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

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Running title: Decision aids in pregnancy care – a systematic review

**ABSTRACT**

**Background**

Rapid development in health care has resulted in an increasing number of screening and treatment options. Consequently, there is an urgency to provide patients with relevant information about benefits and risks of health care options in an unbiased way. Decision aids help patients 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% CI: 4.85, 17.27), decreased decisional conflict scores (weighted mean difference -3.66, 95%CI:-

6.65, -0.68)) and decreased anxiety (weighted mean difference -1.56, 95%CI:-2.75, -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, pregnancy healthcare, obstetrics, systematic review

## INTRODUCTION

Rapid development in health care 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 patients and provide relevant information about both the benefits and risks of health care 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 consequences for subsequent pregnancies, which makes it a complicated decision. Previous studies have highlighted that pregnant women want to be involved in decision making.{Waldenstrom, 2006 123 /id;Brown, 1994 122 /id}

Decision aids (DA), or decision support techniques, aim to help patients make these close call decisions by providing unbiased non-directive research evidence about all treatment options, including the risks and benefits, and assisting patients in clarifying their personal values related to corresponding outcomes and side effects.[3;4] Standard education materials, such as leaflets, help patients understand their diagnosis, treatment, and management, but differ from DAs as 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]

[DELETE? A large systematic review of over 500 patient DAs by O'Connor and colleagues have demonstrated the overall effectiveness and additional value of DAs for people facing health treatment or screening decisions. . 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.{Nassar, 2007 166 /id;Nagle, 2006 168 /id;Montgomery, 2007 205 /id}]We are specifically interested in the additional value

of DAs for pregnant women due to 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 summarize 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, decision$, (choic$ or preference$), 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 (RCT) 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 which provide unbiased and non-directive 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 RCTs which compared pregnancy care DAs to no intervention, usual care, alternative interventions, or a combination. We excluded studies whose 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 that 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 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.[6] Quality of evidence was assessed using the GRADE scale.[7] The International Patient Decision Aid Standards (IPDAS) Collaboration quality criteria framework was used to assess the quality of the DA.[8] 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 RCT, 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 were no defined scores/categories for good vs. poor quality DAs, or guidelines on interpretation of the scores. Therefore, we categorized DAs according to two arbitrary points (<60% of total scores) to define low quality.

**Data extraction and statistical analysis**

Two review authors (FV and JKW) independently assessed all potential studies for inclusion and extracted data. Inconsistencies were resolved by discussion and consensus and/or by consulting a third person (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; and number of women in each study group and quantitative and/or 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 categorized 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), as 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 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 programme), format of DAs (booklet, counselling and computer program) and quality of DAs (<60% and >60% 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[6]. 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, 10 articles were identified and included in the systematic review. 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 health care 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[10-13]

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 had more than 10% loss of respondents at the time of first follow up (comprising of an assessment after the intervention).[14-17]

### Type of DA and quality assessment

The ten decisions investigated in the included studies were: first trimester pregnancy termination method[18], prenatal testing[14;15;19-21], management of breech presentation[22], mode of delivery after previous caesarean section[17;23;24], and labour analgesia[16;23;25]. We identified three formats of DAs: six studies used a booklet as intervention [16;22;26-29] (three included an audio-guide), two used an interactive computer program[15;24] and two studies used structured counselling[14;19].

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 program as control group.

We obtained access to five out of ten DAs. [16;21;22;24;29] 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.[14;29]

**Decisional conflict score**

The overall DCS was the most commonly presented outcome (6 studies).[14;21;22;24;28;29] 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.[15] There was a significant difference in DCS at first follow up with a weighted mean difference (WMD) of -3.66 (95% CI: -6.65, -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, -3.75), but no difference was observed when comparing the DA with other information leaflets[16;21].

**Knowledge**

Five studies assessed knowledge at both baseline and first follow-up.[16;19;22;24;29] 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.[16;19;21;22;24;29] Pooled analysis showed significantly lower anxiety in DA versus comparison groups (WMD -1.59 (95% CI: -2.75, -0.43)) (figure 4). Similar results were found in all of the subgroup analyses with the biggest differences reported when DAs were compared to 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 to 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 (RR 0.42, 96% CI: 0.24-0.74)[22;30;31] or regretted their decision (RR 0.58, 95%CI: 0.35-0.97)[15;22] and a greater proportion of women felt they had enough information to make their decision when they were informed with a DA (RR 2.88, 95%CI: 2.02-4.10)[16;22;30]. Most studies looking at satisfaction found a non-significant positive effect of DAs on satisfaction with decision[16;24;26], decision-making process[16], and experience with birth and pregnancy[17]. Kupperman et al. found a significant difference in satisfaction with decision-making process at first follow-up (scale 0-10, DA 8.1 vs. control 7.5, ($p<0.001$).[15]

Only one study assessed 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 ($p<0.001$).[15]

**Choice behaviour and adherence to chosen option**

In the study by Kupperman et al. (prenatal testing), 48% of women in the DA group said that the intervention had affected their decision-making process, compared to 28% in the control group (OR 2.42, $P<0.001$). Raynes-Greenow et al. (pain relief during labour) reported that women with the DA tended to consider their caregivers opinion more (37.8% vs. 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)[22;24;26;28].

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 vs. 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 Heath care system outcomes**

Three out of nine studies reported on neonatal outcomes[16;22](add Nassar reference) ( Apgar score at 1 and 5 minutes post partum, birth weight, 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 health care costs revealed no difference in resource-use by mothers and babies in the intervention versus the control group.[19,32] Although, Bekker et al. reported the consultation length was slightly longer by six 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 amount of women who are undecided and increase accuracy of risk perception. Subgroup analyses highlight that 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 an information leaflet, 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 to 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 patients in the form of less uncertainty and anxiety.[19] Written information did also result in greater recall of information. Thus, 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 patients that 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-points of less and greater than 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 as decisions in obstetrics do not only concern the patient / mother, but also the fetus which may influence decisional conflict and anxiety. Furthermore, this is the first review which 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.

Of included studies, only half assessed if patients 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 'decision regret' and two studies 'satisfaction with decision'. Generally, a reduction in validated outcome measures such as DCS, knowledge and anxiety make it plausible that patients are helped by DAs in making the best choice according to their own values, but there is need for an overall, uniform outcome measure 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 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 (figure of the funnel plot is available online) 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 versus the comparison group.

Surprisingly, of all developed DAs, only three were available on the internet and a further two were obtained on request. This may be due to 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.[33;34] This could be due to time pressure and ideas of non-productiveness 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 utilise and implement DAs in their clinical practice. Identifying the barriers and facilitators to implementation is also important in increasing their relevance and application.

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**Declarations 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 ECV, she did not participate in the inclusion, or assessment of bias of her own study.

**Contributions to authorship**

The idea for this study was conducted by B.W. Mol, F. Vlemmix and N. Nassar. Study protocol was written by F Vlemmix and JK Warendorf. All other authors reviewed the protocol. The first and second author performed the literature search, data extraction and the statistical analysis, N Nassar was consulted in situations where the first and second author disagreed. All other authors contributed evenly in supervising the work of the first two authors during this process and provided their knowledge on systematic reviews, decision support techniques and statistical analyses of the extracted data.

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**Table / figure caption list**

Figure 1: flow chart study selection process

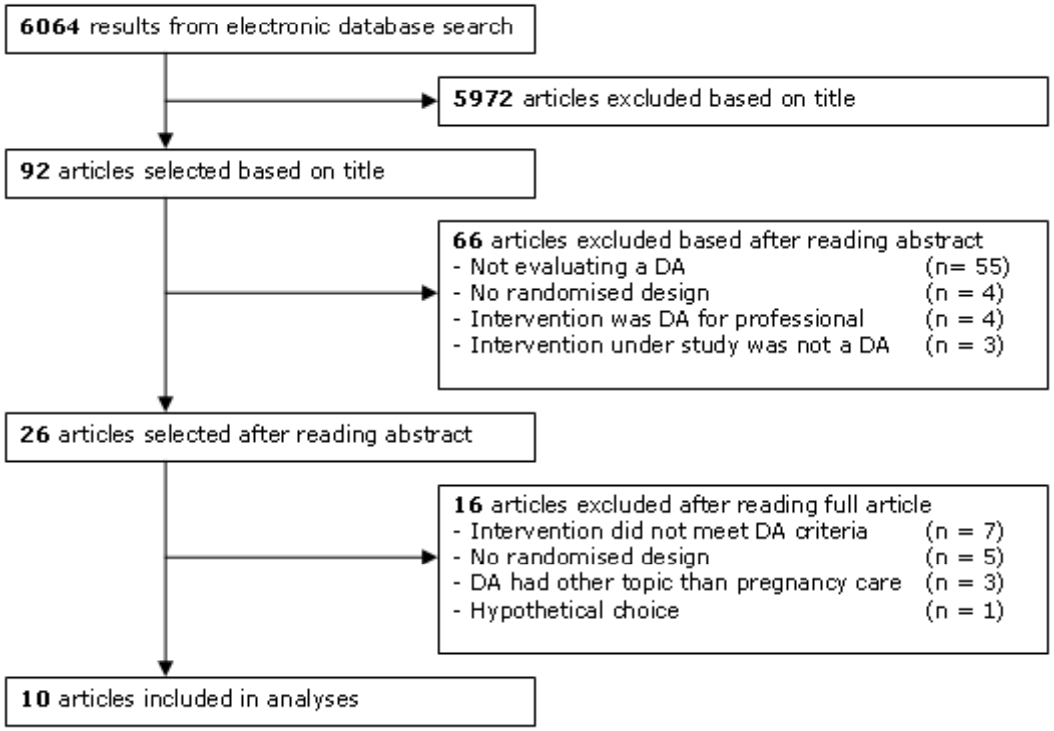

Table 1: Study characteristics

| Citation | Country | N DA | N Control | Design | Decision | intervention | control | Study population | Timing of assessment first follow-up | Total IPDAS-score |
|---|---|---|---|---|---|---|---|---|---|---|
| **Pregnancy termination method** | | | | | | | | | | |
| Wong, 2006[29] | UK | 154 | 159 | RCT | Pregnancy termination method | Information leaflet[33] | Information leaflet on contraception | <9 weeks gestation | After intervention | 38.0% (17/50) |
| **Prenatal testing** | | | | | | | | | | |
| Bekker, 2004[19] | UK | 50 | 56 | RCT | Prenatal diagnosis Down syndrome for women with a positive screening test. | Structured counselling with decision analysis | Normal counselling | 15 weeks gestation | After intervention | 45.5% (25/55)* |
| Hunter, 2005[20] | 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 gestation | After intervention | 63.6% (35/55)* |
| Arimori, 2006[14] | Japan | 38 | 43 | RCT | Prenatal testing | Counselling by nurse based on the Ottawa decision support framework | Usual counselling | 11-15 weeks gestation | After intervention | 7.3% (15/55)* |
| Nagle, 2008[21] | Australia | 167 | 172 | Cluster RCT | Prenatal testing in primary care | Booklet with worksheet[34] | Standard information pamphlet | <12 weeks gestation, consultation by GP's | After making decision or at 14 weeks gestation | 74.1% (43/58) |
| Kupperman, 2009[15] | USA | 244 | 252 | RCT | Prenatal testing for Down syndrome | Interactive computer program | Computerised educational booklet | <20 weeks gestation | 1-2 weeks after intervention^ | 58.2% (32/55)* |
| **Breech presentation** | | | | | | | | | | |
| Nassar, 2007[22] | Australia | 102 | 98 | RCT | Singleton Breech presentation | Booklet, worksheet and audio-CD[35] | Usual care | >34 weeks gestation | 1 week after intervention | 75.5% (40/53) |
| **Vaginal birth after CS** | | | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Shorten, 2005[17] | Australia | 99 | 92 | RCT | Mode of delivery after previous caesarean section | Booklet with value clarification exercise [36] | Usual care | Inclusion 12-18 weeks gestation, information at 28 weeks gestation | 8 weeks after intervention | 68.0% (34/50)* |
| Montgomery, 2007[24] | UK | 196 | 202 | RCT | Mode of delivery after previous caesarean section | Computerized information and decision analysis program[37] | Usual care | 19-35 weeks gestation | 37 weeks gestation | 58 % (29/50) |
| **Pain relief in labour** | | | | | | | | | | |
| Raynes-Greenow, 2010[16] | Australia | 395 | 201 | RCT | Pain relief in labour | a. Booklet and worksheet<br>b. Booklet, worksheet and audio-guide[38] | Information leaflet | >36 weeks gestation, primiparous planning on vaginal delivery | 1 week after intervention | 83.0% (44/53) |

^regret and satisfaction assessed at 26-30 weeks of gestation.

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

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

| | Randomisation | Allocation concealment | Patient blinding | Assessor blinding | Incomplete data | Intention to treat analysis |
|---|---|---|---|---|---|---|
| Raynes-Greenow 2010 | ⊕ | ⊕ | ⊕ | ∅ | ∅ | ⊕ |
| Kupperman 2009 | ⊕ | ⊕ | ⊕ | ∅ | ⊕ | ⊗ |
| Nagle, 2007 | ⊕ | ⊕ | ⊗ | ⊗ | ∅ | ⊕ |
| Nassar 2007 | ⊕ | ⊕ | ∅ | ∅ | ⊕ | ⊕ |
| Montgomery, 2007 | ⊕ | ⊕ | ⊗ | ⊕ | ⊕ | ⊕ |
| Wong, 2006 | ⊕ | ⊕ | ⊕ | ⊗ | ⊕ | ⊕ |
| Arimori, 2006 | ⊕ | ⊕ | ⊗ | ⊗ | ∅ | ⊗ |
| Shorten, 2005 | ⊕ | ⊕ | ∅ | ⊗ | ∅ | ⊗ |
| Hunter, 2005 | ⊕ | ⊕ | ⊗ | ∅ | ⊗ | ⊕ |
| Bekker 2004 | ⊕ | ⊕ | ⊗ | ∅ | ⊕ | ⊗ |

⊕ Good, ∅ Moderate, ⊗ Missing information and/or data

Figure 2: Forest plot decisional conflict_

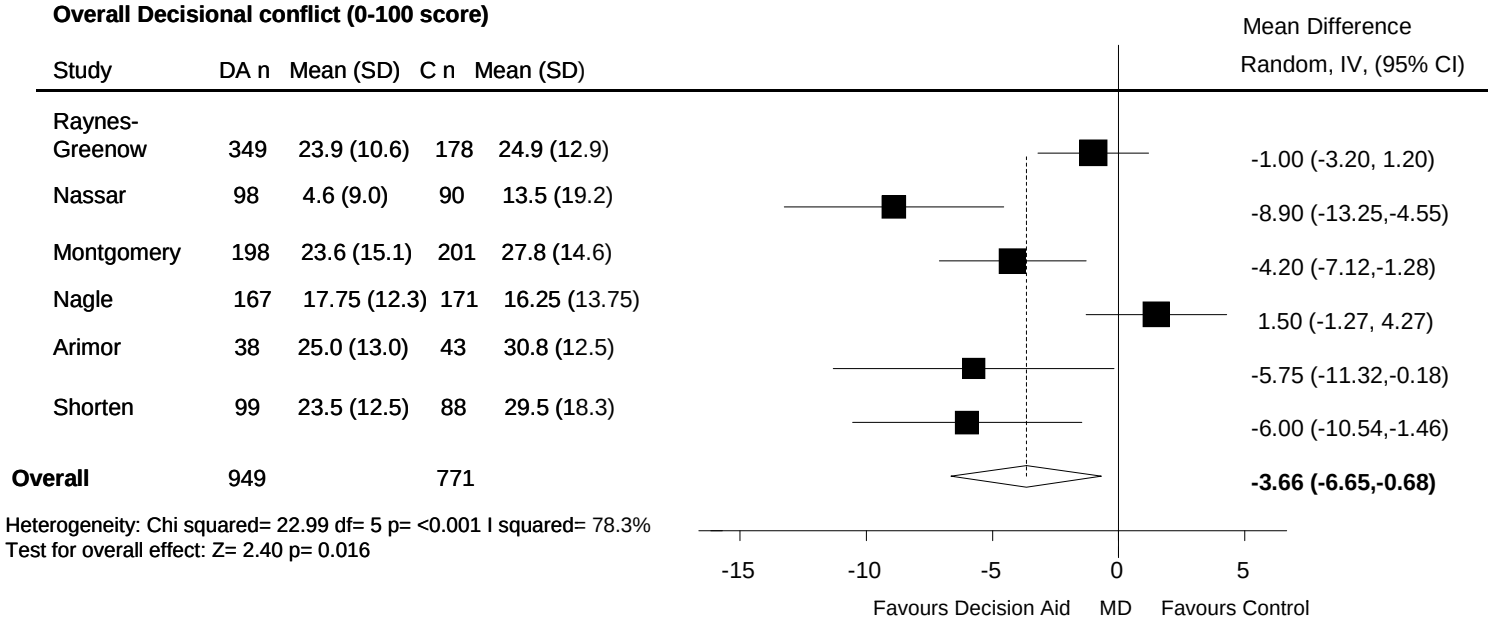

Figure 3: Forest plot knowledge_

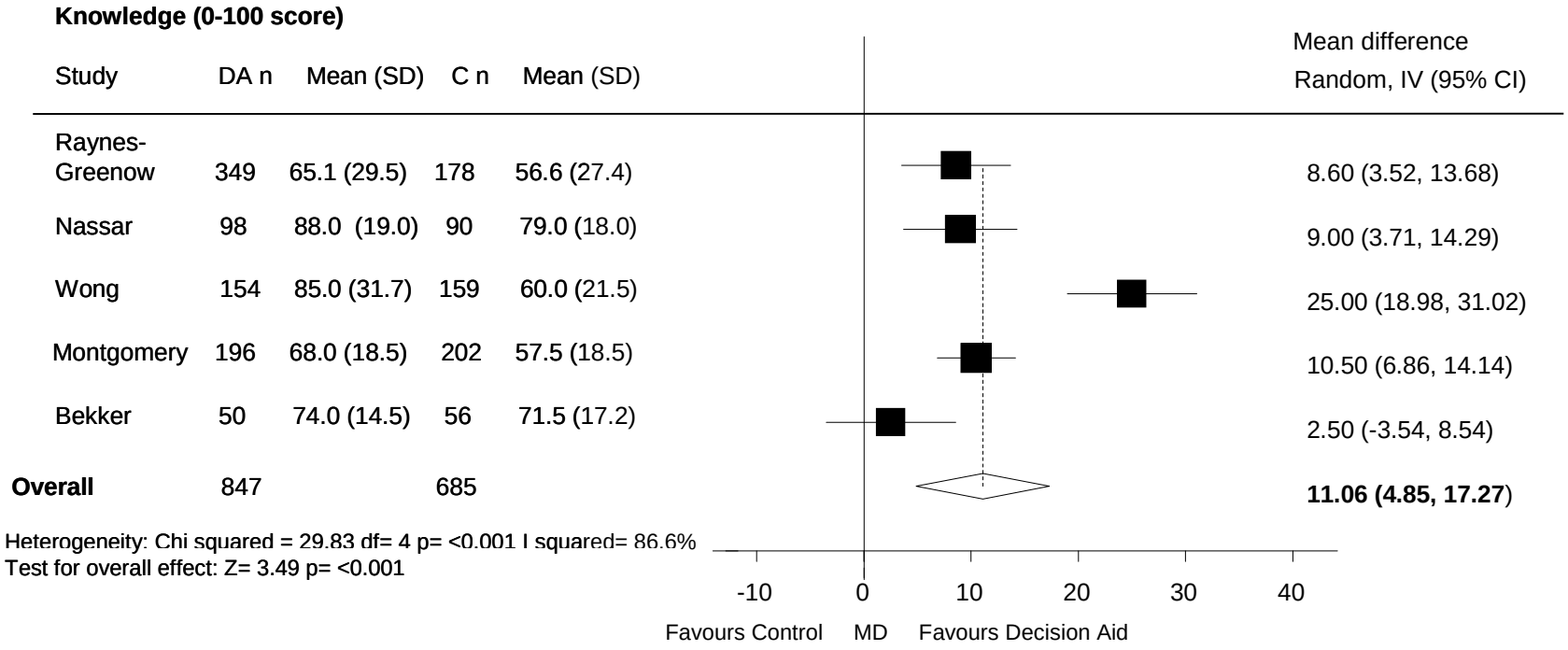

Figure 4: Forest plot Anxiety

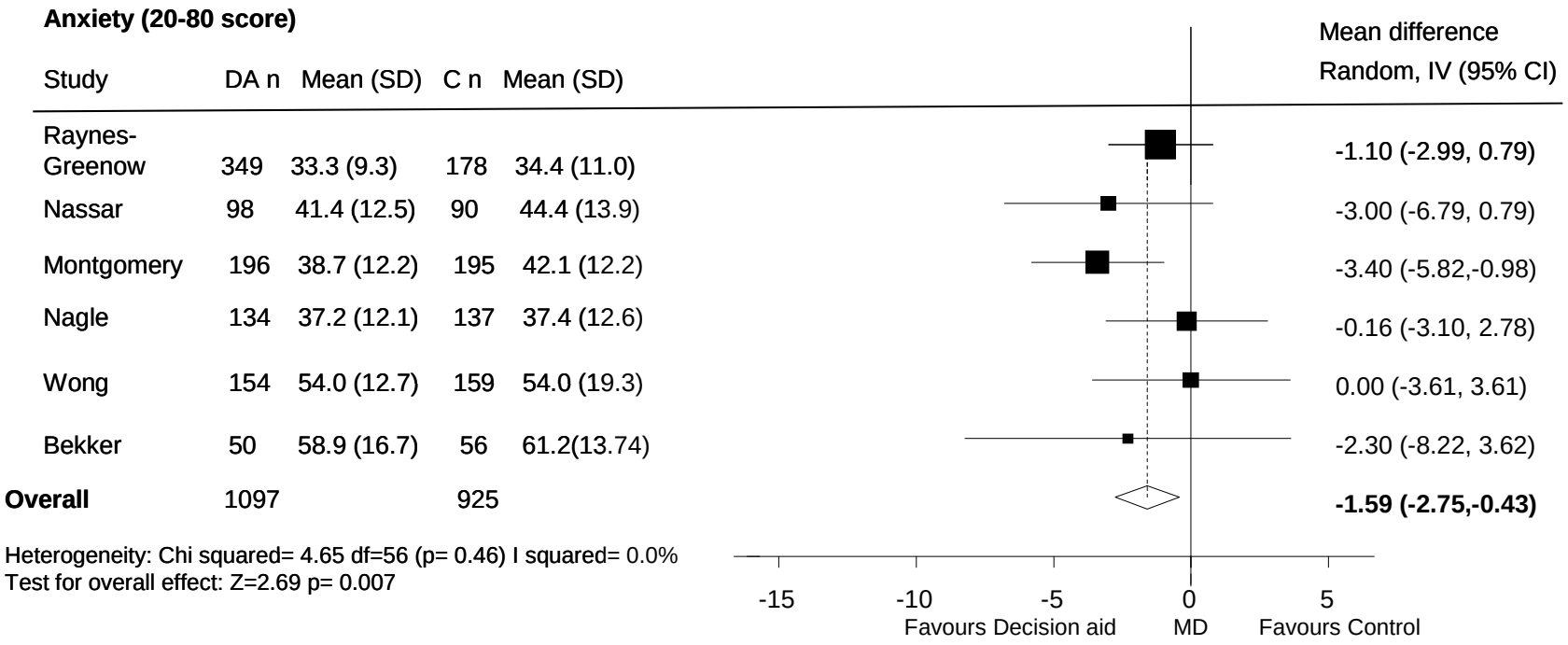

Figure 5 Funnel plot decisional conflict

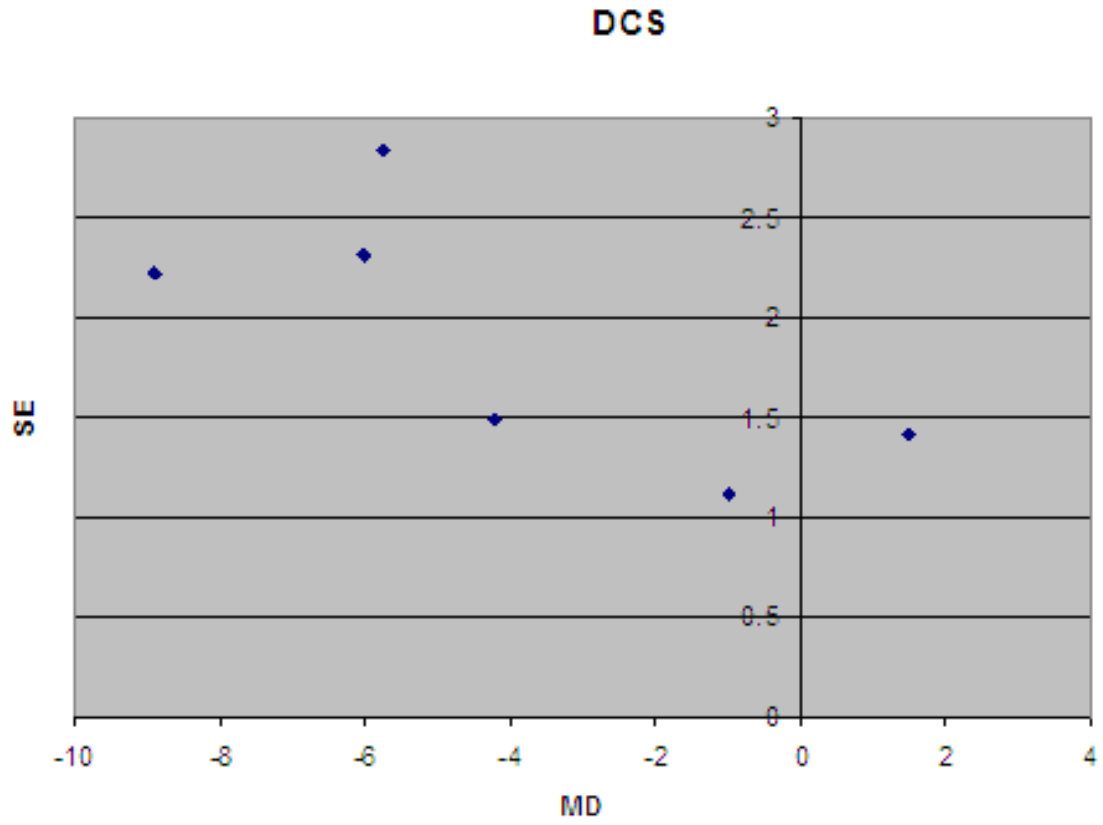

Table 3: Results of subgroup analysis

| Outcome | Subgroup analysis | Subgroup | WMD (95% CI) | $I^2$ |
|---|---|---|---|---|
| **DCS** | **Type of control intervention** | Usual care[14;22;24;28] | -5.75 (-7.75, -3.75) | 4.3% |
| | | Information programme [16;21] | 0.0 (-2.5, 2.5) | NA |
| | **Type of intervention** | Booklet [16;21;22;28] | -3.75 (-7.25, -2.5) | 81% |
| | | Interactive computer programme [24] | -4.2, SE: 1.5 | - |
| | | Counselling [14] | -5.75 SE: 2.75 | - |
| | **IPDAS score** | >60 [14;16;21;22;28] | -3.75 (-7.25, -0.25) | 81% |
| | | <60 [24] | -4.5 (-7.25, -2) | NA |
| **Knowledge** | **Type of control intervention** | Usual care[19;22;24;29] | 11.7 (3.74, 19.65) | 90% |
| | | Information programme [16] | 8.6 SE:2.59 | - |
| | **Type of intervention** | Booklet [16;22;29] | 9.6 (-1.42, 20.67) | 94% |
| | | Interactive computer programme [24] | 10.5 SE: 1.85 | - |
| | | Counselling [19] | 2.5 SE:3.08 | - |
| | **IPDAS score** | >60 [16;22] | 4.59 (-3.67, 12.85) | 87 |
| | | <60 [19;24;29] | 12.62 (1.45, 23.8) | 93 |
| **Anxiety** | **Type of control intervention** | Usual care[19;22;24;29] | -2.47 (-4.17, -0.77) | 0% |
| | | Information programme [16;21] | -0.83 (-2.42, 0.76) | NA |
| | **Type of intervention** | Booklet [16;21;22;29] | -1.21 (-2.42, -0.01) | 0% |
| | | Interactive computer programme [24] | -3.4 SE: 1.24 | - |
| | | Counselling [19] | -5.75 SE: 2.75 | - |
| | **IPDAS score** | >60 [16;21;22] | -1.37 (-2.65, -0.09) | 0% |
| | | <60 [19;24;29] | -2.24 (-4.39, -0.05) | 15% |