
Thomas	2013	DCS total score (Overall patients): - PtDA = 35 (2.9) - UC = 34.1 (3.5) - p=0.33				Knowledge of SCA and ICDs improvement (Overall Patients): - PtDA = 8.4 (2.7) to 10.8 (2.1) - UC = 7.4 (3.9) to 9.7 (2.9) - No significant difference Information retention at 1 week: - PtDA = 10.8 (1.5) - UC = 9.0 (4.1) - No significant difference
Thomson	2007	Pre Clinic PtDA vs UC: Difference = 0.02 (-0.22 to			Overall pre and post clinic mean change =	Knowledge scores (0-10) reported separately for aspirin

		0.26) Post clinic PtDA vs UC: Difference = -0.18 (CI -0.34 to -0.01) At 3 month follow up, PtDA vs UC: Difference = -0.15 (CI -0.37 to 0.06)			-4.57 (CI -6.3 to -2.84); no significant difference between PtDA and UC groups in reduction in anxiety	and warfarin for each group at pre-clinic, post clinic and at 3 months. No difference was found at any point between PtDA vs UC.

Table S6: Instruments used for measurement of outcomes in each study

Reference		Outcomes measured	Instrument used	Time points of measurement
Allen	2018	Decisional conflict	Decisional conflict scale - Validated (O'Connor et al)	Baseline, 1 month, 6 months
		Decisional regret	Decision regret scale - Validated (Brehaut et al)	1 month, 6 months

		Knowledge	10 item knowledge test developed by the research team and validated by clinicians and patients	Baseline, 1 month, 6 months
Carroll	2017	Decisional conflict	1. Decisional conflict scale (as above) 2. SURE test (4 item screening test – Developed by Legare et al, validated by Ferron et al)	Prior to intervention and following the procedure (ICD implantation)
		Knowledge	5 knowledge-based questions developed by the inter-disciplinary team	Prior to intervention and following the procedure (ICD implantation)
Case	2019	Decisional conflict	Decisional conflict scale (as above)	Not specified
		Decisional satisfaction	Decisional satisfaction scale developed by Holmes-Rovner et al	Not specified
		Knowledge	10 item quiz developed by the research team	Not specified
Coylewright	2016	Decisional conflict	Decisional conflict scale (as above)	Pre- and post- intervention
		Knowledge	Total correct out of 10 questions developed by the research team, and specific knowledge that PCI does not reduce risk of MI compared with OMT alone	Pre- and post- intervention
Doll	2019	Decisional conflict	Decisional conflict scale (as above)	Pre- and post- intervention
		Knowledge	6 item knowledge scale developed by the research team	Pre- and post- intervention
Fraenkel	2012	Decisional	Informed and Values Clarity subscales of the Decisional	Pre- and post- intervention

		conflict	Conflict Scale	
		Knowledge	Knowledge scale developed by research team	Pre- and post- intervention
Hess	2012	Decisional conflict	Decisional conflict scale (as above)	30 days post intervention
		Knowledge	7 item knowledge scale developed by research team	30 days post intervention
Hess	2016	Decisional conflict	Decisional conflict scale (as above)	Pre- and post- intervention
		Knowledge	Knowledge scale developed by the research team	Pre- and post- intervention
Holbrook	2007	Decisional conflict	Decisional conflict scale (as above)	Pre- and post- intervention
		Knowledge	10 item knowledge scale developed by the research team	Pre- and post- intervention
Kostick	2018	Decisional conflict	Decisional conflict scale (as above)	Immediately post intervention, and at 1 week
		Decisional regret	Decision regret scale (as above)	1 month post intervention
		Decisional satisfaction	Decisional satisfaction scale (as above)	1 month post intervention
		Knowledge	Validated knowledge scale developed by the research team	Immediately post intervention, at 1 week and at 1 month
Kunneman	2020	Decisional	Decisional conflict scale (as above)	Pre- and post- intervention

		conflict		
		Knowledge	Knowledge scale developed by the research team	Pre- and post- intervention
Lewis	2020	Decisional conflict	Decisional conflict scale (as above)	2-4 weeks post intervention, 6 months, 12 months
		Knowledge	6 true/false questions developed by the research team	2-4 weeks post intervention
McAlister	2005	Decisional conflict	Decisional conflict scale (as above)	2 weeks post intervention
		Knowledge	Estimate of biannual stroke risk	2 weeks post intervention
Man-Son-Hing	1999	Decisional conflict	Decisional conflict scale (as above)	1-4 days post intervention
		Decisional satisfaction	6 questions using 5-point Likert scale	1-4 days post intervention
		Knowledge	23 item knowledge scale developed by the research team	1-4 days post intervention
Morgan	2000	Decisional satisfaction	12 Item decision making process questionnaire developed by Barry et al (with small adjustments)	Pre- intervention and at the time of treatment (at least 1 month post intervention)
		Knowledge	20 true/false questions developed by the research team	Pre- intervention and at the time of treatment (at least 1 month post intervention)
Schwalm	2012	Decisional	Decisional conflict scale (as above)	Not specified

		conflict		
		Knowledge	Knowledge scale developed by the research team	Not specified
Thomas	2013	Decisional conflict	Decisional conflict scale (as above)	1 week post intervention
		Knowledge	13-item knowledge scale developed by the research team	Pre-intervention, post-intervention, after 1 week
Thomson	2007	Decisional conflict	Decisional conflict scale (as above)	Pre-intervention, post-intervention, at 3 months
		Decisional anxiety	State Trait Anxiety Inventory developed by Spielberg et al	Pre-intervention, post-intervention
		Knowledge	Knowledge scale	Pre-intervention, post-intervention, at 3 months

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Table S7: Summary of instruments' characteristics

	Instrument used	**What is being measured**	**Why is it being measured**	**How is it being measured**	**Psychometric properties**
Decisional conflict	Well validated scale: Decisional	1) Health-care consumers' uncertainty in making a health-related decision; 2) the factors contributing to the uncertainty; and 3)	Lowering decisional conflict (through intervention) increases the feeling of making a better decision, avoidance of 'changing the	Various formats: clinical practice format (1 version), and research format (3 versions) statement format,	Very frequently used in research

	conflict scale (A.M. O'Connor)	health-care consumers' perceived effective decision making	mind' and higher satisfaction.	question format, low literacy format. See link below.	Reliability: Test-retest correlations and Cronbach's alpha >0.78 Construct validity: -Related to constructs of knowledge, regret, and discontinuance. -Discriminated between groups who make and delay decisions Tool response to change -before and after studies Possesses predictive validity
Decisional regret	Well validated scale: Decision	Distress or remorse after a health care decision	Greater involvement of patients in health care decisions may lead to higher levels of regret, a very	Five statements rated on a 5-point Likert scale:	Very frequently used in research

	regret scale (J.C. Brehaut et al)		negative emotion.		Reliability: Cronbach's alpha: 0.81-0.92 Construct validity: Scale correlates with satisfaction with the decision, decisional conflict and overall rated quality of life.
Decisional satisfaction	Well validated scale: Satisfaction with decision scale M. Holmes-Rovner et al	Satisfaction with decision made	Higher satisfaction a very positive emotion. Satisfaction with a decision is thought to predict patients' certainty to carry out decision.	Six statements rated on a 5-point Likert scale:	Frequently used: Reliability: Cronbach's alpha = 0.86 Construct validity: Scale correlates with decisional conflict, confidence in decision, knowledge and other scales.
Decisional	Well validated	Two forms of anxiety:	Anxiety (with a decision)	Fourty statements rated	Extensive use in

anxiety	instrument (C.D. Spielberger et al): State Trait Anxiety Inventory (STAI).	State anxiety and trait anxiety.	may lead to dissatisfaction with care and discontinuation of treatment	on a 4-point Likert scale. Twenty items were developed for 'trait anxiety' and 20 items for 'state anxiety'.	assessment of anxiety and depression, less frequently used in relation to shared decision making.

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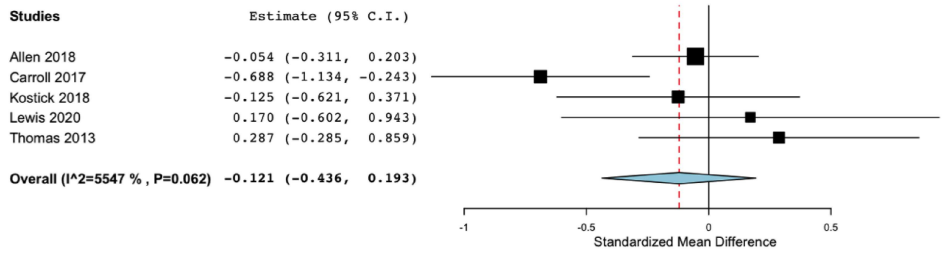
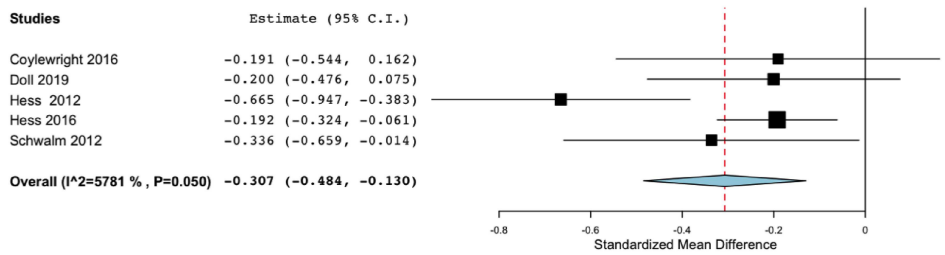
Figure S1: Subgroup analysis for decisional conflict and knowledge stratified according to cardiac condition

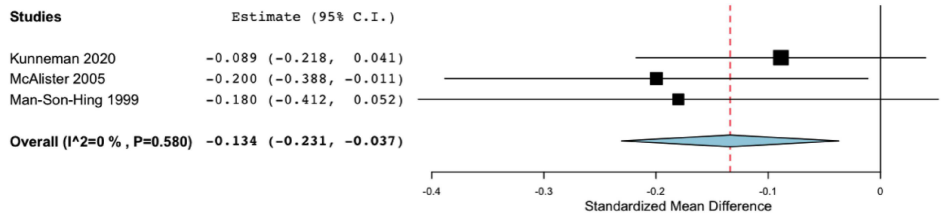
A) Cardiac devices (e.g. ICDs) and left ventricular assist devices (LVAD) – decisional conflict



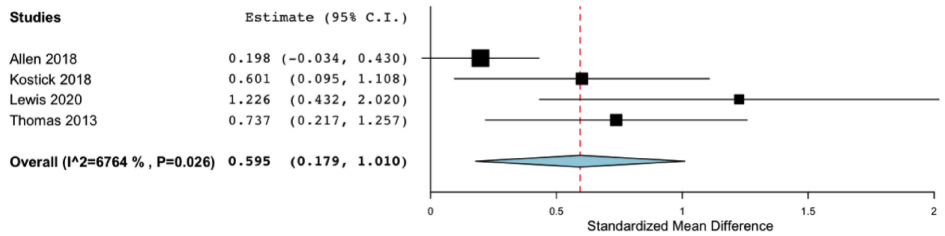
B) Coronary artery disease – decisional conflict



C) Atrial fibrillation – decisional conflict



D) Cardiac devices (e.g. ICDs) and left ventricular assist devices (LVAD) – knowledge



E) Coronary artery disease – knowledge

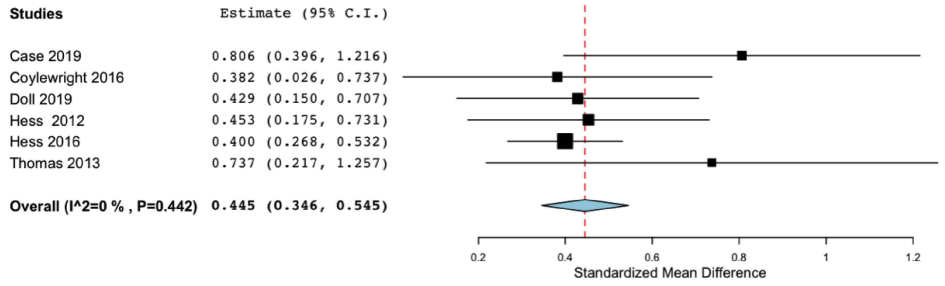
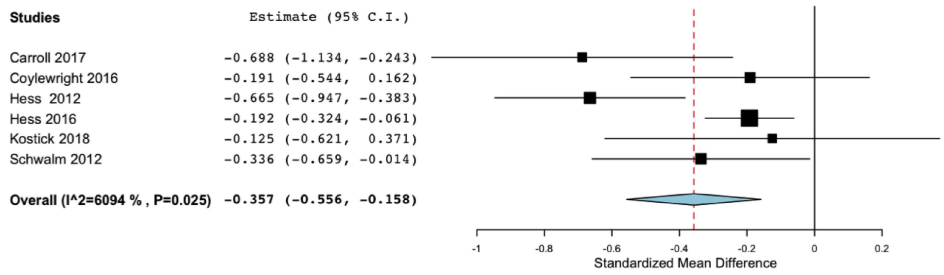
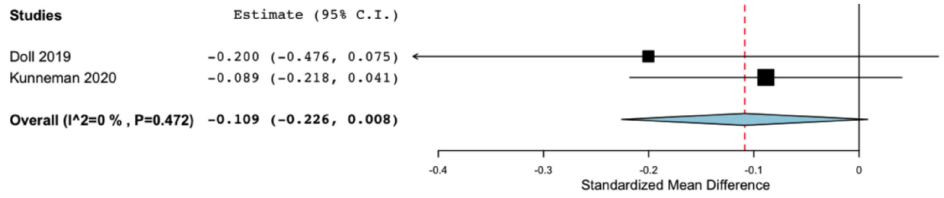


Figure S2: Subgroup analysis for decisional conflict and knowledge stratified according to decision aid used

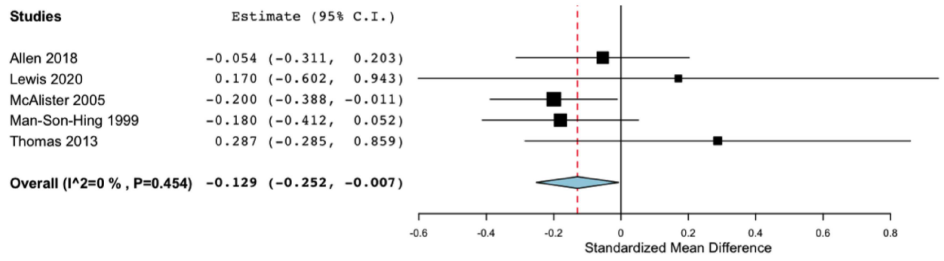
A) Printed decision aids – decisional conflict



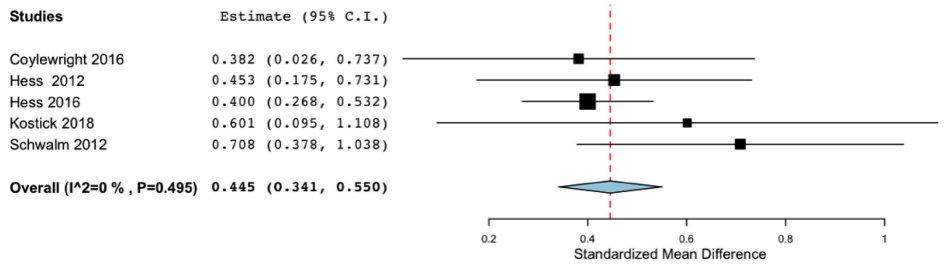
B) Computer or web-based decision aids – decisional conflict



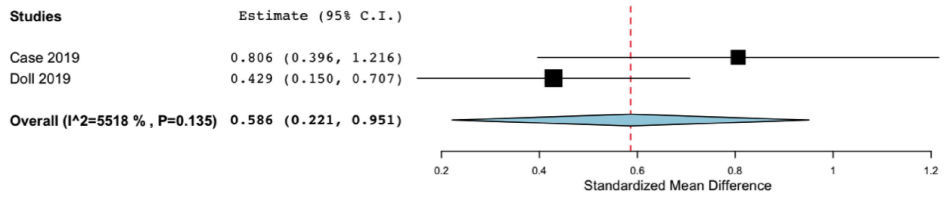
C) Mixed and other decision aids – decisional conflict



D) Printed decision aids – knowledge



E) Computer or web-based decision aids – knowledge



F) Mixed and other decision aids – knowledge

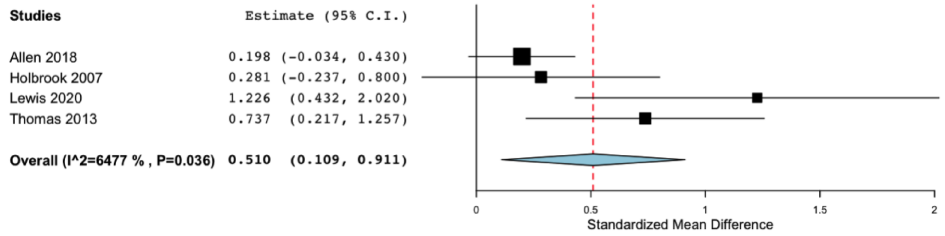


Figure S3: Leave-one-out sensitivity analysis