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REVIEW ARTICLE

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Evaluate the effectiveness of breast cancer decision aids: A systematic review and meta-analysis of randomize clinical trails

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Abstract

Aim: To assess the effectiveness of decision aids in the treatment, prevention and screening of breast cancer patients.

Design: A systematic review and meta-analysis.

Methods: The review protocol was registered in the CRD Prospero database(CRD42020173028).

A literature search was carried out in five databases: PubMed, Cochrane, EMBASE, Scopus and Web of science data in January 2020. We used The Cochrane risk bias assessment tool to evaluate the literature quality of included trials and the Review Manager 5.2 software to analyse data.

Results: We included 22 studies. Compared with the conventional methods, decision aids reduced treatment decision conflicts and had no significant effect on screening decision conflicts (WMD=−2.25, 95% CI = - 2.64,-1.87, $p < .0001$; WMD=−1.37, 95% CI = - 3.57,0.83, $p = .22$). Three were no statistical differences in participants' anxiety, decision regret, knowledge, informed choice and decision-making satisfaction between the two groups.

KEYWORDS

breast cancer, decision conflict, patients decision aids, share decision-making

1 | INTRODUCTION

Breast cancer is the most common tumour in women worldwide; it poses a severe threat to women's life and health. Breast cancer is the fifth most commonly occurring cancer in China (Bray et al., 2018). However, in recent years, with the increasing number of breast cancer screening and treatment, breast cancer's cure rate and survival rate are also gradually increasing. The five-year survival rate for breast cancer patients in China is more than 70%. Breast cancer survivors are the largest group of all cancer survivors (Hui, 2011).

Since Halsted's (Halsted, 1894) radical mastectomy, there has been rapid growth in the development of breast cancer treatments. These methods are divided into several management techniques to treat local lesions, including applied surgery or radiotherapy, or a combination of these; and systemic lesions through the application of chemotherapy or endocrine. Unique treatment methods are recommended for different stages of breast cancer. For example, two options are available for local treatment of early-stage breast cancer patients (stage 1 and II), namely breast conservation therapy and modified radical mastectomy. In addition to surgical interventions, breast cancer patients are faced with multiple clinical options, such as the choice of radiotherapy after breast-conserving surgery or breast reconstruction after radical mastectomy. Studies (O'Connor, 1993) show that when two or more medical alternatives are presented, these need to be weighed and tailored to patients'

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own preferences, although decision-making conflicts will inherently occur. Patients' procrastination in decision-making may be characterized by verbalized uncertainty, hesitation, and questioning of personal values and beliefs.(Knops et al., 2013; O'Connor, 1993, 1995) Patients who experience high levels of decisional conflict equivocate have regrets, reduce participation, express dissatisfaction with the medical decision-making process and even blame clinicians for unsatisfactory outcomes, often leading to doctor–patient conflict. (Katapodi et al., 2011; Knops et al., 2013; O'Connor, 1995; Song & Sereika, 2006) Thus, fear and uncertainty about the disease and its prognosis influence cancer-related decisions.

Most breast cancer patients are female, to whom breasts have an extraordinary significance. Should they choose breast conservation therapy or non-breast conservation therapy? How should childless patients measure fertility problems against breast cancer recurrence arising from pregnancy? Should older patients focus on quality of life or seek to improve their survival rate? These dilemmas also affect patients' cognitive functions since approximately 1/7 of breast cancer patients suffer from mental disorders. (Schonberg et al., 2014) Therefore, it is imperative to help breast cancer patients choose and weigh the risks and benefits of various treatment options. Breast cancer patients who participate early in decision-making better understand their treatment plan and are more satisfied with outcome probabilities and the decision-making process. Thus, patient participation in decision-making is a significant factor in oncological care. (Keating et al., 2002) Shared decision-making means medical staff are responsive to identifying and meeting patients' needs by considering their values and personal preferences. Inversely, patients should be emboldened to express their wishes, as ideally doctor–patient consultations should culminate into reasonable mutual clinical decisions. Tools such as decision-making aids promote patients' shared participation in medical and nursing-related treatment decisions. Its ultimate goal is to enable higher-quality decisions[11].

Decision aids vary by function. For instance, therapeutic decision aids can be a resource for patients' self-management and decision-making. Patients can be assisted to make wise choices and reduce decisional conflicts. Correspondingly, screening decision aids can promote national disease screening and heighten awareness of measures to promote early detection, diagnosis and treatment among healthy and high-risk groups.

Decision aids acknowledge patients' participation in decision-making. Doctor–patient sharing assures patients' rights and increases the individualization and accuracy in decision-making. It is an essential link in a patient-centred model and improves the quality of medical service. The change in medical concept to "patient-centred" is widely accepted, and "patients' participation in treatment and nursing decision-making" are now important parts of the modern medical model.(Guadagnoli & Ward, 1998) The World Health Organization Alliance for Patient Safety encourages patients and their families to participate in medical and health decision-making.(Longtin et al., 2020) However, most patients are often passive players in the decision-making process due to insufficient medical knowledge. This makes it easy for decisional conflicts, thus affecting the quality of treatment decisions. The purpose of developing decision aids, therefore, is to facilitate patient involvement in decision-making by assisting them to evaluate different treatment options and make specific, prudent decisions.

Given the complexity of breast cancer treatment, the particularity of groups and the lack of research on decision aids in the Republic of China, the purpose of this study was to examine the effectiveness of decision aids in breast cancer treatment or screening. It also provides a reference base for the future development of breast cancer decision-making tools.

2 | MATERIALS AND METHODS

The review protocol was registered in PROSPERO, the International prospective register of systematic reviews (CRD42020173028).

2.1 | Search strategies and data sources

The following databases were searched: PubMed, Cochrane Library, EMBASE, Scopus, and Web of Science, using the Mesh keywords: "Decision Making," "Decision Theory," "Decision Support Technique," "Decision Support Model," "Decision Aids," "Decision Analysis," "Neoplasms," "Breast". The time established to retrieve items from the database was 15 January 2020. The search strategy also included references for inclusive trials—see retrieval strategy in Appendix 1.

2.2 | Inclusion and exclusion criteria

The inclusion criteria were as follows: (1) Patients: breast cancer patients or patients with breast cancer decision aids; (2) Intervention: experimental groups using decision aids; and control groups using standard nursing/conventional methods; and (3) Study design: randomized controlled trials (RCT); (4) Outcome indicators: criteria of the International Patient Decision Aid Standards (IPDECISION AIDS) collaboration checklist(Collaboration, 2005) used to evaluate Decision aids and develop outcome indicators. Studies must include at least one of the mentioned outcomes along with the following indicators.

Primary outcomes: (1) Decisional conflict referred to patients' uncertainty in the face of treatment plans. When the benefits and harms of treatment options are similar, they need to be balanced in conjunction with patients' own values. Decision-making conflict will inherently occur. The decisional conflict was measured with the Decisional Conflict Scale; (2) Knowledge: this was used to evaluate breast cancer patients' knowledge about risk factors, prevention programs, screening problems or treatment options—one of which must be included. The method of measurement was unlimited because different types of breast cancer involve different measurement tools; (3) Anxiety: the method of measurement is not limited, such as the State-Trait Anxiety Inventory (STAI) and the State

Anxiety subscale of the Spielberger State-Trait Anxiety Inventory; and (4) Satisfaction: this referred to the decision-maker's satisfaction with the decision-making process; the method of measurement is not limited.

Secondary outcomes: (1) Informed choice: this was assessed as a dichotomous outcome combining measures of knowledge, attitudes and intentions. For example, a woman was judged to have made an informed choice if she had adequate knowledge and her attitudes and intentions were consistent (positive attitudes and intentions, or negative attitudes and intentions); and (2) Decision regret: this was a negative emotion that occurred when an individual realized/imagined a happier state if they had taken other actions earlier. Decision regret was measured with the Decision Regret Scale. The exclusion criteria were as follows: (1) non-randomized controlled trials; (2) no control group; and (3) abstracts, conference papers and inaccessible full text.

2.3 | Literature screening and quality evaluation

Two independent evaluators screened the retrieved literature based on the inclusion and exclusion criteria. First, they eliminated repetitious and incompatible works after reviewing titles and abstracts; next, they read full-text literature and cross-checked results; finally, they evaluated the approved articles and resolved dissenting opinions by inviting the third evaluator to comment.

The researchers used the Cochrane Library risk bias assessment tool (Higgins & Green, 2011) to evaluate the methodological quality (risk of bias), which included seven items: random sequence generation, allocation concealment, double blindness of participants and trial performers, the blindness of outcome assessment, incomplete outcome data, selective reporting and other biases. Each quality item was divided and categorized into high, undefined and low risk. The quality of the included trials was assessed as low, high or medium.

2.4 | Data extraction

Two independent investigators extracted the following data from the included literature: primary author; publication date; age; sample size; type of decision aids; number of lost visits; and follow-up time. Extracted content was deemed relevant when trials were greater than two sets or had multi-factor designs.

2.5 | Publication bias evaluations

We used Stata 13.0 software (Stata Corp, College Station, TX) to conduct the publication bias test (Egger's test); the test level was set at $\alpha = 0.05$, P values of 0.05. The publication bias was not statistically significant.

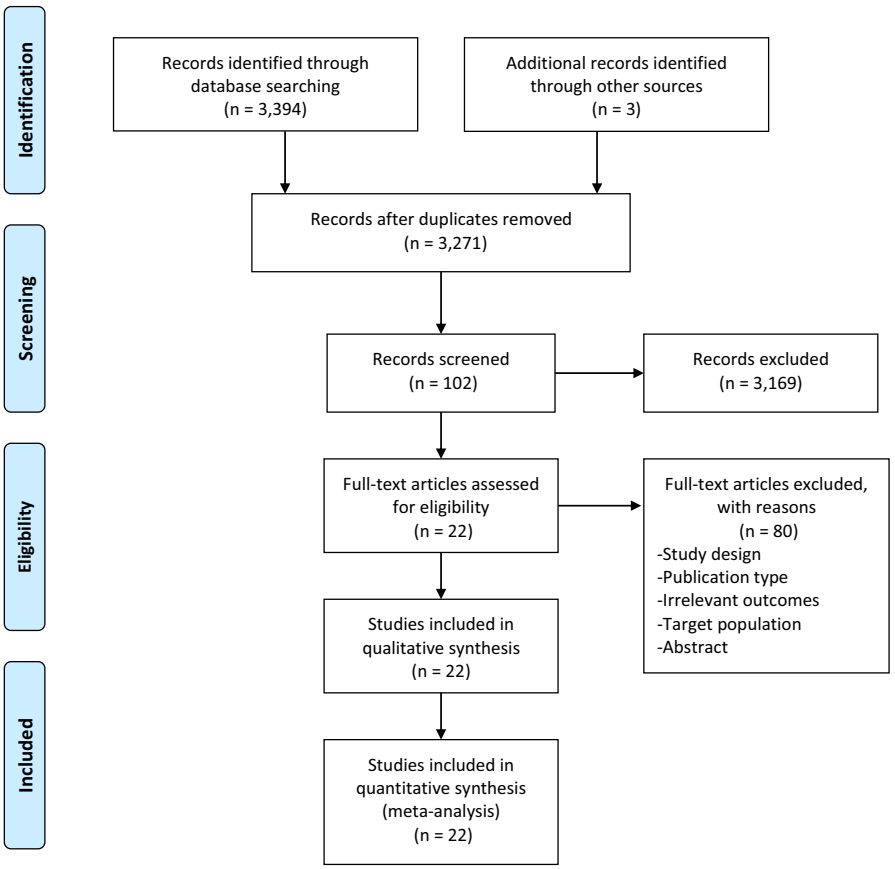

FIGURE 1 PRISMA flow diagram

TABLE 1 Characteristics of the included articles

First Author	Year	Country	Trail Type	Decision context	Types of DA	Patients
Molenaar[15]	2001	Netherlands	RCT	Treatment	Interactive CD-ROM	stage I or II breast cancer
Lam[14]	2014	Hong Kong China	RCT	Treatment	booklet	early-stage breast cancer
Garvelink[22]	2016	Netherlands	RCT	Treatment	Web-based	breast cancer
Klaassen[26]	2018	Netherlands	RCT	Treatment	Web-based	breast cancer
Lee[11]	2009	USA	RCT	Treatment	Computer	breast cancer
Luan[21]	2016	USA	RCT	Treatment	booklet	breast cancer
Manne[10]	2015	USA	RCT	Treatment	Web-based	ductal carcinoma in situ or stage 1, 2, or 3a breast cancer
Osaka[18]	2016	Japan	RCT	Treatment	booklet	early-stage breast cancer
Parkinson[13]	2018	Australia	RCT	Treatment	Web-based	breast cancer or ductal carcinoma in situ
Politi[27]	2019	USA	RCT	Treatment	Multimedia	0–III stage breast cancer
Stankowski[28]	2019	USA	RCT	Treatment	websites, video	0–III stage breast cancer
Tucholka[29]	2017	USA	RCT	Treatment	websites	0–III stage breast cancer
Vodermaier[12]	2009	German	RCT	Treatment	decision board	newly diagnose breast cancer
Vodermaie[24]	2011	German	RCT	Treatment	decision board	newly diagnose breast cancer
Whelan[17]	2004	Canada	RCT	Treatment	decision board	stage I or II breast cancer
Goel[30]	2001	Canada	RCT	Treatment	Booklet, video	newly diagnose breast cancer
Street[25]	1995	USA	RCT	Treatment	Interactive multimedia program	stage I or II breast cancer
Pérez-Lacasta [20]	2019	Spanish	RCT	Screening	pamphlet	/
Green[16]	2004	USA	RCT	Screening	Computer	/
Hersch[31]	2015	Australian	RCT	Screening	pamphlet	/
Mathieu[23]	2010	Australia	RCT	Screening	websites	/
Metcalfe[19]	2016	Canada	RCT	Screening	pamphlet	/

Abbreviations: BRAID, breast reconstruction decision support aid; BRECONDA, Breast reconstruction Decision Aid; CG, control group; DA, decision aid; IG, intervention group.

Mean age (years)		Sample		Intervention		Percent of lost visits (%)	Outcome(s)
IG	CG	IG	CG	IG	CG		
55.4	54.6	92	88	CDROM	Standard care	7	Decisional conflict; Satisfaction
56.8	54.6	138	138	DA booklet	Standard-information booklet	18	Knowledge; Satisfaction
35.8	32.9	13	13	Web-based DA	Brochures	3.80	Decisional conflict; Knowledge; Decisional regret
58.4	59.7	44	43	DA	No DA-usage	6.70	Satisfaction
48.4	48.9	168	87	Computer module	No computer module	31.76	Satisfaction
49.3	49	8	8	DA	No DA	0	Decisional conflict; Decisional regret Anxiety;
50.2	50.2	21	22	BRAID	Pamphlet	27.91	Decisional conflict; Knowledge; satisfaction; Anxiety
49.7	48.6	61	54	DA	Usual care	17.14	Decisional conflict; satisfaction; Anxiety
/	/	106	116	BRECONDA	Usual care	25.23	Decisional conflict; Decisional regret; satisfaction
52.3	49.1	60	60	BREAST Choice	Enhanced Usual Care	0	Decisional conflict Knowledge
61	58	102	99	DA	Standard Websites	17.62	Satisfaction
61	57	116	111	DA	Standard Websites	6	Knowledge
53.5	56.9	55	56	DA	standard treatment	0	Decisional conflict Satisfaction
55.2	55.2	55	56	DA	standard treatment	0	Decisional conflict Anxiety
58.2	58.1	94	107	Decision Board	Usual care	3.48	Decisional conflict Satisfaction; Anxiety; Knowledge
57.6	57.4	86	50	DA	Trifold pamphlet	2.86	Decisional conflict Decisional regret Anxiety; Knowledge
57.4	60.8	30	30	Multimedia	Brochure	0	Knowledge
50.1	50.2	203	197	DA	Standard leaflet	23.66	Decisional Conflict; knowledge; Anxiety
45	44	105	106	Computer counseling	Standard counseling	26.07	Decisional Conflict; knowledge; Anxiety Satisfaction
49.7	49.7	419	419	Intervention DA	Control [4]DA	2.51	Decisional conflict; Anxiety; Knowledge
41.8	41.9	113	189	DA	/	0	Informed choice; Anxiety
38.5	39.7	76	74	DA	standard care	7	Decisional conflict; Knowledge

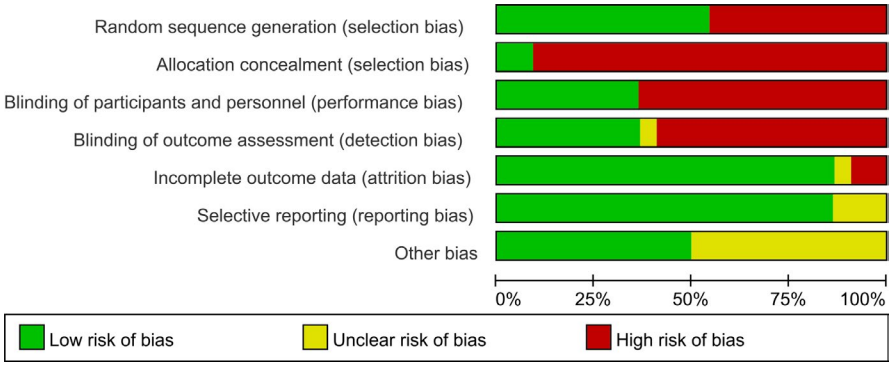

FIGURE 2 Risk of bias summary for included studies

2.6 | Sensitivity analysis

Sensitivity analysis, also known as robust analysis, was an important method mainly used to evaluate the robustness and reliability of the combined results of meta-analysis. We used the R version 3.6 to conduct a sensitivity analysis. Meta-analysis results were considered stable if they did not change after the interchange, otherwise, they were considered unstable, and caution was taken to interpret the results.

2.7 | Statistical analyses

All analyses were conducted using the Review Manager 5.2 software (The Cochrane Collaboration, Oxford, UK). A descriptive analysis was included along with a meta-analysis. Dichotomous outcomes were analysed with the relative ratio (RR) and 95% confidence interval (CI). Continuity variables were analysed using the standardized mean difference (SMD) or the weighted mean difference (WMD). The index of inconsistency (I^2) was used to assess statistical heterogeneity, which measured the proportion of inequality in individual studies that cannot be explained by random error. The data pooling model used the random-effects when the I^2 value is > 50%, and the data pooling model used the fix-effects when the I^2 value is < 50%. The test level was set at $\alpha = 0.05$; P values of 0.05 were considered to show the difference was statistically significant. We also did a subgroup analysis based on the types of breast cancer decision aids.

3 | RESULTS

3.1 | Search results

Overall, the sample totalled 4,288 cases, including 2,165 in the experimental group and 2,123 in the control group. The initial retrieval of 3,397 related articles excluded 726 duplicates and 3,169 screened titles and abstracts. Further evaluation excluded 80 full texts. Ultimately, 22 articles were included(Garvelink et al., 2017; Goel et al., 2001; Green et al., 2004; Hersch et al., 2015; Klaassen et al., 2018; Lam et al., 2014; Lee et al., 2010; Luan et al., 2016; Manne et al., 2015; Mathieu et al., 2010; Metcalfe et al., 2017; Molenaar et al., 2001; Osaka & Nakayama, 2017; Parkinson et al., 2018; Perez-Lacasta et al., 2019; Politi et al., 2019; Stankowski-Drengler et al., 2019; Street et al., 1995; Tucholka et al., 2018; Vodermaier et al., 2009, 2011; Whelan et al., 2004) (Figure 1) which comprised 17 articles that evaluated decision aids for breast cancer treatment, and five on breast cancer screening. Trials were conducted in the United States (8), Canada (3), Australia (3), the Netherlands (3), Germany (2), China (1), Japan (1) and Spain (1) (Table 1).

3.2 | Risk of bias

Evaluation results of the 22 RCT articles were only ten articles used the random computer method (seven articles mentioned "random," three articles used "weekly" allocation, one paper failed to mention a random allocation method); one study used sealed opaque envelopes, while others failed to mention allocation concealment; except for seven studies, none of the others blinded researchers, patients, and evaluation of results; seven studies showed no loss of follow-up/withdrawal unlike the other 15 which also explained why loss of follow-up/withdrawal occurred. From this number, only four articles adopted intention therapy analysis of the loss of follow-up (Figures 2&3).

3.3 | Outcome measures

3.3.1 | Decision conflict

Eleven trials(Garvelink et al., 2017; Goel et al., 2001; Hersch et al., 2015; Manne et al., 2015; Metcalfe et al., 2017; Osaka & Nakayama, 2017; Parkinson et al., 2018; Perez-Lacasta et al., 2019; Vodermaier et al., 2009, 2011; Whelan et al., 2004) assessed the effects of decision aids on decisional conflict—eight trials(Garvelink et al., 2017; Goel et al., 2001; Manne et al., 2015; Osaka & Nakayama, 2017; Parkinson et al., 2018; Vodermaier et al., 2009, 2011; Whelan et al., 2004) on breast cancer treatment, and three (Hersch et al., 2015; Metcalfe et al., 2017; Perez-Lacasta et al., 2019) on screening. Heterogeneity test results

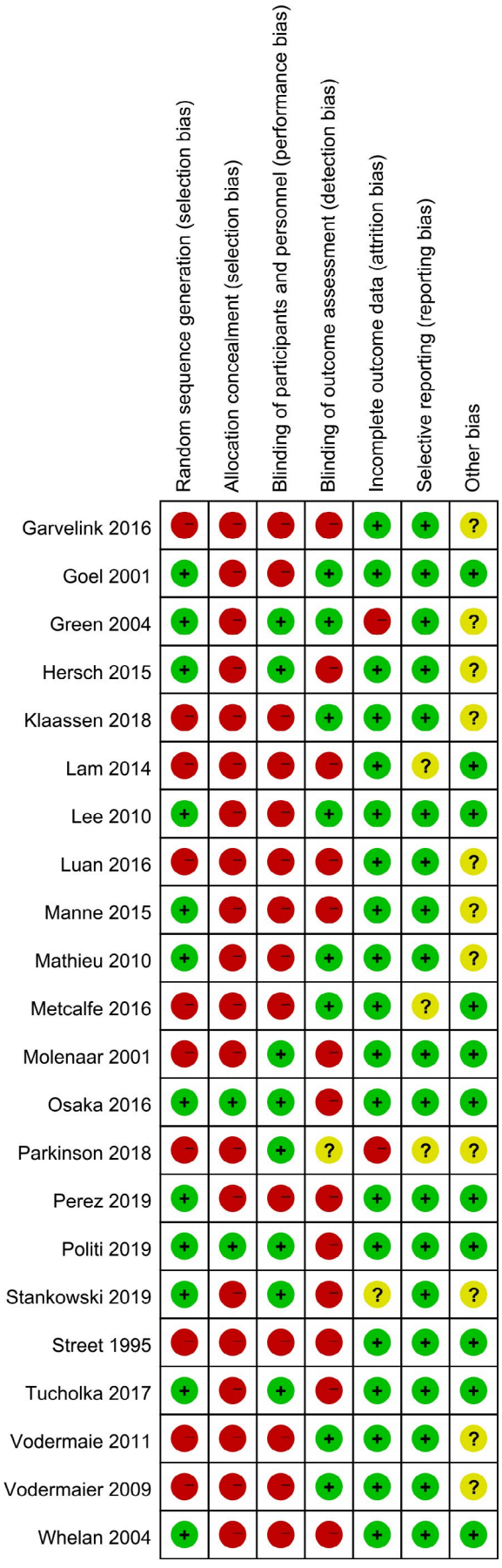

FIGURE 3 Risk of bias assessment for each included study

showed homogeneity among studies of therapeutic decision aids (I^2 = 43% p = .08). However, there was heterogeneity among studies screening decision aids (I^2 = 55%. p = .11); the random effect model was used in subgroup analysis to combine the effects. The subgroup analysis showed that the pooled MD for treatment Decision aids was −2.25(95% CI=−2.64, −1.87, p = .0001); the pooled MD for screening decision aids was −1.37(95% CI = 3.57, 0.83, p = .22) (Figure 4).

3.3.2 | Anxiety

Eight trials (Green et al., 2004; Luan et al., 2016; Manne et al., 2015; Mathieu et al., 2010; Metcalfe et al., 2017; Osaka & Nakayama, 2017; Perez-Lacasta et al., 2019; Whelan et al., 2004) evaluated the effects of decision aids on anxiety, four on breast cancer treatment(Luan et al., 2016; Manne et al., 2015; Osaka & Nakayama, 2017; Whelan et al., 2004) and four on screening (Green et al., 2004; Mathieu et al., 2010; Metcalfe et al., 2017; Perez-Lacasta et al., 2019). Heterogeneity evaluation results of six studies showed that there was homogeneity among the studies of therapeutic Decision aids (I^2 = 34%, Chi^2 = 4.51, p = .21), but there was heterogeneity among studies of screening decision aids (I^2 = 95%, Chi^2 = 19.14, p < .0001). The subgroup analysis used the random effect model to combine effects. In the subgroup analysis, the results revealed no significant difference in decision-makers' anxiety, either during breast cancer treatment or screening decision aids (p = .41) (Figure 5).

Since the remaining two trials were on breast cancer screening, only the p-value was provided, which could not be pooled in the analysis. Green and colleagues (Green et al., 2004) found that both decision aids and standard nursing effectively reduced participants' anxiety. Mathieu et al. (Mathieu et al., 2010) made similar findings.

3.3.3 | Satisfaction

Ten trials(Green et al., 2004; Klaassen et al., 2018; Lam et al., 2014; Lee et al., 2010; Manne et al., 2015; Molenaar et al., 2001; Osaka & Nakayama, 2017; Parkinson et al., 2018; Stankowski-Drengler et al., 2019; Whelan et al., 2004) assessed the impact of decision aids on the decision-making process and satisfaction: nine on breast cancer treatment(Green et al., 2004; Klaassen et al., 2018; Lam et al., 2014; Manne et al., 2015; Molenaar et al., 2001; Osaka & Nakayama, 2017; Parkinson et al., 2018; Stankowski-Drengler et al., 2019; Whelan et al., 2004) and one on screening.(Lee et al., 2010) Heterogeneity evaluation results of six studies showed homogeneity among therapeutic decision aids (I^2 = 12%, Chi^2 = 5.66, p = .34); the fixed-effect model was used to combine the effect. The pooled SMD for the decision-making process and satisfaction was −0.05(95%CI: −0.18–0.08; p = .43) (Figure 6).

The remaining four trials could not be pooled in the analysis because of different data types. Three trials(Lee et al., 2010;

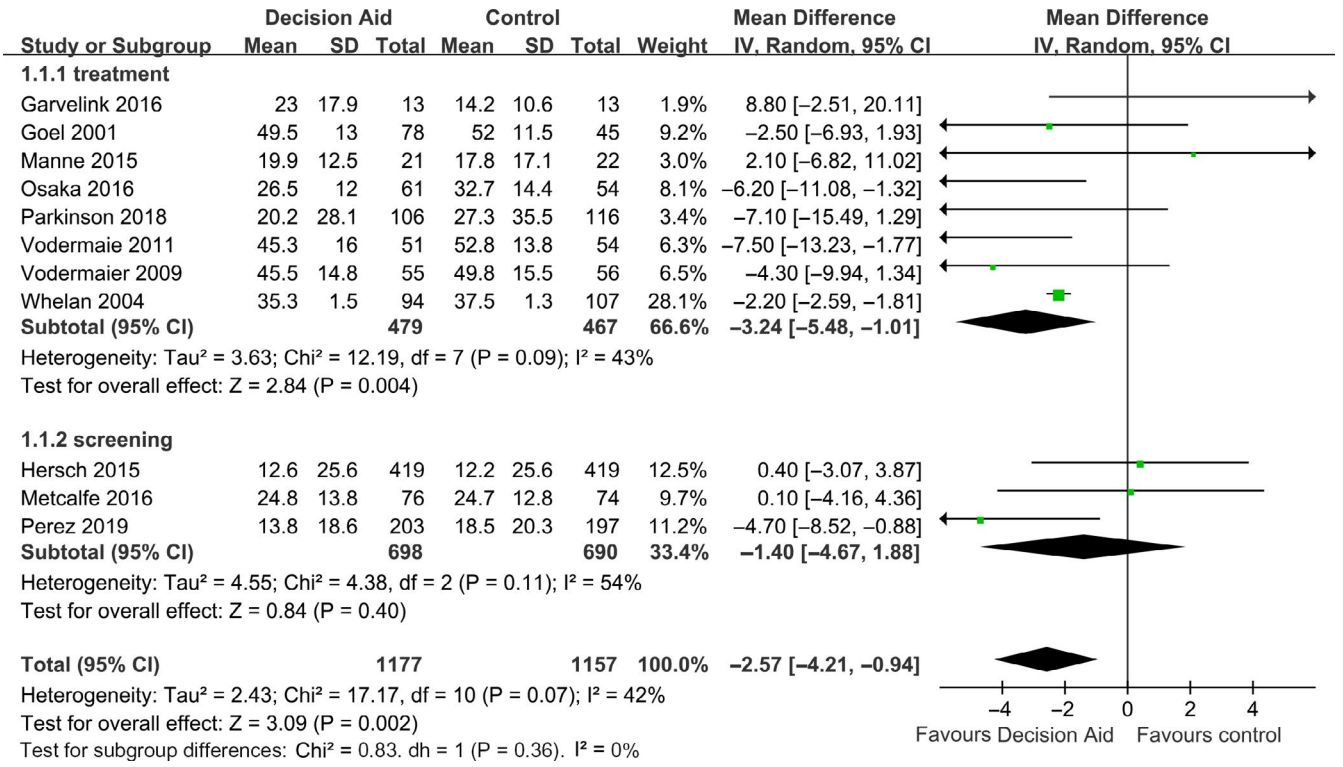

FIGURE 4 Forest plot of decision conflict between decision aid group and usual care group

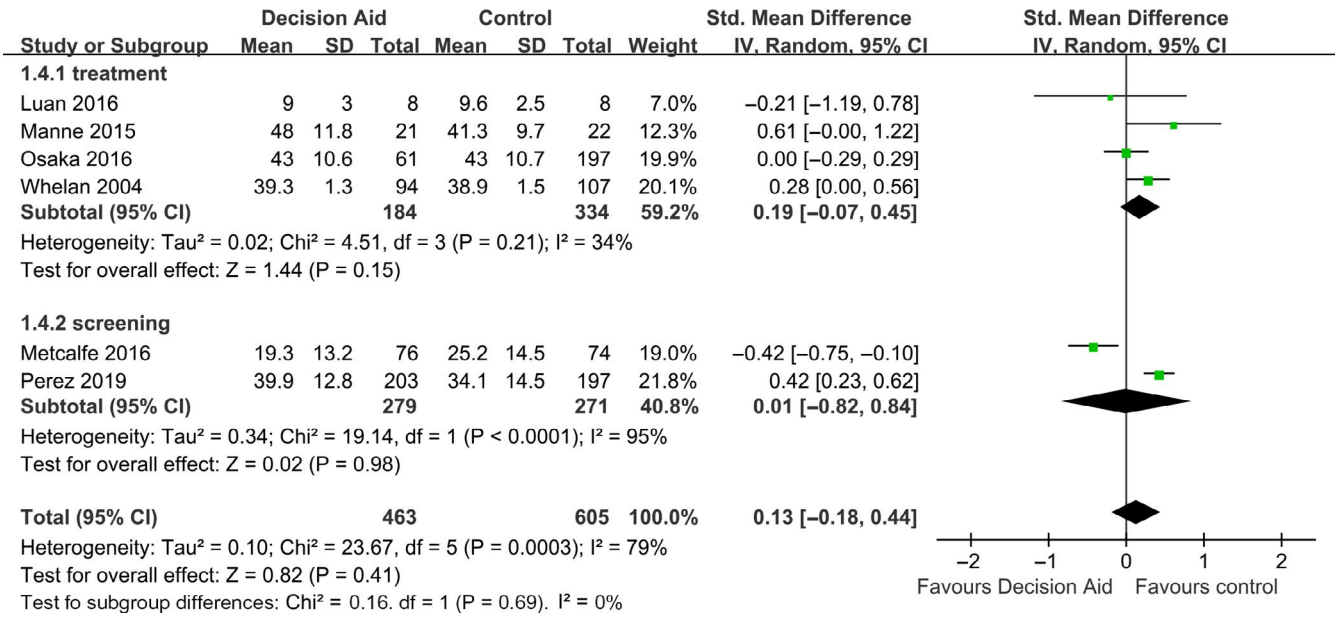

FIGURE 5 Forest plot of Anxiety between decision aid group and usual care group

Osaka & Nakayama, 2017; Stankowski-Drengler et al., 2019) evaluated Decision aids for breast cancer treatment; two trials(Osaka & Nakayama, 2017; Stankowski-Drengler et al., 2019) reported no difference between the two groups; one trial(Lee et al., 2010) reported patients in the computer learning group were more satisfied with the amount of information from reconstructive surgeons.

One trial (Green et al., 2004) evaluated decision aids for breast cancer screening satisfaction with decision-making. The study showed slightly higher mean satisfaction scores for low-risk women, but there was no difference in controls with high-risk women exposed to decision aids.

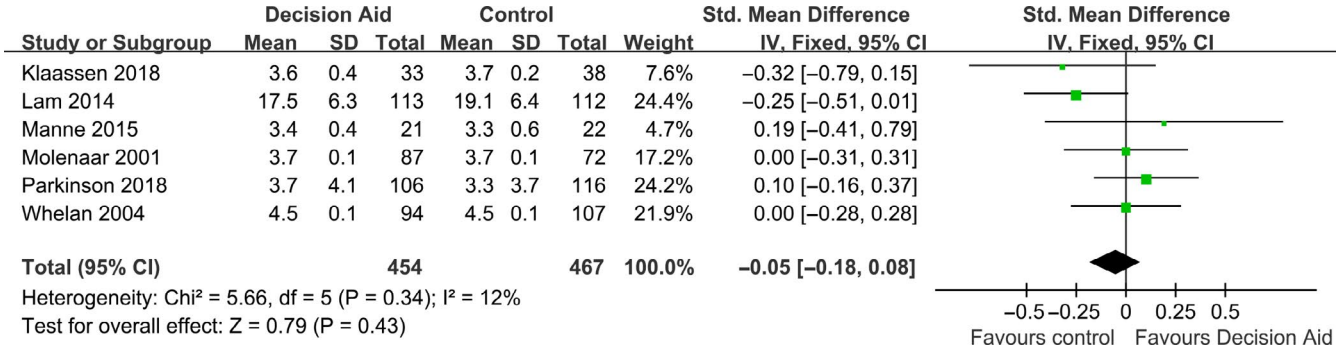

FIGURE 6 Forest plot of Satisfaction between decision aid group and usual care group

3.3.4 | Knowledge

Six studies(Garvelink et al., 2017; Goel et al., 2001; Lam et al., 2014; Manne et al., 2015; Metcalfe et al., 2017; Perez-Lacasta et al., 2019) evaluated the impact of Decision aids on knowledge, four on breast cancer treatment(Garvelink et al., 2017; Goel et al., 2001; Lam et al., 2014; Manne et al., 2015) and two on screening.(Metcalfe et al., 2017; Perez-Lacasta et al., 2019) Heterogeneity test results showed homogeneity between treatment Decision aids (I^2 = 0%, $Chi^2 = 0.34$, $p = .95$) and screening decision aids ($I^2 = 0\%$, $Chi^2 = 0.05$, $p = .82$); the fixed-effect model was used to combine effects. The subgroup analysis showed no significant difference in patients' knowledge, on either breast cancer treatment or screening decision aids ($p = .16$) (Figure 7).

3.3.5 | Informed choice

Three studies (Hersch et al., 2015; Mathieu et al., 2010; Perez-Lacasta et al., 2019) evaluated the influence of Decision aids on informed choice about screening. Heterogeneity test results showed heterogeneity among studies of screening decision aids (I^2 = 93%, $Chi^2 = 28.90$, $p < .00001$); the random effect model was used to combine the effects. The pooled RR for the informed choice was 2.58 (95%CI = 0.97, 6.82, $p = .06$) (Figure 8).

3.3.6 | Decision regret

Two studies (Garvelink et al., 2017; Parkinson et al., 2018) evaluated the effect of decision aids on decision regret about treatment. Heterogeneity test results showed homogeneity among the studies of therapeutic decision aids ($I^2 = 0\%$, $Chi^2 = 0.15$, $p = .70$). The fixed-effect model was used to combine the effects. The pooled MD for decision regret was −4.91 (95%CI=−11.19, 1.38, $p = .13$) (Figure 9).

3.3.7 | Sensitivity analysis

Sensitivity analysis revealed that the results of decision conflict, satisfaction, decision regret and knowledge were robust, but informed choice and anxiety were unstable (Figures 10-15).

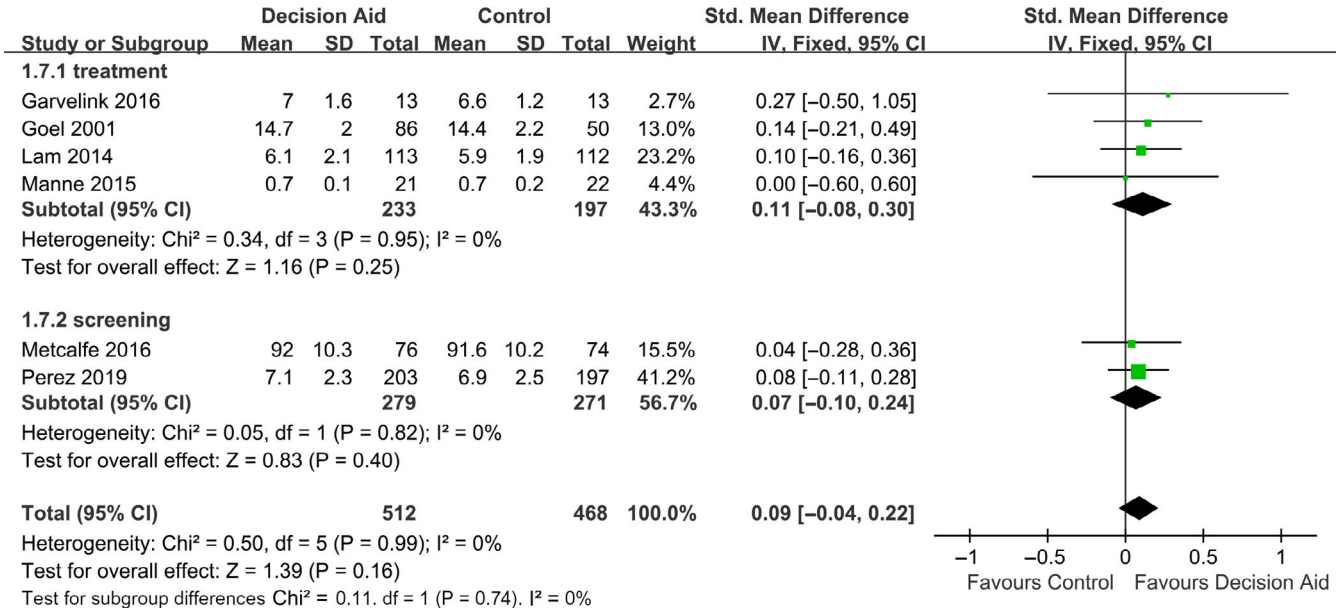

FIGURE 7 Forest plot of Knowledge between decision aid group and usual care group

3.3.8 | Publication bias

Judging from the funnel chart analysis (Figure 10), the asymmetrical distribution of decisional conflict studies on both sides of the funnel chart suggested there may be publication bias. However, Egger's regression analysis showed there was no statistical difference in publication bias (t =−0.25, 95% CI: −1.23, 0.98, $p > .81$) (Figures 16 and 17).

4 | DISCUSSION

In this systematic review and meta-analysis, we studied the effects of decision aids as experimental and conventional methods on breast cancer treatment, prevention and screening using 22 works from the international literature. Our results showed that decision aids can reduce conflicts in breast cancer treatment decisions and do not adversely affect informed choice, decision regret, anxiety, knowledge and satisfaction. The findings were characterized under the following headings:

4.1 | Significance of breast cancer decision-making aids to patients and medical staff

Consistent with previous researches, we found that while decision aids reduced decisional conflict in breast cancer treatment, (Herrmann et al., 2016; O'Brien et al., 2009; Trikalinos et al., 2014; Zdenkowski et al., 2016) they had no significant effect when used for breast screening. Saino et al. reported (Sainio et al., 2001) nearly 50% of cancer patients were dissatisfied with the information obtained for decision-making from health providers. Consequently, some patients experienced severe stress and anxiety because of limited access to or ambiguity about disease information. Information acquisition was integral to patients' participation in medical decision-making. The multifactorial complexity in decision-making on breast cancer treatment options was a result of the advancement in medical technology. However, information was especially important for females since breast cancer is a common malignancy diagnosis and an annually increasing incidence. Therefore, in the design of cancer decision-making aids, the communication strategy between patients and specialists is crucial for patients' full understanding and management of treatment plans, to reduce uncertainty, dispel doubts, anxiety and fear, improve self-efficacy and treatment confidence. Patients' trust in clinicians can be enhanced to improve their enthusiasm in shared decision-making and reduce decision-making conflicts. Decision aids are conducive for patients' mental preparation of the aetiology, process and possible complications of breast cancer treatment. A treatment plan determined by doctor–patient consultation can reduce decision conflicts and improve compliance. Patients' participation in decision-making is therefore a way to share the information process. Patients can feel respect and care, and their perceived value and trust from doctors can be enhanced, further reducing decisional conflicts to improve satisfaction and well-being.

Medical staff are obligated to provide high-quality information to patients, which is an important part of medical service. Their evaluation of patients' attitudes to participate in shared decision-making is crucial to improve access to accurate and equipoise health information for decision-making and enhance communication skills to support preferences for a particular outcome. Screening decision aids can help patients understand their benefits and provide guidance and education to enable patients to make the best choice based on their specific condition. Even if patients refused to accept routine screening (which is their right), this does not mean screening decision assistance tools are ineffective nor negate their supportive role in decision-making.

4.2 | The impact of decision aid on knowledge of breast cancer

Knowledge was a measure of successful information transmission. This study showed that decision aids had no significant impact on participants' decision-making knowledge, which was contrary to conclusions made by previous researchers. Zdenkowski et al. (2016) decision aids are a complex intervention, and their successful use is closely related to factors such as language, computer or literacy level, and socio-economic level. This study also explored the relationship between decision aids and patients' knowledge about breast cancer but was unable to draw a strong conclusion due to limited evidence. In general, decision aids provided information for the general public. Notwithstanding, patients seemed more concerned about personalized information, which may be a reason for poor adoption of decision aids.

4.3 | Forms of decision aids for breast cancer

Breast cancer decision-making assistance tools included a variety of print products, computer learning modules and web-based interventions, among which websites and brochures were the most common. Diverse forms of decision aids serve different target groups. In the information age, networks are widely used in study, work and recreational life, which improve possibilities for decision aid implementation. Still, decision-making assistance tools of different network carriers must adapt to a diverse population. For example, decision aids based on computer modalities required patients to have acquired an eighth grade or above reading level, so this method was more appropriate for educated patients. Then, while websites have a large capacity for various forms of information, some patients' success rates were limited by poor accessibility and retrievability. Accessibility to decision-making assistance from brochures was good, and if written in clear and simple language, it may be better suited to elderly patients. Interestingly, chart or picture decision-making assistance was the most popular. Decision boards were also immensely popular as information could be disseminated to patients, relatives and other personnel,

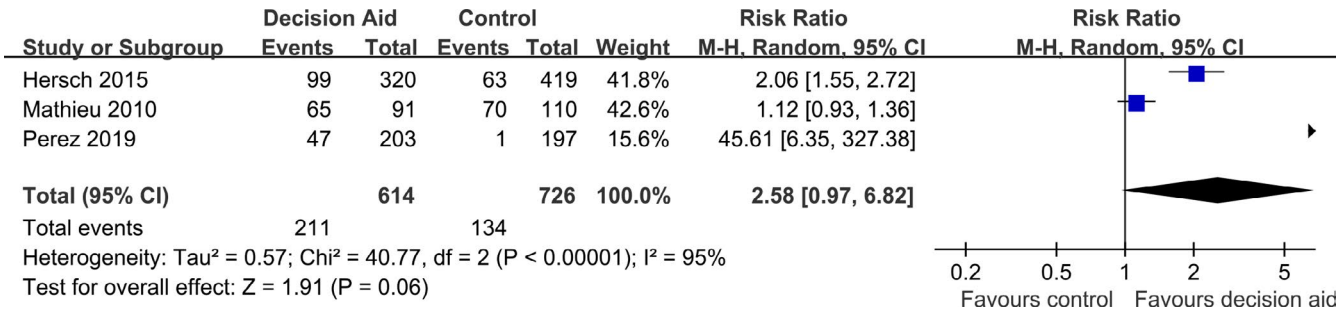

FIGURE 8 Forest plot of Informed choice between decision aid group and usual care group

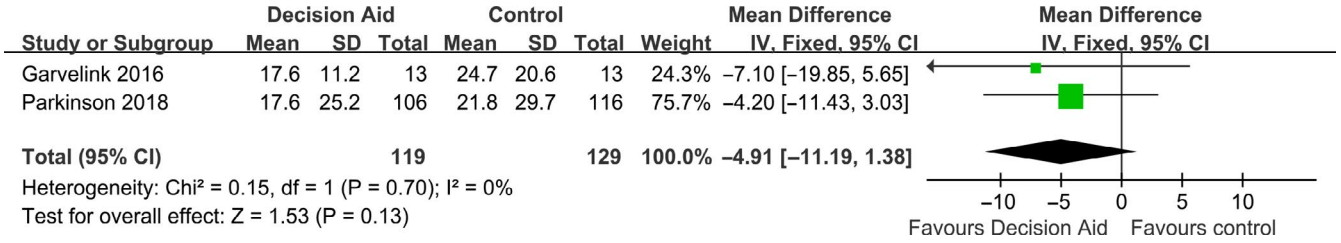

FIGURE 9 Forest plot of Decision regret between decision aid group and usual care group

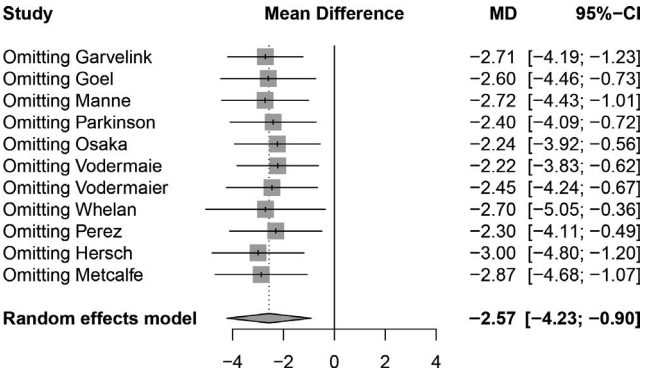

FIGURE 10 the sensitivity analysis of decision conflict between decision aid group and usual care group

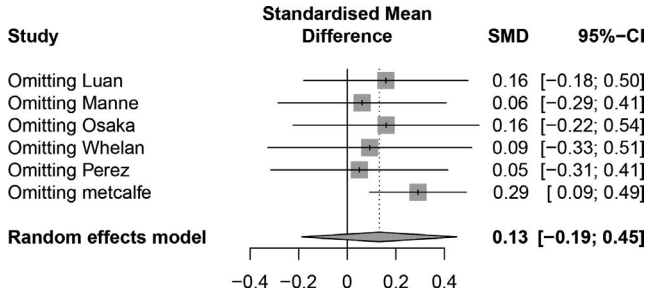

FIGURE 11 the sensitivity analysis of Anxiety between decision aid group and usual care group between decision aid group and usual care group

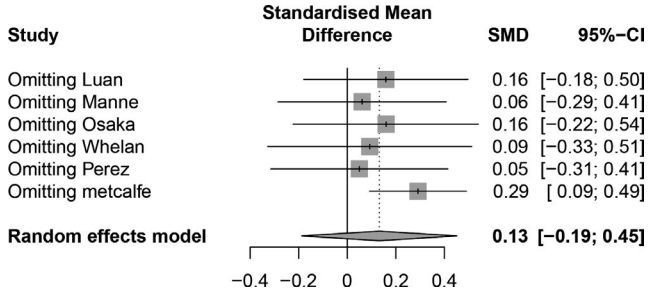

FIGURE 12 the sensitivity analysis of satisfaction between decision aid group and usual care group between decision aid group and usual care group

but it was less informative and impersonal. Generally, clinicians should guide patients to choose the best option from multitudes of decision aids.

Factors that affect the acceptability and accessibility of decision-making aids include language, culture and population. Therefore, these aspects must be considered when recommending decision aids developed in other countries. Whenever possible, decision aids must fit national conditions and customized based on international patient decision-making aids' measurement tools.

4.4 | The significance of decision aid for breast cancer in China

In China, doctors are pivotal to cancer treatment decision-making at most hospitals, (Jian guo, 2007; Lili, 2004) which means they often lead the entire process. Since patients must sign informed consent prior to treatment, this is often misunderstood as informed choice; so, while the two concepts are closely linked, their purposes are different. A Taiwanese study on Chinese breast cancer surgery patients concluded that decision aids could reduce decision-making conflicts.

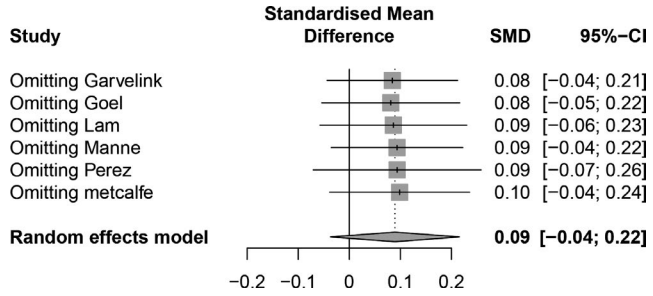

FIGURE 13 the sensitivity analysis of knowledge between decision aid group and usual care group between decision aid group and usual care group

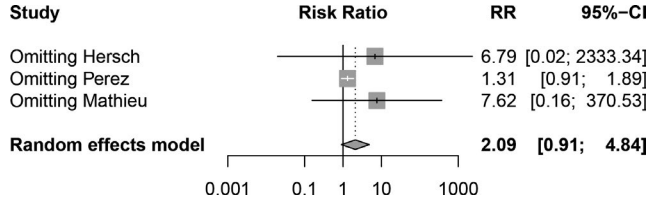

FIGURE 14 the sensitivity analysis of informed choice between decision aid group and usual care group between decision aid group and usual care group

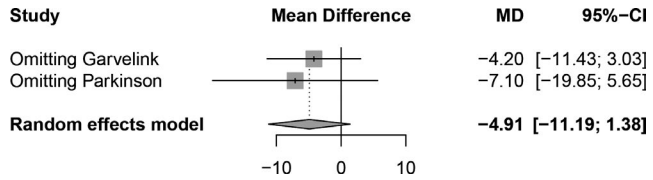

FIGURE 15 the sensitivity analysis of decision regret between decision aid group and usual care group between decision aid group and usual care group

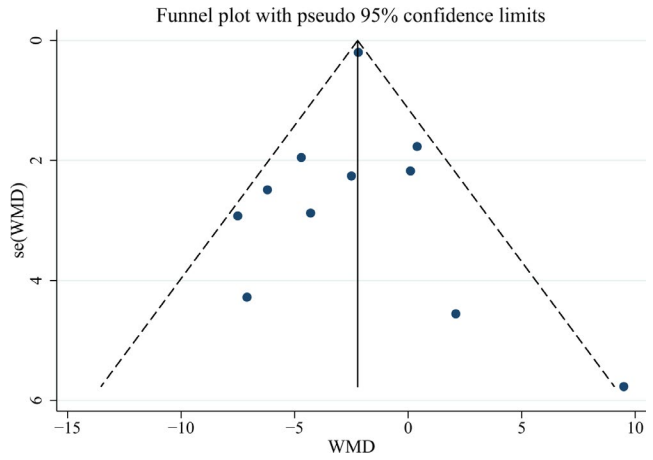

FIGURE 16 Funnel of Decision conflict

The difficulty of treatment and postoperative decision-making regrets showed that Decision aids can be incorporated as part of routine clinical services. However, in China, decision aids are underdeveloped as there is insufficient understanding or appreciation of their use. China has a large population, uneven educational levels, prolific medical staffing, tense doctor–patient relationships and the phenomenon of excessive medical treatment. (Rui et al., 2020; Zhang, 2020).

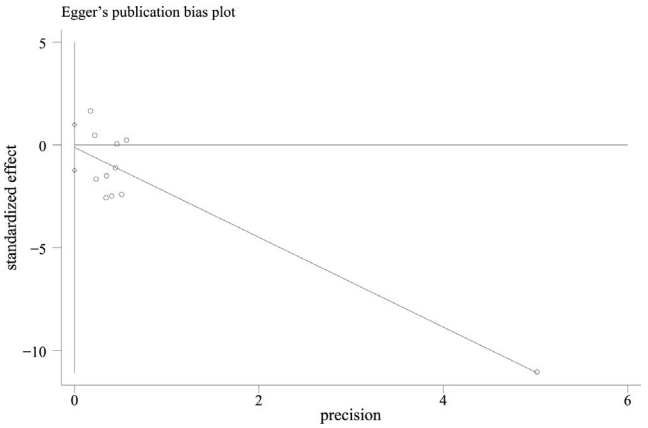

FIGURE 17 Egger's test of Decision conflict

Presently, conflict in the doctor–patient relationship is a pervasive problem, (JIA, 2020; Zhao, 2020) mainly because of the information imbalance which introduces tension into the relationship. (Rui et al., 2020) However if patients participated in shared decision-making, both groups can enjoy a more conducive relationship and agree on a health regimen based on mutual trust. Patients can learn how to manage medical costs to achieve better treatment results. In this way, when patients require excessive medical treatment, doctors can alleviate their fear through augmented communication. Conversely, patients can also manage their doctors and explicitly refuse excessive medical schemes. This is a constructive approach to enable both doctors and patients to select economical breast cancer diagnosis and treatment programs and improve the efficiency of health resources.

It is, therefore, necessary to develop customized Chinese decision aids and facilitate their use by medical staff and patients, to help patients obtain more information, actively participate in decision-making, reduce decisional conflicts and alleviate doctor–patient tension. This would guarantee the improvement in the rate of use of health resources.

4.5 | Limitations

The research had some limitations. First, although many RCTs were included, the quality of monitoring and reporting among them varied. Second, we selected only a few works to corroborate the effect of decision-making support tools but did not consider health outcomes as symptoms. We also neglected to explore whether screening decision aids led to excessive screening, but this may be a subject for future research. Finally, potential bias was possible since the measurement times and tools of outcome indicators were different. So, for future works, it may be necessary to target higher-quality studies and include more indicators to evaluate Decision aids.

5 | CONCLUSION

Decision aids have demonstrated an ability to reduce conflicts in breast cancer treatment in standard nursing and other aspects of clinical care. For countries such as China, which is currently burdened with a high medical staff load, tense doctor–patient relationships and excessive medical treatments, encouraging shared decision-making will enable patients to fully understand their diseases/conditions and treatment plans. This will improve patients' self-efficacy, treatment confidence, trust in medical staff and reduce decisional conflicts. Therefore, clinicians in China should be encouraged to study the benefits of personalized decision-making assistance tools and implement them in line with national conditions.

RCT REGISTRATION DETAILS

ID Number: CRD42020173028.

Web address: https://www.crd.york.ac.uk/prospero/#myprospero

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CONFLICT OF INTEREST

The author reports no conflicts of interest in this work.

DISCLAMIERS

The author's statement that the views expressed in the submitted article are her own and not an official position of the institution or funder.

AUTHORS' CONTRIBUTIONS

Jin-ping Gao, Ying-hui Jin and Shi-fan Han wrote the manuscript paper. Ying-hui Jin, Shi-fan Han and Jin-ping Gao designed the study. Jin-ping Gao, Ying-hui Jin, Shao-fu Yu, Wang-feng Wu and Shi-fan Han collected data and performed some analysis. All authors read and approved the final manuscript.

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