

Decision aids to improve informed decision-making in pregnancy care: a systematic review

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Background Rapid development in health care has resulted in an increasing number of screening and treatment options. Consequently, there is an urgency to provide people with relevant information about benefits and risks of healthcare options in an unbiased way. Decision aids help people to make decisions by providing unbiased non-directive research evidence about all treatment options.

Objective To determine the effectiveness of decision aids to improve informed decision making in pregnancy care.

Search strategy We searched MEDLINE (1953–2011), EMBASE (1980–2011), CENTRAL (CENTRAL, *the Cochrane Library*; 2011, Issue 4), Psycinfo (1806–2011) and Research Registers of ongoing trials (www.clinicaltrials.gov, www.controlled-trials.com).

Selection criteria We included randomised controlled trials comparing decision aids in addition to standard care. The study population needed to be pregnant women making actual decisions concerning their pregnancy.

Data collection and analysis Two independent researchers extracted data on quality of the randomised controlled trial (GRADE criteria),

quality of the decision aid (IPDAS criteria), and outcome measures. Data analysis was undertaken by assessing group differences at first follow up after the interventions.

Main results Ten randomised controlled trials could be included. Pooled analyses showed that decision aids significantly increased knowledge, (weighted mean difference 11.06, 95% confidence interval 4.85–17.27), decreased decisional conflict scores (weighted mean difference –3.66, 95% confidence interval –6.65 to –0.68) and decreased anxiety (weighted mean difference –1.56, 95% confidence interval –2.75 to –0.43).

Conclusions Our systematic review showed the positive effect of decision aids on informed decision making in pregnancy care. Future studies should focus on increasing the uptake of decision aids in clinical practice by identifying barriers and facilitators to implementation.

Keywords Decision aids, informed decision making, obstetrics, pregnancy health care, systematic review.

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Introduction

Rapid development in healthcare technology and interventions has resulted in an increasing number of screening and treatment options. Many decisions in health care do not have a single best option but rather a number of ‘close call’ decisions that are ultimately influenced by patient preference. In pregnancy, for example, patient preferences are instrumental in decisions on first-trimester screening or analgesia during labour. Consequently, there is an urgency to inform people and provide relevant information about both the benefits and risks of healthcare options in an unbiased way.

Counselling pregnant women is challenging as these women not only need to consider their own health, but also the health of the fetus and the consequences for any subsequent pregnancies. Previous studies have highlighted that pregnant women want to be involved in decision making.^{1,2}

Decision aids (DA), or decision-support techniques, aim to help people to make these close-call decisions by providing unbiased nondirective research evidence about all treatment options, including the risks and benefits, and assisting people in clarifying their personal values related to corresponding outcomes and adverse effects.^{3,4} Standard education

materials, such as leaflets, help people to understand their diagnosis, treatment and management, but differ from DAs because they do not necessarily facilitate informed decision making by exploring personal values and preferences.⁵ DAs are intended to be an adjunct to usual care and should not influence intervention uptake.³

A large systematic review of over 500 patient DAs by O'Connor and colleagues demonstrated the overall effectiveness and additional value of DAs for people facing health treatment or screening decisions.⁴ Although a number of DAs related to aspects of pregnancy care have been developed and evaluated, there has been no review of the overall efficacy of these aids in pregnancy care.^{6–8} We are specifically interested in the additional value of DAs for pregnant women because of the multiple consequences of their choices, and additional impact on their baby and family, as well as their own health.

The aim of this study was to conduct a systematic review of randomised trials to summarise the available decision-support techniques, and to assess their quality and their effectiveness for pregnancy care.

Methods

Sources

We searched MEDLINE (1953–2011), EMBASE (1980–2011), CENTRAL (CENTRAL, *the Cochrane Library*; 2011, Issue 4) and Psycinfo (1806–2011) up to March 2011 using keywords: choice behaviour, decision making, decision-support techniques, decisions, (choices or preferences), informed consent, pregnancy, labour, birth. No time or language restrictions were applied. Reference lists of eligible studies, previously published systematic reviews and review articles, as well as the website of the Patient Decision Aids research group (www.ohri.ca/decisionaid/) were checked to identify cited trials not captured by electronic searches. We searched research registers for ongoing trials (www.clinicaltrials.gov, www.controlled-trials.com).

Study selection

We included studies using a randomised controlled trial or cluster randomised design evaluating DAs. Study populations needed to include pregnant women, who were facing the relevant pregnancy care decision in their current pregnancy. DAs were defined as interventions that provide unbiased and nondirective information to help pregnant women make choices based on personal values. They should contain information on all treatment options (including expectant management), and outcomes relevant to a person's health status. Furthermore, implicit methods to clarify values should also be presented. We included randomised controlled trials that compared pregnancy care DAs with no intervention, usual care, alternative interventions, or a

combination of these. We excluded studies where the interventions did not meet the criteria of a DA or where the DA was not available and the article did not provide enough information to determine whether the intervention met the minimum criteria to qualify as a patient DA, according to the International Patient Decision Aid Standards (IPDAS) criteria. These criteria assess the quality of DAs and were developed by over 100 experts from various decision-making fields and representing 14 countries, using the Delphi consensus process.³

Outcome measures

We studied decisional conflict score (DCS), knowledge and anxiety. Decisional conflict refers to uncertainty in chosen option and the score ascertains whether individuals had clarity of values and felt informed and supported in their decision making. Knowledge is assessed using specific questions concerning the topic of the DA and usually consists of several true/false or multiple choice questions. Anxiety is often examined in these studies to confirm that DAs do not increase anxiety by providing too much detailed information. Anxiety was usually measured using the State-Trait Anxiety Scale. Secondary outcomes assessed were effectiveness of DA (proportion of individuals undecided, accuracy of risk perception of treatment options, enough information to make decision, involvement in decision making, regret of choice and satisfaction with choice); acceptability of DA (readability of DA and usefulness of information to make choice); decision behaviour outcomes (outcome of decision, uptake of intervention, and adherence to chosen option); health outcomes (neonatal and maternal morbidity and mortality, Apgar score, gestational age at delivery, and depression and self-esteem); and healthcare-system outcomes (cost-effectiveness of the DA, length of stay in hospital and length of consultation).

Quality assessment

Quality of included studies was assessed by examining risk of bias, using the criteria outlined in the Cochrane Handbook for Systematic Reviews of Interventions.⁹ Quality of evidence was assessed using the GRADE scale.¹⁰ The IPDAS Collaboration quality criteria framework was used to assess the quality of the DA.¹¹ Final DAs were retrieved from a number of sources including internet articles, theses, or by contacting authors. If unavailable, the quality of the DA was assessed using information provided in the articles of the randomised controlled trial, pilot study or protocol. Studies were excluded if the intervention did not qualify as a DA according to the IPDAS criteria used for scoring and where adequate information on the contents could not be obtained. The maximum IPDAS score ranged from 50 to 64 points, depending on the extensiveness of the DA (additional scoring items for patient stories, internet-based DAs and DAs on

screening tests). We converted scores to percentages of total scores. At the time of assessment there was no defined score/category for good-quality versus poor-quality DAs, or guidelines on interpretation of the scores. Therefore, we categorised into two categories (high-quality and low-quality aids) based on an arbitrary cut-off value of 60% of total IPDAS score.

Data extraction and statistical analysis

Two reviewers (FV and JKW) independently assessed all potential studies for inclusion into the review and extracted the data. Inconsistencies were resolved by discussion and consensus and by consulting a third reviewer (NN). Data extracted included information relevant to study characteristics, methodological quality (method of randomisation, allocation concealment and degree of blinding); study population and inclusion/exclusion criteria; topic of decision, type of intervention and comparator and respective formats; number of women in each study group; and quantitative and qualitative data relating to the selected primary and secondary outcomes, where available. Where relevant data were not reported, we contacted corresponding authors for additional information. Studies were categorised according to topic, quality of the DA, format of the DA and type of intervention in the control group.

Data analysis for each primary and secondary outcome was undertaken by assessing group differences at first follow up after the administration of the interventions. We were unable to evaluate differences over time (baseline measurements before intervention and at first follow up), because most studies did not report standard deviations over time. If different scales to measure the same outcome were

used among studies, the scales were converted to the scale with the largest range. Continuous measures were assessed by comparing the means and standard deviations between the two treatment groups and calculating pooled weighted mean differences. For dichotomous data we used relative risk to calculate pooled relative risk. We calculated missing values such as standard deviations, mean differences, relative risks and 95% confidence intervals (95% CI) where possible or wrote to authors for additional information on the outcomes. The I^2 test was used to assess variability between the studies and where we found strong evidence of heterogeneity ($I^2 > 50\%$), we analysed data with a random effects model. Subgroup analyses were conducted to take into account potential differences in the type of intervention applied in the control group (usual care or information program), format of DAs (booklet, counselling and computer program) and quality of DAs (<60% and >60% of IPDAS total scores). For analysing decision behaviour and health outcomes we pooled and assessed outcomes per topic of the DA. We also examined evidence of publication bias using funnel plots and plotting the standard error of the risk difference (or odds ratio) by the risk difference (or odds ratio) and of these for skewness.⁹ All analyses were conducted using STATA version 9.2, 2007.

Results

Search results

We critically appraised 6064 unique citations from the databases, of which we reviewed 92 abstracts and selected 26 articles for further reading and assessment. Of these, ten articles were identified and included in the systematic review.

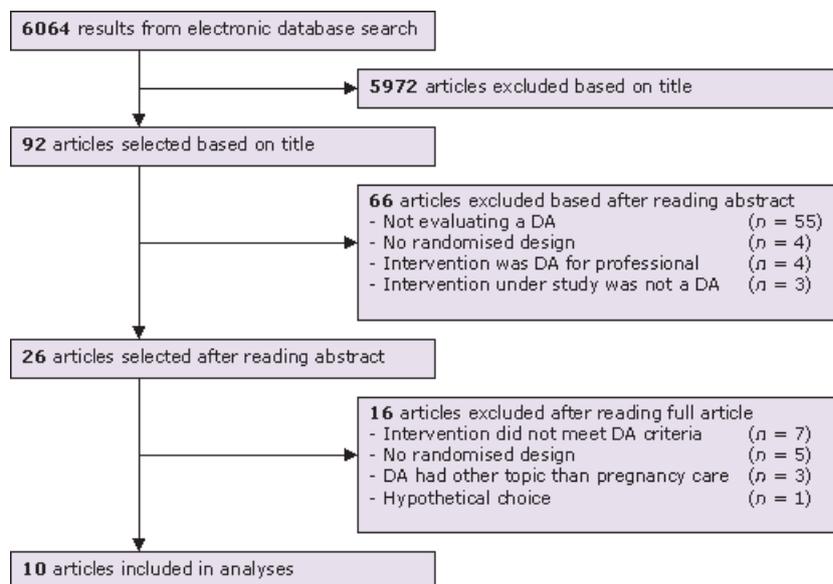


Figure 1. Flow chart study selection process.

Reasons for exclusion are reported in Figure 1. We identified four possible ongoing trials and approached authors for information on the status of the trials; one trial evaluated a healthcare provider DA, one study was still recruiting (April 2011) and no response was received from the other two research groups, so these were not included.^{12–15}

Characteristics of the ten studies included in this review can be found in Table 1. Scores of methodological quality assessment are presented in Table 2; blinding for this type of intervention is difficult, but most studies did try to limit contamination and blinded care providers by employing a research nurse or research assistant to administer the DA. Most studies did not report if there was blind outcome assessment. Loss to follow-up varied greatly; Raynes–Greenow, Kupperman, Arimori and Shorten and their colleagues^{16–19} had more than 10% loss of respondents at the time of first follow up (comprising an assessment after the intervention).

Type of DA and quality assessment

The ten decisions investigated in the included studies were: first-trimester pregnancy termination method,²⁰ prenatal testing,^{16,17,21–23} management of breech presentation,⁶ mode of delivery after previous caesarean section,^{8,19,24} and labour analgesia.^{18,24,25} We identified three formats of DAs: six studies used a booklet as intervention^{6,7,18,20,22,26} (three included an audio-guide), two used an interactive computer program^{8,17} and two studies used structured counselling.^{16,21}

Five out of ten studies compared a DA to usual (verbal) counselling. Other studies used group counselling, a placebo intervention (information leaflet on relevant topic), or an information programme as control group.

We obtained access to five out of ten DAs.^{6,8,18,20,23} The other DAs were scored based on the information provided in the articles. IPDAS scores ranged from 27.3% (15 out of 55 points) to 83.0% (44 out of 53 points) (Table 1). The lower scores tended to be those where we did not have access to the DA and where there was a lack of information regarding the developmental process.^{16,20}

Decisional conflict score

The overall DCS was the most commonly presented outcome (six studies).^{6,8,16,20,23,26} Articles used different DCS scales, so we converted them to a 0–100 scale for pooled data analysis. A lower score is associated with less decisional conflict and a score below 25 is generally considered as good decision making.¹⁷ There was a significant difference in DCS at first follow up with a weighted mean difference (WMD) of -3.66 (95% CI -6.65 to -0.68) in favour of DAs (Figure 2). Subgroup analysis showed similar results regardless of the type (booklet, computer program or counselling) or quality (low [<60] or high [>60] IPDAS scores) of the decision-support technique (Table 3). However, the type of control intervention did make a difference to decisional conflict with a stronger effect evident when

comparison group was usual care (WMD -5.75 , 95% CI 7.75 to -3.75), but no difference was observed when comparing the DA with other information leaflets.^{18,23}

Knowledge

Five studies assessed knowledge at both baseline and first follow up.^{6,8,18,20,21} We carried out a pooled analysis for knowledge scores at first follow up, calculated as the percentage of correctly answered questions. The WMD was 11.06% (95% CI 4.85–17.27) in favour of the DA group (Figure 3). There was a similar positive effect of the DA on knowledge regardless of most types of DA, control intervention, or IPDAS quality score (Table 3). However, there was little effect and no difference in knowledge scores when the DA was in the form of counselling (Table 3).

Anxiety

Anxiety was assessed by six studies at first follow up.^{6,8,18,20,21,23} Pooled analysis showed significantly lower anxiety in DA versus comparison groups (WMD -1.59 , 95% CI -2.75 to -0.43) (Figure 4). Similar results were found in all of the subgroup analyses with the biggest differences reported when DAs were compared with usual care or when the intervention involved some form of counselling or interactive computer program (Table 3). Smaller benefits were observed when DAs were either in the form of a booklet or compared with other information leaflets (Table 3).

Other secondary outcomes

Various measures were applied to assess the impact of DAs on decision-making. This included assessment of decisional regret, enough information to make a decision, and increase in understanding of treatment options. The studies assessing these outcomes showed significant effects in favour of the DAs. Fewer women were undecided at first follow up (relative risk [RR] 0.42, 95% CI 0.24–0.74)^{6,27,28} or regretted their decision (RR 0.58, 95% CI 0.35–0.97)^{6,17} and a greater proportion of women felt that they had enough information to make their decision when they were informed with a DA (RR 2.88, 95% CI 2.02–4.10).^{6,18,27} Most studies looking at satisfaction found a nonsignificant positive effect of DAs on satisfaction with decision,^{8,18,22} decision-making process,¹⁸ and experience with birth and pregnancy.¹⁹ Kupperman et al.¹⁷ found a significant difference in satisfaction with decision-making process at first follow up (scale 0–10, DA 8.1 versus control 7.5; $P < 0.001$).

Only one study assessed the accuracy of risk perception, by measuring the percentage of women with correct risk perception for intervention related to miscarriage and the risk of having a baby with Down syndrome. In this study, authors found a significantly larger percentage of women in the DA group had correct risk perception ($P < 0.001$).¹⁷

Table 1. Study characteristics

Citation	Country	DA, n	Control, n	Design	Decision	Intervention	Control	Study population	Timing of assessment first follow up	Total IPDAS-score
Pregnancy termination method										
Wong, 2006 ²⁰	UK	154	159	RCT	Pregnancy termination method	Information leaflet ²³	Information leaflet on contraception	<9 weeks of gestation	After intervention	38.0% (17/50)
Prenatal testing										
Bekker, 2004 ²¹	UK	50	56	RCT	Prenatal diagnosis for Down syndrome for women with a positive screening test	Structured counselling with decision analysis	Normal counselling	15 weeks of gestation	After intervention	45.5% (25/55)*
Hunter, 2005 ²²	Canada	116	110	RCT	Prenatal diagnosis for mothers of advanced maternal age	Booklet, worksheet and audio-guide, option to discuss with a genetic counsellor	Group counselling (usual care)	<18 weeks of gestation	After intervention	63.6% (35/55)*
Armori, 2006 ¹⁶	Japan	38	43	RCT	Prenatal testing	Counselling by nurse based on the Ottawa decision support framework	Usual counselling	11–15 weeks of gestation	After intervention	7.3% (15/55)*
Nagle, 2008 ²³	Australia	167	172	Cluster RCT	Prenatal testing in primary care	Booklet with worksheet ²⁴	Standard information pamphlet	<12 weeks of gestation, consultation by GP	After making decision or at 14 weeks of gestation	74.1% (43/58)
Kupperman, 2009 ¹⁷	USA	244	252	RCT	Prenatal testing for Down syndrome	Interactive computer program	Computerised educational booklet	<20 weeks of gestation	1–2 weeks after intervention [^]	58.2% (32/55)*
Breech presentation										
Nassar, 2007 ⁵	Australia	102	98	RCT	Singleton breech presentation	Booklet, worksheet and audio-CD ³⁵	Usual care	>34 weeks of gestation	1 week after intervention	75.5% (40/53)
Vaginal birth after caesarean section										
Shorten, 2005 ¹⁹	Australia	99	92	RCT	Mode of delivery after previous caesarean section	Booklet with value clarification exercise ³⁶	Usual care	Inclusion 12–18 weeks of gestation, information at 28 weeks of gestation	8 weeks after intervention	68.0% (34/50)*
	UK	196	202	RCT			Usual care			58% (29/50)

Table 1. (Continued)

Citation	Country	DA, n	Control, n	Design	Decision	Intervention	Control	Study population	Timing of assessment first follow up	Total IPDAS-score
Montgomery, 2007 ⁸					Mode of delivery after previous caesarean section	Computerised information and decision analysis program ³⁷		19–35 weeks of gestation	37 weeks of gestation	
Pain relief in labour Raynes-Greenow, 2010 ¹⁸	Australia	395	201	RCT	Pain relief in labour	a. Booklet and worksheet b. Booklet, worksheet and audio-guide ³⁸	Information leaflet	>36 weeks of gestation, primiparous planning on vaginal delivery	1 week after intervention	83.0% (44/53)

RCT, randomised controlled trial.

[^]regret and satisfaction assessed at 26–30 weeks of gestation.

*IPDAS-score based on information in article, full decision aid not available for scoring.

Choice behaviour and adherence to chosen option

In the study by Kupperman et al. (prenatal testing),¹⁷ 48% of women in the DA group said that the intervention had affected their decision-making process, compared with 28% in the control group (OR 2.42, $P < 0.001$). Raynes-Greenow et al.¹⁸ (pain relief during labour) reported that women with the DA tended to consider their caregiver's opinion more (37.8% versus 30.7%, $P = 0.09$) and were more likely to make a shared decision with their care provider (19.3% and 13.8%, $P < 0.05$).

Seven studies looked at patient preferences for the different treatment options at the time of first follow up after the intervention. We pooled outcomes of the five studies that looked at prenatal testing decisions and found no significant difference between DA and control groups preference for testing (RR 1.04, 95% CI, 0.95–1.14). However, presenting the information in a DA decreased the rate of women who were still undecided after receiving an intervention (RR 0.44, 95% CI 0.26–0.73).^{6,8,22,26}

The pooled analyses of the studies on prenatal testing preferences did not show a difference in chosen option, but the actual uptake (actual number of women who underwent prenatal screening) was slightly higher among women informed with a DA (RR 1.15, 95% CI 1.04–1.24). In contrast, Nassar et al. reported an increase of women counselled with the DA who intended to undergo external cephalic version (77.1 versus 55.47%, RR 1.38, 95% CI 1.12–1.70); however there was no significant difference in number of women who actually underwent the procedure.

Health and healthcare system outcomes

Two out of nine studies reported on neonatal outcomes^{6,18} (Apgar score at 1 and 5 minutes postpartum, birthweight, preterm delivery and cephalic presentation) and found no significant difference between DA and control groups. There was also no difference in maternal mortality and morbidity, maternal length of stay in hospital, self-esteem or depression scores between groups. Assessment of the impact of DAs on healthcare costs revealed no difference in resource-use by mothers and babies in the intervention versus the control group.^{19,22} Although, Bekker et al.²¹ reported that the consultation length was slightly longer by 6 minutes in the DA group (MD 5.9, 95% CI 1.15–10.65).

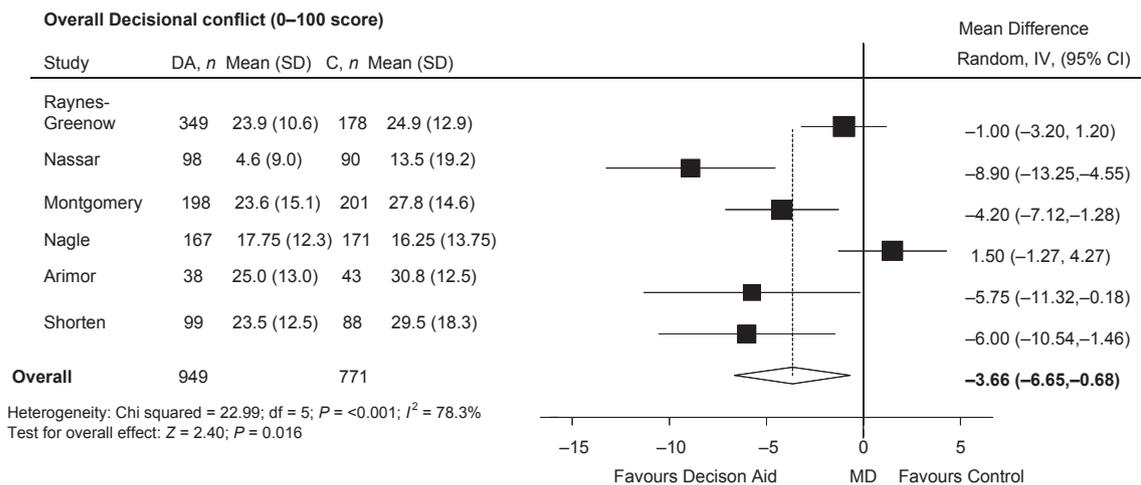
Discussion

This is the first systematic review of DAs in obstetrics using a critical appraisal of study and DA qualities. We found that DAs in pregnancy care significantly decrease decisional conflict, increase knowledge and decrease anxiety. Furthermore, DAs reduce decisional regret, reduce the proportion of women who are undecided and increase accuracy of risk perception. Subgroup analyses highlight that

Table 2. Methodological quality summary: risk of biases for each included study

	Random-isation	Allocation concealment	Patient blinding	Assessor blinding	Incomplete data	Intention-to-treat analysis
Raynes-Greenow 2010 ¹⁸	⊕	⊕	⊕	⊖	⊖	⊕
Kupperman 2009 ¹⁷	⊕	⊕	⊕	⊖	⊕	⊗
Nagle, 2007 ²³	⊕	⊕	⊗	⊗	⊖	⊕
Nassar 2007 ⁶	⊕	⊕	⊖	⊖	⊕	⊕
Montgomery, 2007 ⁸	⊕	⊕	⊗	⊕	⊕	⊕
Wong, 2006 ²⁰	⊕	⊕	⊕	⊗	⊕	⊕
Arimori, 2006 ¹⁶	⊕	⊕	⊗	⊗	⊖	⊗
Shorten, 2005 ¹⁹	⊕	⊕	⊖	⊗	⊖	⊗
Hunter, 2005 ²²	⊕	⊕	⊗	⊖	⊗	⊕
Bekker 2004 ²¹	⊕	⊕	⊗	⊖	⊕	⊗

⊕, Good; ⊖, Moderate; ⊗, Missing information and/or data.

**Figure 2.** Forest plot decisional conflict.

the type of decision-support technique has an impact on outcomes with counselling resulting in less decisional conflict and anxiety, but knowledge is not as enhanced. Results also reveal that the control group did make a difference to results with usual care compared with information leaflets, as the control group was more inferior, and led to the DA having a stronger effect on outcomes.

These findings suggest that DAs improve patient decision making compared with usual care. Furthermore, the greatest benefits were found when the decision-support technique was implemented in the form of counselling from a care provider; involving information, discussion of options and clarification of values, resulting in the greatest benefits to people in the form of less uncertainty and anxiety.²¹ Written information also resulted in greater recall of information. Hence, although the absolute differences between treatment groups were relatively small for some outcomes and some may question the clinical relevance, these findings suggest that there may be some

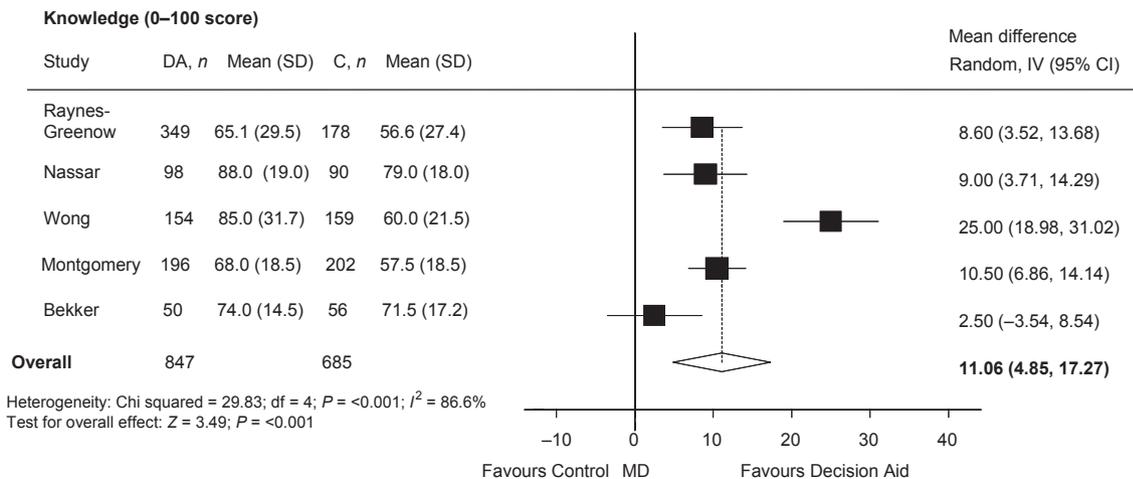
people who may benefit from increased information and support in their decision making.

Findings were also consistent regardless of the quality of the DA, although there was no explicit ranking or guideline for the interpretation of IPDAS quality scores and our own arbitrary cut-off points of <60 and >60 may not have been sensitive enough. However, the IPDAS criteria for DAs form an evidence-based tool to develop and assess information leaflets and DAs.

In our opinion, it is important to separate these DAs from other topics because decisions in obstetrics do not only concern the mother but also the fetus, which may influence decisional conflict and anxiety. Furthermore, this is the first review that has assessed the quality of pregnancy-related DAs to provide an overview of their effectiveness and utility. One of the strengths of this review is the generalisability of the findings with the additional value of DAs proven in a wide range of pregnant populations and covering the prenatal period from first trimester until birth.

Table 3. Results of subgroup analysis

Outcome	Subgroup analysis	Subgroup	WMD (95% CI)	I ²
DCS	Type of control intervention	Usual care ^{6,8,16,22}	-5.75 (-7.7 to -3.75)	4.3%
		Information program ^{18,23}	0.0 (-2.5 to 2.5)	NA
	Type of intervention	Booklet ^{6,18,22,23}	-3.75 (-7.25 to -2.5)	81%
		Interactive computer program ⁸	-4.2, SE: 1.5	-
		Counselling ¹⁶	-5.75 SE: 2.75	-
IPDAS score	>60 ^{6,16,18,22,23}	-3.75 (-7.25 to -0.25)	81%	
	<60 ⁸	-4.5 (-7.25 to -2)	NA	
Knowledge	Type of control intervention	Usual care ^{6,8,20,21}	11.7 (3.74 to 19.65)	90%
		Information program ¹⁸	8.6 SE:2.59	-
	Type of intervention	Booklet ^{6,18,20}	9.6 (-1.42 to -20.67)	94%
		Interactive computer program ⁸	10.5 SE: 1.85	-
		Counselling ²¹	2.5 SE: 3.08	-
	IPDAS score	>60 ^{14,20}	4.59 (-3.67 to 12.85)	87
<60 ^{8,20,21}		12.62 (1.45 to 23.8)	93	
Anxiety	Type of control intervention	Usual care ^{6,8,20,21}	-2.47 (-4.17 to -0.77)	0%
		Information program ^{18,23}	-0.83 (-2.42 to 0.76)	NA
	Type of intervention	Booklet ^{6,18,20,23}	-1.21 (-2.42 to -0.01)	0%
		Interactive computer program ⁸	-3.4 SE: 1.24	-
		Counselling ²¹	-5.75 SE: 2.75	-
	IPDAS score	>60 ^{6,18,19}	-1.37 (-2.65 to -0.09)	0%
<60 ^{8,20,21}		-2.24 (-4.39 to -0.05)	15%	

**Figure 3.** Forest plot knowledge.

Of the included studies, only half assessed if people felt that they had 'made the right choice for them', a decision consistent with their values. Although, the studies assessing these outcomes showed significant effects in favour of the DAs, measures used varied widely. Three studies used the outcome 'undecided', two studies used 'decision regret' and two studies used 'satisfaction with decision'. Generally, a reduction in validated outcome measures such as DCS, knowledge and anxiety make it plausible that people are helped by DAs in making the best choice according to their

own values, but there is a need for an overall, uniform outcome measure on which to base this assumption.

Our study does have some limitations. One of the main issues with the review is the heterogeneity among the trials. This may be explained by the variety in topics of the DAs, the different control groups among the studies, the difference in outcome measurement scales, and cultural differences within the countries concerning health care and patient involvement in decision making. We tried to overcome these potential sources of heterogeneity by conducting random effect and

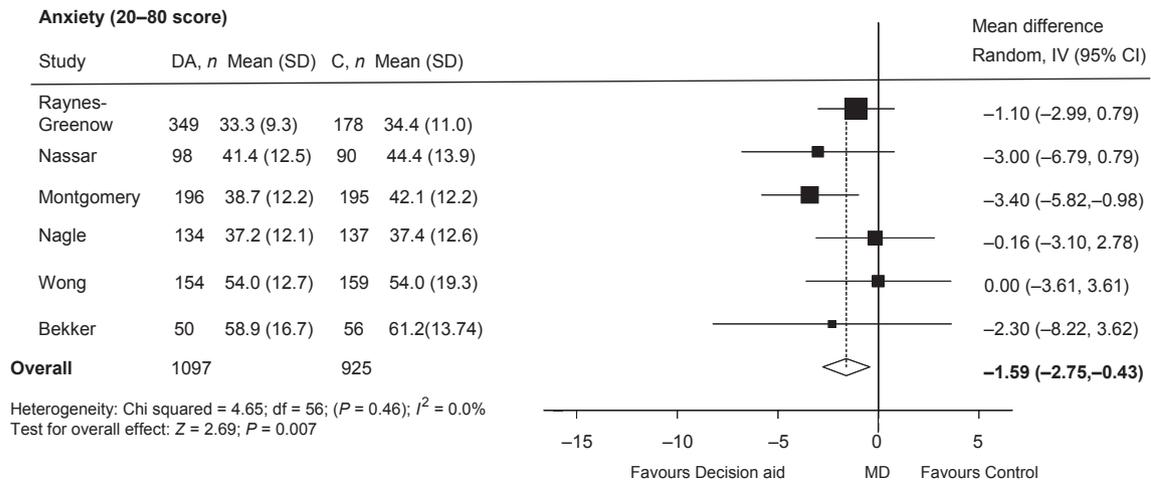


Figure 4. Forest plot anxiety.

subgroup analyses. These analyses revealed that, while some of the differences in outcomes could be explained by the type of control group, the study quality did not have any effect on results. Other weaknesses of the review were the observed asymmetry in the funnel plot for the DCS, indicating possible publication bias (the funnel plot is available online, see Supplementary material, Figure S1) and that evidence in the included studies was graded as being of moderate quality on the GRADE scale. A further limitation of the review is the percentage of loss to follow up, which was over 10% in some of the included studies. However, impact on meta-analyses results were minimised as the proportion of loss to follow up in each study was similar in the intervention and comparison groups.

Surprisingly, of all developed DAs, only three were available on the internet and a further two were obtained on request. This may be because of a lack of resources for implementation or support for the intervention. A number of trials included in the review were funded by grants and it may be that these had funding for development and evaluation, but no further resources to support implementation. This is confirmed by the fact that overall, we only found two studies assessing implementation of DAs in daily practice and both studies found that DAs were poorly used in daily practice and experienced many barriers especially from physicians, despite positive attitudes to the use of DAs.^{29,30} This could be a result of time pressure and ideas of nonproductiveness of shared decision making. Other possible barriers may involve the relevance of information presented to the particular setting, lack of availability or relevance of options presented in the DA and whether information is up-to-date. Identification of the barriers and facilitators that may be associated with the implementation of decision-support techniques may increase their application and relevance.

Conclusion

Our systematic review highlights the positive effect of DAs on informed decision making in pregnancy care. Furthermore, the most positive benefits were when the decision-support technique was implemented by a care provider. Future studies should focus on increasing the uptake of DAs in clinical practice by both describing the elements of 'effective DAs' for their development, and provide advice on how pregnancy care providers should use and implement DAs in their clinical practice. Identifying the barriers and facilitators to implementation is also important in increasing their relevance and application.

Disclosure of interest

All authors state that no benefits will be received from a commercial party, research fund or foundation related directly or indirectly to the subject of the article. Dr Nassar has developed and published a DA for external cephalic version, she did not participate in the inclusion, or assessment of bias of her own study.

Contributions to authorship

The idea for this study was produced by BWM, FV and NN. Study protocol was written by FV and JKW. All other authors reviewed the protocol. FV and JKW performed the literature search, data extraction and statistical analysis; NN was consulted in situations where FV and JKW disagreed. All other authors contributed evenly in supervising the work of FV and JKW during this process and provided their knowledge on systematic reviews, decision support techniques and statistical analyses of the extracted data.

Details of ethics approval

None.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Figure S1. Funnel plot dicisional conflict. ■

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