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The impact of decision aids used during clinical encounters on clinician outcomes and consultation length: A systematic review

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Abstract

Ethical approval

Not required.

Data sharing

No additional data available.

Transparency

CCD affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

Competing interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the submitted work; MRG has conducted consulting work around shared decision making for Pfizer with travel costs and honoraria paid to his institution. MRG was also paid by Hillcrest Medical Center (Tulsa, OK) to speak on SDM at a continuing medical education event with travel costs and an honorarium paid to his institution; no other relationships or activities that could appear to have influenced the submitted work.

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Importance—Clinicians' satisfaction with encounter decision aids is an important component in facilitating implementation of these tools.

Objective—To determine the impact of decision aids supporting shared decision making during the clinical encounter on clinician outcomes.

Evidence review—We searched 9 databases from inception to June 2017. Randomised clinical trials (RCTs) of decision aids used during clinical encounters with an unaided control group were eligible for inclusion.

Synthesis—Due to heterogeneity among included studies we used a narrative evidence synthesis approach.

Results—Twenty-five papers met inclusion criteria including 22 RCTs and 3 qualitative or mixed-methods studies nested in an RCT, together representing 23 unique trials. These trials evaluated health care decisions for cardiovascular prevention and treatment (n=8), treatment of diabetes mellitus (n=3), treatment of osteoporosis (n=2), treatment of depression (n=2), antibiotics to treat acute respiratory infections (n=3), cancer prevention and treatment (n=4), and prenatal diagnosis (n=1). Clinician outcomes were measured in only a minority of studies. Clinicians' satisfaction with decision making was assessed in only 8 (and only 2 of them showed statistically significantly greater satisfaction with the decision aid); only 3 trials asked if clinicians would recommend the decision aid to colleagues and only 5 asked if clinicians would use decision aids in the future. Outpatient consultations were not prolonged when a decision aid was used in 9 out of 13 trials. The overall strength of the evidence was low, with the major risk of bias related to lack of blinding of participants and/or outcome assessors.

Conclusion—Decision aids can improve clinicians' satisfaction with medical decision making and provide helpful information without affecting length of consultation time. Most shared decision making trials, however, omit outcomes related to clinicians' perspective on the decision making process or the likelihood of using a decision aid in the future.

Introduction

Shared decision making (SDM) is considered an essential element of patient-centred care, yet its implementation into routine clinical practice has proven to be difficult.¹ SDM refers to a process of deliberation in which clinician and patient work together to achieve the best possible health care choice aligned with the patients' values and preferences.²³

Despite evidence that decision aids improve patients' knowledge and clarify patients' values,⁴ the uptake of encounter decision aids for SDM among clinicians and their integration into routine clinical care is low.¹⁵⁶ Most of the barriers to widespread implementation of SDM are commonly encountered with any clinical practice changes.⁷⁸ These include time constraints with competing priorities taking precedence and uncertainty about the value of the proposed change.⁹ Clinicians may also have concerns about the lack of applicability of SDM due to patient characteristics and the clinical situation.¹⁶

System approaches (as opposed to reliance on individual clinicians) have been identified as potential facilitators to implementation of SDM into mainstream clinical practice.¹⁵ It is likely that some system approaches, such as implementation of encounter decision aids into

the electronic medical record system, would support uptake of this intervention by clinicians. In addition, however, it seems essential to address and overcome clinicians' concerns in order to achieve wide-spread implementation of SDM. This includes concerns that SDM takes too much time or that decision aids for SDM do not address the needs of all patients, in particular that they may not address the perceived different needs of elderly people, immigrants and patients with low health literacy in general.¹⁰

Measured outcomes in trials to assess the impact of decision aids for SDM have usually been patient-reported and have focused on patients' experience and satisfaction with the decision making process.⁴ Clinicians' feedback is, however, also important, as clinicians' satisfaction with the way that the process of SDM using an encounter decision aid affects the clinical encounter can be a strong incentive for sustained uptake of encounter decision aids alongside other incentives such as achieving appropriate medical decisions and satisfaction with the decision making process. Ideally, decision aids, particularly those designed for use in the clinical encounter, will facilitate constructive engagement and collaborative deliberation between patients and clinicians about health care options, increasing both patients' and clinicians' satisfaction with the clinical encounter.

It is unknown how the experience of using an encounter decision aid for SDM may change the perception and acceptability of these tools among clinicians. To date there is no systematic evaluation of whether physicians who have used encounter decision aids for SDM have been satisfied by this experience and how they judge the SDM tool's helpfulness and impact on the decision making process. We were thus interested to evaluate and compare opinions about decision aids for use during the clinical encounter in clinicians who had used these tools in randomised controlled trials (RCTs) and those who had not. Consequently, we performed a systematic review to determine clinician outcomes in RCTs of encounter decision aids for SDM.

Methods

Literature search

We reviewed all studies included in the Cochrane review entitled "Decision aids for people facing health treatment or screening decisions" published in April 2017 (literature search conducted on 24 April 2015).⁴ The Cochrane review captured trials of decision aids for people facing health treatment or screening decisions. The majority of studies in the Cochrane review used decision aids outside of medical encounters, while our study included decision aids used during the medical encounter, and we focused on clinician outcomes. We updated the search using the following electronic bibliographic databases: Ovid Embase, Ovid Medline, PubMed, The Cochrane Library (Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, Cochrane Methodology Register), Health Technology Assessment Database, NHS Economic Evaluation Database, PsycInfo, and EBSCO CINAHL.

The literature search was conducted by an experienced research librarian (PJE). Databases were searched from the date of inception to June 1, 2017. We also searched the reference lists of relevant papers.

Eligibility criteria

Study types—As we were interested in the comparative effectiveness of encounter decision aids, we included RCTs of encounter decision aids that compared a decision aid intervention to at least one control and measured at least one clinician outcome. Further, we included studies of any design nested within an RCT design (e.g., a second analysis of the original trial), if they met the other study inclusion criteria and reported relevant outcomes not mentioned in the parent study. We included articles reported in any language.

Participants—To be included, studies needed to report on adults making decisions about screening or treatment options for themselves, a child, or an incapacitated significant other. Participating clinicians could have been any health care professional (nurse, physician, physician assistant, dietician, etc.) in any type of health care setting (in- or outpatient).

Interventions—Encounter decision aids were defined as any communication or support tool that facilitated a SDM process including patients and clinicians deliberating available health care options. The decision aid had to include at least one component designed for use during the patient-clinician encounter. Decision aids only used before or after the clinical encounter were excluded.

Control—Control groups were usual care or alternative interventions without the use of a decision aid. Studies that only compared different types of decision aids were excluded.

Outcome measures—We aimed to include studies that measured clinician-reported or clinician-important outcomes in the following a priori defined categories: 1) Clinicians' satisfaction with: i) the clinical encounter in general, ii) the decision-making process or any component of it (e.g., knowledge transfer, patient participation and engagement, decisional comfort/conflict), iii) the decision aid (e.g., plan to use the decision aid again, recommend it to others), and iv) the decision made; 2) Efficiency in terms of the length of the clinical consultation; and 3) Personal and professional wellbeing including: i) mood and burnout indicators, and ii) satisfaction with the practice of clinical care.

Study selection and data extraction—All references identified in the literature search were independently screened by two reviewers using DistillerSR software (Evidence Partners Inc., Ottawa, Ontario, Canada). All studies that were identified for full text review based on abstract and title were reviewed by two independent reviewers. Disagreements were resolved through discussion. Data were extracted from included articles by two independent research team members using a standardized data extraction form. All extracted data were cross-checked by the first author. The processes for study screening and data extraction from included studies were pilot-tested by having study reviewers and data extractors independently conduct preliminary study screening and data extraction on selected articles. Extracted data included: study name and authors, year of publication, study location(s), topic area, number of patients and clinicians in intervention and control groups, number of clinical encounters, characteristics of clinician participants, description of the intervention, description of the comparator, quantitative and qualitative clinician outcomes

Analysis—Due to high heterogeneity among included studies, we conducted narrative evidence syntheses. We grouped outcome categories and assessed results within each category without quantitative pooling.

Risk of bias assessment—The methodological quality of the studies (i.e., risk of bias) was appraised by two independent reviewers using the original Cochrane Collaboration's risk of bias tool.¹¹

We reported our systematic review and meta-analysis according to the PRISMA guidelines.¹² A review protocol with *a priori* defined outcome categories was developed before study selection commenced.

Results

Studies included in the Cochrane review on decision aids (n=105) and citations identified with an updated search resulted in 6,702 unique citations, from which 218 full-text articles were reviewed after consideration of title and abstract (Figure 1). Twenty-five papers met the inclusion criteria including 22 RCTs and 3 qualitative or mixed-methods studies nested in an RCT, together representing 23 unique trials (Table 1).^{13–37} One study was excluded because it had no comparator group without decision aid.³⁸ There were 3 nested qualitative studies and 9 RCTs included in our review that were not included in the Cochrane review, the majority of which were published after April 2015, the date of the literature search for the Cochrane review.

Study characteristics

The characteristics of the included trials are summarized in Table 1. Ten trials were conducted in the United States of America (USA), followed by the United Kingdom (UK) with three and Canada with two studies. One study each was conducted in Spain, Greece, Germany, the Netherlands and Australia. Three trials were international multicentre RCTs. Trials evaluated health care decisions for cardiovascular prevention and treatment (n=8), treatment of diabetes mellitus (n=3), treatment of osteoporosis (n=2), treatment of depression (n=2), antibiotics to treat acute respiratory infections (n=3), cancer prevention and treatment (n=4), and prenatal diagnosis (n=1). In three trials, SDM interventions were multifaceted programs (including an encounter decision aid).

Risk of bias assessment

Table 2³⁹ gives an overview of the risk of bias assessment of all included studies. The major source of risk of bias in trials was the lack of blinding of participants.

Clinicians' satisfaction with decision aid and decision making process

Clinicians' satisfaction with the decision aid and decision making was measured as a quantitative outcome in the decision aid group and the control group in 8 studies of which 2 showed statistically significant greater satisfaction in the decision aid group and 6 showed no difference between groups. Of the 8 studies, 6 measured satisfaction as a continuous

outcome, of which 1 showed greater satisfaction among clinicians in the intervention group, and 5 showed no difference between clinicians in different groups (Table 3).

A study on a decision aid for treatment of depression reported clinician satisfaction with decision making as dichotomous outcome and found a significantly higher proportion of clinicians being satisfied or extremely satisfied in the intervention compared to the control group (76.3% versus 54.0%; relative risk (RR) 1.64, 95% CI 1.25 to 2.16).²⁸ A study on a decision aid for diabetes medication that used five categories of different levels of satisfaction found no significant difference between groups (intervention versus control group: completely satisfied: 34.7% versus 17.7%, very satisfied: 50.0% versus 59.8%, somewhat satisfied: 9.2% versus 17.7%, poorly satisfied: 5.1% versus 4.9%, not at all satisfied: 1.0 versus 0%; $p=0.87$) (Figure 2).²³

Clinicians perceived the decision aid as useful when it was easy to use and implement into routine clinical care.²²³² One study reported that clinicians felt proud to have additional tools for patients to view and take home.¹⁴ Many clinicians reported that patients were more satisfied with care after using the decision aid. These clinicians recognized that the decision aid may have an added value.¹⁴

Added value from the use of a decision aid reported by clinicians included that the decision aid positively challenged patients' preconceived ideas;¹⁴²²³² contained useful information²⁵ and increased patients' and clinicians' knowledge;²²³² enhanced communication by providing visual representations of choices;¹⁴ reduced clinicians' burden to produce accurate representations by hand by providing graphical contents, giving clinicians more time to engage in meaningful discussions with patients;¹⁴ provided scientific evidence for issues discussed in the consultation;³² reassured patients;²⁵ helped to frame the "usual care"/ no-intervention option in a more positive light (e.g., non-antibiotic prescribing decisions with a positive message about symptom relief);³² facilitated more structured and coherent consultations;²²³² provided reminders of specific topic to cover in the discussion;³² motivated patients and/or involved them in the choice to be made;²⁵³² assisted in the elicitation of patient preferences;¹⁴ and led to a greater recognition among clinicians of the importance of actively engaging patients in treatment decisions.¹⁴

Clinicians' concerns about encounter decision aids were that they felt obliged to discuss options that were not relevant (e.g., medically not possible) for some patients because they were included in the decision aid;²⁵ information in decision aids was sometimes worrying for patients or difficult to understand;²⁵ patients had other priorities during the encounter than discussing the decision aid;²⁵ they did not perceive the decision aid as motivating for behavioural change;²⁵ they had to give up feelings of competence and comfort with their own familiar routines;¹⁴ decision aids would add time to their clinics if they were not simple and straightforward;¹⁴ and informing the patient before the visit (as opposed to using an encounter decision aid) may save time during the clinical encounter and potentially improve the conversation.¹⁴

Knowledge transfer

Knowledge transfer was assessed in one study.²³ The majority of clinicians in the intervention group asked to assess the knowledge transfer using the decision aid judged it as very easy (48%) or easy (39%).²³

Decisional conflict/comfort

Decisional conflict was reported as a comparative continuous outcome in three studies. Clinicians in the decision aid group were less conflicted with the decisions made than clinicians in the control group in two studies and there was no difference between groups in one study (Table 3). One study reported decisional conflict as dichotomous outcome and found no statistically significant difference between groups. The proportion of clinicians with 2.5 or more on the Decisional Conflict Scale (1 = low decisional conflict, 5 = very high decisional conflict) was 4.6% (range 0–6.1%) in the decision aid group and 1.1% (range 0 to 2.4%) in the control group (adjusted RR 3.4; 95% CI 0.3 to 38.0) (Figure 2).³⁰

Helpfulness of the shared information

Three studies assessed helpfulness of the information in the intervention and control group. Results from all studies indicated that clinicians found the information in the decision aid group more helpful than in the control (mean difference 0.64, 95% CI 0.18 to 1.09²⁷ (Table 3); 70% versus 35% of clinicians judged information as helpful²⁶ and a significantly higher proportion (54.1%) of clinicians in the intervention group who judged the information as extremely helpful compared to the control (33.7%), Figure 2).¹⁵

Two studies that assessed how helpful clinicians in the intervention group found the information contained in the decision aid (but did not assess the outcome in the comparator group) revealed that 98% and 86% of clinicians respectively found the information helpful.^{16,24} Some clinicians reported that the decision aid helped influence the health care decision.²²

Intention to use decision aid/SDM making in the future/for other decisions

Of three studies that measured intention to use a decision aid/SDM in the future as comparative continuous outcome, one found a significantly higher proportion of clinicians in the intervention intending to use a decision aid/SDM for other decisions and two did not show any significant differences between intervention groups and controls (Table 3). Of two studies using dichotomous and categorical outcomes respectively, one found a significantly higher proportion of clinicians in the intervention intending to use a decision aid/SDM for other decisions (67% versus 41%, RR 1.6; 95% CI 1.01 to 2.6),²⁶ but the other found no statistically significant difference between groups (three categories of answers for intention to use a decision aid/SDM in future: “yes”, “not sure”, “no” with 62.9% versus 43.8% “yes” answers in the intervention and control group respectively) (Figure 2).¹⁵

Four studies assessed intention to use a decision aid/SDM in the future in the intervention group only and found that 63%,¹⁶ 90%,²⁴ 94%,²³ and 100%¹⁴ of clinicians respectively intended to use a decision aid/SDM in the future.

Would recommend decision aid/SDM to other clinicians

Three studies assessed whether clinicians would recommend the use of decision aids/SDM to colleagues in the intervention and control group and all found that clinicians in the intervention group were more likely to recommend use of a decision aid/SDM to other clinicians (mean difference 1.09, 95% CI 0.57 to 1.61²⁷ (Table 3); 74% versus 30% of clinicians would recommend decision aids/SDM²⁶ and a significantly higher proportion (62.7%) of clinicians in the intervention group who would recommend decision aids/SDM compared to the control (41.9%) when given a choice between “yes” (would recommend), “no” and “not sure” (Figure 2).¹⁵

Intention to follow clinical practice guidelines

The outcomes of two studies did not show any significant difference regarding intention to follow clinical practice guidelines between intervention groups and controls (Table 3).

Disruption to flow of consultation

Disruption to the flow of a consultation was assessed in one study, which showed that 77% of clinicians in the decision aid group thought that the use of a decision aid was not disruptive and even potentially beneficial, while 15% found it neither disruptive nor beneficial and 8% found it potentially disruptive.¹⁴

Length of the clinical consultation

Of thirteen studies conducted in an outpatient setting that measured length of the consultation, 9 found no significant difference in consultation time between intervention and control groups. Three studies reported a longer and one study a shorter consultation time in the decision aid group (Table 3, Figure 2).

One of the reviewed studies, which evaluated reasons why some of the clinicians in the intervention group did not use the assigned encounter decision aid in 19% of all consultations, showed that clinicians' perception that they do not have enough time was the main reason for not using a decision aid (38.5% of all clinician responses).²³ Length of consultation was not measured in this study, and therefore it remains unclear whether use of a decision aid indeed prolonged consultation time in this study.

In a large multicentre study of the chest pain decision aid located in emergency departments, short conversations lasted longer in the intervention than in the control group (mean of 4.4 minutes versus 3.1 minutes).¹⁵

Personal and professional wellbeing

None of the studies assessed mood or burnout indicators for clinicians or the impact of encounter decision aids on clinicians' satisfaction with the practice of clinical care and professional fulfilment.

Discussion

This systematic review and meta-analysis, which evaluated the impact of encounter decision aids on clinician outcomes and consultation length, found that the use of decision aids can improve satisfaction with medical decision making and provide helpful information without negatively affecting other measures of clinician satisfaction and length of consultation time. Clinicians reported added value from the use of a decision aid, for example by positively challenging patients' preconceived ideas, by providing visual representations of choices and by facilitating more structured and coherent consultations. Clinicians' concerns included that they had to step out of their comfort zone when using new decision aids, that decision aids would add time to their clinics and that they felt obliged to discuss options that were not relevant for some patients because they were included in the decision aid. Clinicians who had used a decision aid were more likely to recommend the use of a decision aid or SDM to other clinicians. However, included studies together contributed to inferences warranting only low confidence (because of selection of clinicians into trials and sparse data), and clinician outcomes are only captured in a minority of SDM trials.

Limitations of our review include that the number of clinician participants was relatively small in most included studies, and due to the nature of the intervention, clinicians were not blinded to the use of a decision aid, possibly resulting in bias. Most importantly, this review summarises results from RCTs, and thus the views captured are of clinicians who volunteered and enrolled patients into these trials. Measured outcomes did not correct for the possibility that clinicians might not have used the decision aids as intended (low fidelity). Evidence from a participant-level meta-analysis including 6 RCTs of decision aids for SDM showed that clinicians often did not use encounter decision aids as instructed.⁴⁰ Also, randomisation was not always performed at the level of clinician/clinician group and randomisation at the level of clinical encounter or patient could have resulted in "contamination" of outcomes reported by clinicians who had used the decision aid with a prior patient. This would be expected to have biased results toward no difference.

While we included qualitative outcomes from RCTs and nested studies, the major goal of our review was to assess the comparative effectiveness of encounter decision aids for clinician outcomes. For an in-depth exploration of clinicians' views on SDM and the use of decision aids a systematic review of the qualitative literature would be necessary.

A major barrier to implementing the use of encounter decision aids into routine clinical care is clinicians' perception that using a decision aid is time consuming and therefore often not feasible within the time constraints already placed on them.⁴¹ The results of our systematic review do not support these concerns, demonstrating that the duration of outpatient consultations did not significantly differ whether an encounter decision aid was used or not in 9 out of 13 studies. Three studies reported a longer and one study a shorter consultation time in the decision aid group.

A recent Cochrane review on decision aids for health care decisions, which included 105 studies (of which 89 (84.8%) examined a decision aid used by the patient in preparation for the consultation, not during the clinical encounter) identified 10 (7 using an encounter

decision aid) that evaluated the effect of a decision aid compared to usual care on consultation length.⁴ In the Cochrane review, the median consultation length was 24 minutes (range 3.8 to 68.3) versus 21 minutes (range 4.2 to 65.7) in the decision aid versus usual care groups respectively (difference of 2.6 minutes longer in the decision aid group). There was no significant difference in consultation length in 8 studies, but consultation length was significantly longer in 2 studies, (which both used encounter decision aids; one study additionally employed the time-consuming standard gamble method to elicitate patient values in the decision aid group).¹⁹³⁷

Only one study evaluated the duration of clinical encounters in emergency departments.¹⁵ The significantly longer duration of clinician-patient encounters in the decision aid group compared to usual care in this study (mean of 4.4 versus 3.1 minutes) can likely be explained by the small amount of absolute time spent on these conversations, which, in standard care, likely often focus just on informing the patient rather than having a discussion.

A study (not included in our systematic review because it was not a randomised trial) in which clinicians were interviewed before and after the use of a decision aid for knee osteoarthritis described a clear learning curve among clinicians as they became increasingly familiar with the tool and confident to use it.⁴¹ Clinicians overcame their initial concerns that the decision aid would lead to an increase in encounter duration, would present evidence that differs from current clinical practice, would overload patients with information and lead to inappropriate patient demands. For example, they learned how to make the tool workable by personalizing the decision aid to a patient's circumstances.

None of the clinician-reported outcomes related to the *a priori* chosen outcome domain of clinicians' personal and professional wellbeing. We previously speculated that improving interactions with patients in clinical encounters using SDM could potentially lead to improved physician well-being by creating more meaningful human connections and thus providing deeper professional satisfaction for clinicians,⁴² but this has not been examined in RCTs to date.

The recently published Standards for Universal reporting of patient Decision Aid Evaluations (SUNDAE Checklist) acknowledge the important role of health professionals in any decision making process by recommending the description of characteristics of participating health professionals in reports of evaluation studies of patient decision aids.⁴³⁴⁴

We recommend that clinician outcomes be included in all future trials of decision aids in addition to patient outcomes. Including clinician outcomes that reflect satisfaction with the human connection made with patients during clinical encounters, and evaluating whether encounters that incorporate decision aids for SDM are considered more professionally satisfying than standard care, could provide new insights into factors that are relevant for clinician well-being.

In the United States of America, the Centers for Medicare and Medicaid Services (CMS) have mandated SDM for certain interventions including lung cancer screening and implantation of a left atrial appendage closure device (as an alternative to long-term oral

anticoagulation in patients with non-valvular atrial fibrillation). As mandated SDM is likely to increase in the future in an effort to provide patient-centred care, it is important that regulators do not alienate clinicians by ignoring their input.

Conclusions

Among clinicians who have used decision aids for SDM in clinical encounters there is good acceptance of this intervention. Importantly, consultation times in outpatient settings were not prolonged in the majority of studies when an encounter decision aid was used. Using decision aids for SDM can be mutually beneficial for patients as well as clinicians. Clinician outcomes in SDM trials have been rarely captured and deserve more attention.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Box:**What this paper adds****What is already known on this subject**

- Decision aids improve patients' knowledge and clarify patients' values.
- The uptake of encounter decision aids for shared decision making among clinicians and their integration into routine clinical care is low.

What this study adds

- The use of decision aids during clinical encounters improves satisfaction with medical decision making, provides helpful information, and improves decisional comfort among clinicians without negatively affecting other measures of clinician satisfaction and length of outpatient consultation time.
- This review documents a blind spot in the field: shared decision making trials rarely capture clinician outcomes.

Figure 1:
Flow diagram of study selection

Author Manuscript	<div> Satisfaction with decision making <ul style="list-style-type: none"> Whelan 2003 Montori 2011 LeBlanc Depression 2015 </div>	<div> Satisfaction with decision making <ul style="list-style-type: none"> Ozanne 2007 Legare 2011 Leighl 2011 Legare 2012 Karagiannis 2016 </div>	
Author Manuscript	<div> Decisional conflict (comfort with decision) <ul style="list-style-type: none"> LeBlanc 2015, Depression </div>	<div> Decisional conflict (comfort with decision) <ul style="list-style-type: none"> Legare 2012 LeBlanc 2015, Osteoporosis Warner 2015 </div>	
Author Manuscript	<div> Helpfulness of the information <ul style="list-style-type: none"> Montori 2011 LeBlanc Osteoporosis 2015 Hess 2016 </div>		
Author Manuscript	<div> Intention to use decision aid /SDM in future <ul style="list-style-type: none"> Montori 2011 LeBlanc 2015 Osteoporosis </div>	<div> Intention to use decision aid /SDM in future <ul style="list-style-type: none"> Legare 2011 Legare 2012 Hess 2016 </div>	
Author Manuscript	<div> Would recommend decision aid/ SDM to other clinicians <ul style="list-style-type: none"> Montori 2011 LeBlanc Osteoporosis 2015 Hess 2016 </div>	<div> Intention to follow clinical practice guidelines <ul style="list-style-type: none"> Legare 2011 Legare 2012 </div>	
Author Manuscript		<div> Length of the clinical consultation in an outpatient setting <ul style="list-style-type: none"> Bekker 2004 </div>	
Author Manuscript		<div> Length of the clinical consultation in the emergency department <ul style="list-style-type: none"> Hess 2016 </div>	
	Favours decision aid group	Does not favour any group	Favours control group

Figure 2:

Summary of quantitative comparative outcomes (decision aid versus control group)

Characteristics of the included studies

Table 1:

Study, year of publication	Country	Design	Randomisation	Setting	Clinicians	Health care question addressed	Intervention	Control
Coylewright, 2016 ¹³ USA (RCT) Coylewright, 2017 ¹⁴ (nested study)		2-arm parallel RCT, single centre Nested qualitative study (semi-structured interviews)	At patient level Out of 36 clinicians, 24 had DA encounters and 25 had usual care encounters	Hospital-based outpatient cardiology practices (general and interventional cardiology clinic)	RCT: n=36 Interventional cardiologist, non-invasive cardiologists, physician assistant, cardiac catheterization laboratory physician Extenders Interview study: n=13	Choose between optimal medical therapy and percutaneous coronary intervention (in stable coronary artery disease)	PCI (percutaneous coronary intervention) Choice DA	Usual care
Hess, 2016 ¹⁵ USA		2-arm parallel RCT, multicentre	At patient level 436 post-sit clinician surveys completed in DA group and 430 in usual care group	Emergency Departments	n=361 Emergency clinicians (emergency physicians, nurse practitioners, and physician assistants)	Choose between admission for observation and further cardiac testing (cardiac stress testing or coronary computed tomography angiography) or referral for outpatient evaluation (in patients with low risk chest pain)	Chest Pain Choice DA	Usual care
Hess, 2012 ¹⁶ USA		2-arm, parallel RCT, single centre	At patient level	Emergency Department of tertiary care hospital	n=51 Physicians (including residents), physician-assistants, nurse practitioners	Choose between emergency department observation unit admission and urgent cardiac stress testing or follow-up with a physician within 72 hours (in patients with low risk chest pain)	Chest Pain Choice DA	Usual care
Perestelo-Pérez, 2016 ¹⁷ Spain		2-arm parallel cluster RCT, multicentre	At clinician group level 15 clinicians in the DA group, 14 in the usual care group	Primary care centres	n=29 Physicians	Take a statin yes/no	Statin Choice DA	Usual care
Nunnenga, 2009 ¹⁸ USA		2-arm parallel RCT, single centre	At patient and clinician level	Subspecialty clinic for diabetes at tertiary hospital	n=16 Endocrinologists specializing in diabetes care (consultants and fellows)	Take a statin yes/no	Statin Choice DA	Standard patient education pamphlet
Thomson, 2007 ¹⁹ United Kingdom		2-arm, parallel RCT, multicentre	At patient level	Two research clinics deriving patients from general practices	n=2 One doctor per clinic, trained in delivering either the DA or guidelines	Warfarin anticoagulation or aspirin treatment to reduce the risk of stroke (in patients with atrial fibrillation)	DARTS II (Decision Analysis in Routine Treatment II) DA	Paper-based guidelines (control)
Warner, 2015 ²⁰ USA		2-arm parallel RCT, single centre	At patient level Separate groups of clinicians delivered the decision aid (n = 18) and usual care (n = 6) to minimize the potential for contamination.	Preoperative evaluation centre at a tertiary hospital	n=24 Physician assistants, an internist, anaesthesiologists and anaesthesiology residents	Choose between three options: continue smoking, attempt a period of temporary abstinence, and attempt to quit smoking for good (in smokers evaluated in preparation for elective surgery)	DA Smoking Cessation Around the Time of Surgery	Usual care
Muthers, 2012 ²¹ United Kingdom (RCT) Brown, 2014 ²² (nested study)		2-arm parallel cluster RCT, multicentre Nested mixed-methods study (interviews and observations of consultations)	At clinician group/ practice level The nested study focused on eight encounters within the RCT	General practices (25 practices in the DA group, 24 in the control group)	n: not specified Patients' primary care clinicians for diabetes care (general practitioner or practice nurse)	Start insulin (in patients with type 2 diabetes mellitus) yes/no	PANDAs (Patients And Decision Aids) DA	Usual care
Karagannis, 2016 ²³ Greece		2-arm parallel cluster RCT, multicentre	At clinician group/ practice level 101 clinicians in DA group, 103 in usual care group	Primary and secondary care practices	n=204 Physicians, physician assistants, and nurse practitioners	Choose between different anti-hyperglycaemic drugs for treatment of type 2 diabetes mellitus	Diabetes Medication Choice DA	Usual care
Mullan, 2009 ²⁴ USA		2-arm cluster parallel RCT, multicentre	At clinician level 21 clinicians in the DA group, 19 clinicians in the control group	Primary care and family medicine sites	n=40 Physicians, physician assistants, and nurse practitioners	Choose between different anti-hyperglycaemic drugs for treatment of type 2 diabetes mellitus	Diabetes Medication Choice DA	Usual care
Denis, 2014 ²⁵ The Netherlands		2-arm parallel RCT, multicentre	At clinician group/ practice level for computer-based versus printed DA At patient level for DA versus control	General practices	n=25 Nurse practitioner, nurse, or specialised assistant for diabetes care	Set treatment goals in diabetes and choose treatment options of risk factors including: statin, angiotensin-converting enzyme (ACE) inhibitor, healthy life style	DA for prioritising treatment goals in diabetes	Usual care
LeBlanc, 2015 (Osteoporosis) ²⁶ USA		3-arm parallel RCT, multicentre	At patient level 22 clinicians administered DA, 28 clinicians were in the control group	Primary care practices	n=50 Physicians, physician-assistants, nurse practitioners	Take bisphosphonates yes/no	Osteoporosis Choice DA	1.Provision of the patient's risk of fracture (obtained from FRAX calculator) only to the clinician Usual care
Montori, 2011 ²⁷ USA		2-arm parallel RCT, multicentre	At patient level Out of 60 clinicians, 39 administered DA, 33 administered usual care)	General medicine and primary care practices	n=60 Primary care clinicians	Take bisphosphonates yes/no	Osteoporosis Choice DA	2.Usual care

Study, year of publication	Country	Design	Randomisation	Setting	Clinicians	Health care question addressed	Intervention	Control
LeBlanc, 2015	(Antidepressants) ²⁸ USA	2-arm parallel cluster RCT, multicentre	At clinician group/ practice level 66 clinicians in DA group, 51 in usual care group	Primary care practices	n=17 Clinicians (including residents)	In adults with moderate to severe depression: considering treatment with an antidepressant	Depression Medication Choice DA	Usual care
Loh, 2007 ²⁹	Germany	2-arm parallel cluster RCT, multicentre	At clinician level 20 clinicians in the DA group, 10 in the control group patients recruited by each physician were viewed as clusters	General practices associated as teaching practices with University Hospital	n=30 Primary care physicians	Choose between treatment options for newly diagnosed depression	Multi-faceted shared decision making program	Usual care
Légaré, 2012 ³⁰	Canada	2-arm parallel cluster RCT, multicentre	At clinician group/ practice level 77 clinicians in the DA group, 72 clinicians in the control group	Family practice teaching units (walk-in clinics)	n= 149 Family physicians, including physician teachers, and residents Physicians who had participated in the DECISION+ trial were excluded.	Take antibiotics for acute respiratory infections yes/no	DECISION+2: multi-faceted shared decision making training program (modified from DECISION+)	Usual care
Légaré, 2011 ³¹	Canada	2-arm parallel cluster RCT, multicentre	At clinician group/ practice level 18 clinicians in the DA group, 15 clinicians in the control group	Family medicine groups	n= 33 Family physicians	Take antibiotics for acute respiratory infections yes/no	DECISION+ multi-faceted shared decision making training program	DECISION+ participation delayed for 6 months
Anthierens, 2015 ³²	Belgium, England, Netherlands, Poland, Spain and Wales	Qualitative study (semi-structured interviews) nested in cluster RCT using a 2x2 factorial design, multicentre	At clinician group/ practice level 53 practices in DA group, 55 practices in usual care group 66 clinicians were interviewed in the nested study	General practices	n= 372 (total in all 3 arms) Physicians in primary care	Take antibiotics for acute respiratory infections yes/no	Training in enhanced communication skills for physicians and Interactive booklet on antibiotics for acute respiratory-tract infections for clinical encounter	Usual care (other arms, not analysed in our review included CRP group and DA +CRP group)
Walezak, 2017 ³³	Australia	2-arm parallel RCT, multicentre	At patient level, stratified by clinician, 1:1 balanced randomisation codes for each clinician.	Cancer treatment centres affiliated with major hospitals	Two senior nurses (one with palliative care background and one with emergency medicine background) had meetings with patients approximately one week before visits with an oncologist.	Discuss information regarding prognosis, end-of-life, future care, advance care planning (in patients with various advanced, inoperable and/or metastatic diagnoses assessed 2–12 month life expectancy)	Nurse-led communication support program using a question prompt list	Usual care
Leighl, 2011 ³⁴	Australia, Canada	2-arm parallel RCT, international multicentre	At patient level, stratified by clinician.	Hospital-based outpatient cancer clinics	n=13 Medical oncologists with expertise in colorectal cancer	Take first-line (palliative) chemotherapy for metastatic colorectal cancer yes/no	Booklet with accompanying audiotape or compact disc for patients to take home	Usual care (standard medical oncology consultation)
Ozame, 2007 ³⁵	USA	2-arm parallel RCT, single centre	At patient level	High-risk breast cancer prevention program, breast care centre prevention clinic at one university	n=4 Multidisciplinary group of physicians including surgeons, internists, and gynaecologists, all with expertise in breast cancer prevention	Choose between different breast cancer prevention options (for women at high risk of developing breast cancer)	DA for breast cancer prevention	Usual care
Whelan, 2003 ³⁶	Canada, USA	2-arm parallel RCT, international multicentre	At patient level	Regional cancer centres in Ontario and one general hospital in California	n=22 Medical oncologists	Take adjuvant chemotherapy in lymph node-negative breast cancer yes/no	“Decision Board”	Usual care
Bekker, 2004 ³⁷	United Kingdom	1-arm parallel RCT, single centre	At patient level	Hospital-based prenatal diagnosis clinic	n: not specified “The same professional delivered the routine and intervention consultations.”	Choose between different options for prenatal diagnosis of Down syndrome (in women who had a screen-positive maternal serum screening test result for Down syndrome)	Integration of “prompts” (based on decision analysis methodology) into clinical encounter	Usual care (routine consultation without “prompts”)

DA: decision aid

ED: Emergency department

n: number

RCT: randomised controlled trial

Table 2:

Risk of bias assessment in individual randomised controlled trials

	Random sequence generation	Allocation concealment	Blinding of clinicians and data collectors	Blinding of outcome assessors	Incomplete outcome data (for clinicians)	Selective outcome reporting	Other sources of bias
Coylewright 2016 ¹³ and 2017 ¹⁴ (nested study)	low	low	high	unclear/ not reported	high	high	low
Hess 2016 ¹⁵	low	low	high	low	low	high	high
Hess 2012 ¹⁶	low	low	high	low	low	high	high
Prestelo-Pérez 2016 ¹⁷	low	unclear/ not reported	high	unclear/ not reported	low	low	low
Namenga 2009 ¹⁸	low	low	high	low	low	low	low
Thomson 2007 ¹⁹	low	low	high	unclear/ not reported	low	low	low
Warner 2015 ²⁰	low	unclear/ not reported	high	unclear/ not reported	low	low	low
Mathers 2012 ²¹	low	low	high	high	low	low	low
Karagiannis 2016 ²³	low	low	high	unclear/ not reported	low	low	low
Mullan 2009 ²⁴	low	low	high	unclear/ not reported	low	low	low
Denig 2014 ²⁵	low	low	high	unclear/ not reported	low	low	low
LeBlanc 2015 Osteoporosis ²⁶	low	low	high	high	unclear/ not reported	low	high
Montori 2011 ²⁷	low	low	high	low	low	low	low
LeBlanc2015 Depression ²⁸	low	unclear/ not reported	high	unclear/ not reported	low	low	low
Loh 2007 ²⁹	low	low	high	unclear/ not reported	unclear/ not reported	low	low
Légaré 2012 ³⁰	low	low	high	low	low	low	low
Légaré 2011 ³¹	low	low	high	low	low	low	low
Little 2015 ³⁹ (parent study of Ambierens 2014 ³²)	low	low	high	unclear/ not reported	low	low	low
Walczak 2017 ³³	low	low	high	unclear/ not reported	high	high	high
Leighl 2011 ³⁴	low	low	high	unclear/ not reported	low	low	low
Ozanne 2007 ³⁵	unclear/ not reported	unclear/ not reported	high	unclear/ not reported	low	low	high
Whelan 2003 ³⁶	low	unclear/ not reported	high	unclear/ not reported	unclear/ not reported	unclear/ not reported	low
Bekker 2004 ³⁷	low	low	high	high	low	low	low

low: low risk of bias (green)
unclear/not reported: risk of bias was unclear or not reported (yellow)
high: high risk of bias (red)

Table 3

Comparative (decision aid versus usual care) continuous outcomes

Study	Scale	Mean (SD) intervention*	Mean (SD) control*	Mean difference (95% CI)	p-value
Clinicians' satisfaction with decision aid and decision making process					
Montori 2011, ²⁷ Osteoporosis	Scale 1–7	4.5 (range 3–5)	4 (range 2–5)	0.52 (0.27 to 0.78)	<0.01
Légaré 2012, ³⁰ Antibiotics for respiratory infections (2)	Scale 0–10	8.2 (1.3)	8.4 (1.0)	–0.2 (–0.6 to 0.2)	
Légaré 2011, ³¹ Antibiotics for respiratory infections (1)	Scale 1–10	8.7 (1.2)	8.5 (1.3)	0.2 (–0.34 to 0.89)	0.29
Leigh 2011, ³⁴ Palliative chemotherapy in colorectal cancer	Scale 6–30	median 24 (range 18 to 30)	median 24 (range 21 to 30)	0	
Ozanne 2007, ³⁵ Breast cancer prevention	Scale 1–5	1.82 (0.52)	1.78 (0.45)		0.82
Whelan 2003, ³⁶ Adjuvant chemotherapy in breast cancer	Scale 1–5	4.37 (95% CI 4.16 to 4.58)	4.35 (95% CI 4.19 to 4.51)	0.02	0.89
Decisional conflict					
Warner 2015, ²⁰ Smoking cessation	Decisional comfort scale (0: conflict, 100: comfort)	81 (±12)	74 (±16)	7	0.034
LeBlanc 2015, ²⁶ Osteoporosis	Decisional Conflict Scale (DCS), scores: 0–100 (0: no conflict, 100: highest conflict)	median 25 (IQR 6,25)	median 25 (IQR 14,25)	0	0.18
LeBlanc 2015, ²⁸ Depression	Decisional Conflict Scale (DCS), scores: 0–100 (0: conflict, 100: comfort)	79.7 (95% CI 77.6 to 81.8)	68.3 (95% CI 65.4 to 71.2)	11.4 (5.7 to 17.1)	<0.001
Helpfulness of the shared information					
Montori 2011, ²⁷ Osteoporosis	Scale 1–7	5.8 (range 3 to 7)	5.2 (range: 2 to 7)	0.64 (0.18 to 1.09)	0.006
Intention to use decision aid/SDM making in the future/for other decisions					
Montori 2011, ²⁷ Osteoporosis	Scale 1–7	6.1 (range 4 to 7)	4.9 (range 1 to 7)	1.2 (0.73 to 1.67)	<0.001
Légaré 2012, ³⁰ Antibiotics for respiratory infections (2)	3-item scale (scores: –3 to 3)	1.7 (0.9)	1.8 (0.7)	0.0 (–0.3 to 0.2)	
Légaré 2011, ³¹ Antibiotics for respiratory infections(1)	3-item scale (scores: –3 to 3)	1.3 (1.2)	0.8 (1.3)	0.5 (–0.2 to 1.3)	0.77
Would recommend decision aid/SDM to other clinicians					
Montori 2011, ²⁷ Osteoporosis	Scale 1–7	5.9 (range 3 to 7)	4.8 (range 1 to 7)	1.09 (0.57 to 1.61)	<0.001
Intention to follow clinical practice guidelines					

Study	Scale	Mean (SD) intervention *	Mean (SD) control *	Mean difference (95% CI)	p-value
Légaré 2012, ³⁰ Antibiotics for respiratory infections (2)	3-item scale (scores: -3 to 3)	2.0 (0.7)	2.2 (0.7)	-0.2 (-0.5 to 0.1)	
Légaré 2011, ³¹ Antibiotics for respiratory infections (1)	3-item scale (scores: -3 to 3)	2.1 (0.9)	2.2 (0.5)	-0.1 (-0.7 to 0.5)	
Length of the consultation in outpatient setting					
Coylewright 2016, ¹³ Stable coronary artery disease	minutes	"The mean duration of the clinical visits was 24 minutes, ranging from 5 to 60 minutes."		"Both decision aid and UC visits took a similar amount of time..."	
Perestelo-Pérez 2016, ¹⁷ Statin	minutes	18.10 (8.07)	19.65 (12.61)	-4.36 (-12.9 to 4.18) Beta/Odds Ratio from multilevel linear/logistic regression	
Nannenga 2009, ¹⁸ Statin	minutes	only mean difference available		3.8 (-2.9 to 10.5)	
Thomson 2007, ¹⁹ Anticoagulation atrial fibrillation	minutes	median 31 (IQR 16 to 41)	median 21 (IQR 19 to 26)	10	0.001
Mathers 2012, ²¹ Insulin	minutes	15.31 (2-39)	16.95 (5 to 45)	-1.67 (-0.93 to -4.27)	
LeBlanc 2015, ²⁶ Osteoporosis	minutes	Median 11.5 (range 5.4 to 21.4)	Median 10.7 (range 2.5 to 54.9)	0.8 (-33.6 to 3.0)	
Montori 2011, ²⁷ Osteoporosis	minutes	median 12.4 (range 2.3 to 27.4)	median 9.4 (range 2.1 to 58)	3.0	0.045
LeBlanc 2015, ²⁸ Depression	minutes	44 (22)	48 (27)	-4	0.47
Walczak 2017, ³³ Cancer advance care planning	minutes	20.6	20.4	0.2	0.307
Ozanne 2007, ³⁵ Breast cancer prevention	minutes	24.3 (7.5)	21.9 (8.51)	2.4	0.42
Whelan 2003, ³⁶ Adjuvant chemotherapy in breast cancer	minutes	47.5	39.9		0.26
Bekker 2004, ³⁷ Prenatal Diagnosis	minutes	32.2 (95% CI 28.6 to 35.8)	26.3 (95% CI 23.2 to 29.2)	5.9	0.01
Loh 2007, ²⁹ Depression	minutes	31.4 (15.1)	29.2 (10.7)	2.2	0.476
Length of conversation in emergency department					
Hess 2016, ¹⁵ Chest pain	minutes	4.4 (0.40)	3.1 (0.29)	1.3	0.008

* unless specified otherwise

95% CI=95% confidence interval

IQR= interquartile range; SDM= shared decision making