Année 2018 N°

Thèse

Pour le

DOCTORAT EN MÉDECINE

(DES de MÉDECINE GÉNÉRALE)

Diplôme d'État
Par

Maïna THABAUD

Née le 04/07/1986 à Belfort (90)

Decision aids for women eligible to mammography breast cancer screening : a systematic review update and an evaluation according to the international standards

Présentée et soutenue publiquement le **8 novembre 2018** devant un jury composé de :

Président du Jury :

Professeur Gilles BODY, Gynécologie et obstétrique, Faculté de Médecine -Tours

Membres du Jury :

Professeur Claude LINASSIER, Cancérologie, Radiothérapie, Faculté de Médecine – Tours

Professeur Vincent CAMUS, Psychiatrie d'adultes, Faculté de Médecine – Tours

Docteur Cédric RAT, Médecine Générale, MCU, Faculté de Médecine – Nantes

Directrice de thèse :

Docteur Sandrine HILD, Médecine Générale, CCU, Faculté de Médecine – Nantes

Année 2018 N°

Thèse

Pour le

DOCTORAT EN MÉDECINE

(DES de MÉDECINE GÉNÉRALE)

Diplôme d'État
Par

Maïna THABAUD

Née le 04/07/1986 à Belfort (90)

Decision aids for women eligible to mammography breast cancer screening : a systematic review update and an evaluation according to the international standards

Présentée et soutenue publiquement le **8 novembre 2018** devant un jury composé de :

Président du Jury :

Professeur Gilles BODY, Gynécologie et obstétrique, Faculté de Médecine -Tours

Membres du Jury :

Professeur Claude LINASSIER, Cancérologie, Radiothérapie, Faculté de Médecine – Tours

Professeur Vincent CAMUS, Psychiatrie d'adultes, Faculté de Médecine – Tours

Docteur Cédric RAT, Médecine Générale, MCU, Faculté de Médecine – Nantes

Directrice de thèse :

Docteur Sandrine HILD, Médecine Générale, CCU, Faculté de Médecine – Nantes

Titre

Les outils d'aide à la décision pour les femmes éligibles au dépistage du cancer du sein par mammographie : une actualisation d'une revue systématique de la littérature et une évaluation selon les critères internationaux standards.

Résumé

Introduction : Le cancer du sein est le cancer le plus fréquent et également la première cause de mortalité chez les femmes dans le monde. Le développement des thérapeutiques et la détection précoce sont à l'origine d'une diminution de la mortalité spécifique. Cependant, le risque de faux positifs est élevé et entraîne des sur-diagnostics. Le bénéfice à l'échelle individuelle est différent du bénéfice à l'échelle globale. L'information des femmes pour une décision médicale partagée, tenant compte de leurs valeurs, peut être réalisée au moyen d'outils d'aide à la décision. Les objectifs de ce travail sont de compléter le répertoire des outils existants et d'en évaluer la qualité dans le cadre du dépistage du cancer du sein par mammographie.

Méthode : Nous avons actualisé et complété une revue de la littérature déjà existante issue de Pubmed. Les titres, puis les résumés, puis les textes entiers ont été examinés indépendamment par deux lecteurs. La qualité des outils d'aide a été évaluée selon les critères IPDAS (International Patient Decision Aid Standards instrument), en double aveugle également.

Résultats : Nous avons étudié quatre outils d'aide à la décision. Ils ont une évaluation au-dessus de 75/100 et sont donc intéressants. Les seules dimensions qui nécessitaient une amélioration étaient l'apport de précision sur le développement du processus d'élaboration de l'outil et d'évaluation de celui-ci.

Conclusion : L'actualisation de cette revue met en évidence l'existence d'outils de qualité à destination des femmes à risque moyen pour permettre un choix éclairé et partagé dans la réalisation du dépistage par mammographie.

Mots clés

Cancer du sein, Dépistage, Mammographie, Outils d'aide, Décision partagée, Dépistage précoce du cancer, Communication en santé, Soins primaires.

Title

Decision aids for women eligible to mammography breast cancer screening: a systematic review update and an evaluation according to the international standards

Abstract

Introduction: Breast cancer is the most common cancer and also the leading cause of death among women worldwide. The development of therapeutics and the early detection are the origin of a decrease of the specific mortality. However, the risk of false positives is high and leads to overdiagnosis. The benefits at the individual level are different from the profit at the global level. Decision support tools can be used to women's information for a shared medical decision, based on their values. The objectives of this work are to complete the inventory of existing tools and to evaluate their quality in mammography breast cancer screening.

Method: We updated and completed a review of the existing literature from Pubmed. Titles, then abstracts, then full texts were examined independently by two readers. The quality of the support tools was evaluated according to the International Patient Decision Aid Standards Instrument (IPDAS) criteria in double-blind.

Result: We studied four decision support tools. They obtain a score above 75/100 and are therefore interesting. The only dimensions that require improvement are precision regarding development and evaluation process.

Conclusion: The update of this review highlights the existence of quality tools for medium-risk women to enable informed and shared choice in mammography screening.

Keywords

Breast cancer, Screening, Mammography, Decision aid, Shared Decision Making, Cancer early detection, Decision Tool, Healthcare communication, Primary care.

UNIVERSITE DE TOURS
FACULTE DE MEDECINE DE TOURS

DOYEN
Pr Patrice DIOT

VICE-DOYEN
Pr Henri MARRET

ASSESSEURS
Pr Denis ANGOULVANT, *Pédagogie*
Pr Mathias BUCHLER, *Relations internationales*
Pr Hubert LARDY, *Moyens – relations avec l'Université*
Pr Anne-Marie LEHR-DRYLEWICZ, *Médecine générale*
Pr François MAILLOT, *Formation Médicale Continue*
Pr Patrick VOURC'H, *Recherche*

RESPONSABLE ADMINISTRATIVE
Mme Fanny BOBLETER

****

DOYENS HONORAIRES
Pr Emile ARON (†) – *1962-1966*
Directeur de l'Ecole de Médecine - 1947-1962
Pr Georges DESBUQUOIS (†) - *1966-1972*
Pr André GOUAZE - *1972-1994*
Pr Jean-Claude ROLLAND – *1994-2004*
Pr Dominique PERROTIN – *2004-2014*

PROFESSEURS EMERITES
Pr Daniel ALISON
Pr Philippe ARBEILLE
Pr Catherine BARTHELEMY
Pr Christian BONNARD
Pr Philippe BOUGNOUX
Pr Alain CHANTEPIE
Pr Pierre COSNAY
Pr Etienne DANQUECHIN-DORVAL
Pr Loïc DE LA LANDE DE CALAN
Pr Alain GOUDEAU
Pr Noël HUTEN
Pr Olivier LE FLOCH
Pr Yvon LEBRANCHU
Pr Elisabeth LECA
Pr Anne-Marie LEHR-DRYLEWICZ
Pr Gérard LORETTE
Pr Roland QUENTIN
Pr Alain ROBIER
Pr Elie SALIBA

PROFESSEURS HONORAIRES
P. ANTHONIOZ – A. AUDURIER – A. AUTRET – P. BAGROS – P.BARDOS – J.L. BAULIEU – C. BERGER – JC. BESNARD – P. BEUTTER – P. BONNET – M. BROCHIER – P. BURDIN – L. CASTELLANI – B. CHARBONNIER – P. CHOUTET – T. CONSTANS – C. COUET - J.P. FAUCHIER – F. FETISSOF – J. FUSCIARDI – P. GAILLARD – G. GINIES – A. GOUAZE – J.L. GUILMOT – M. JAN – J.P. LAMAGNERE – F. LAMISSE – Y. LANSON – J. LAUGIER – P. LECOMTE – E. LEMARIE – G. LEROY – Y. LHUINTRE – M. MARCHAND – C. MAURAGE – C. MERCIER – J. MOLINE – C. MORAINE – J.P. MUH – J. MURAT – H. NIVET – L. POURCELOT – P. RAYNAUD – D. RICHARD-LENOBLE – J.C. ROLLAND – D. ROYERE - A. SAINDELLE – J.J. SANTINI – D. SAUVAGE – D. SIRINELLI – B. TOUMIEUX – J. WEILL

PROFESSEURS DES UNIVERSITES - PRATICIENS HOSPITALIERS

ANDRES Christian.....Biochimie et biologie moléculaire
ANGOULVANT Denis .....Cardiologie
AUPART Michel.....Chirurgie thoracique et cardiovasculaire
BABUTY Dominique .....Cardiologie
BALLON Nicolas.....Psychiatrie ; addictologie
BARILLOT Isabelle.....Cancérologie ; radiothérapie
BARON Christophe .....Immunologie
BEJAN-ANGOULVANT Théodora .....Pharmacologie clinique
BERNARD Anne .....Cardiologie
BERNARD Louis .....Maladies infectieuses et maladies tropicales
BLANCHARD-LAUMONNIER Emmanuelle ....Biologie cellulaire
BLASCO Hélène.....Biochimie et biologie moléculaire
BODY Gilles .....Gynécologie et obstétrique
BONNET-BRILHAULT Frédérique .....Physiologie
BRILHAULT Jean.....Chirurgie orthopédique et traumatologique
BRUNEREAU Laurent .....Radiologie et imagerie médicale
BRUYERE Franck.....Urologie
BUCHLER Matthias.....Néphrologie
CALAIS Gilles.....Cancérologie, radiothérapie
CAMUS Vincent.....Psychiatrie d'adultes
CHANDENIER Jacques.....Parasitologie, mycologie
COLOMBAT Philippe.....Hématologie, transfusion
CORCIA Philippe.....Neurologie
COTTIER Jean-Philippe .....Radiologie et imagerie médicale
DE TOFFOL Bertrand .....Neurologie
DEQUIN Pierre-François.....Thérapeutique
DESOUBEAUX Guillaume.....Parasitologie et mycologie
DESTRIEUX Christophe .....Anatomie
DIOT Patrice.....Pneumologie
DU BOUEXIC de PINIEUX Gonzague .....Anatomie & cytologie pathologiques
DUCLUZEAU Pierre-Henri .....Endocrinologie, diabétologie, et nutrition
DUMONT Pascal .....Chirurgie thoracique et cardiovasculaire
EL HAGE Wissam.....Psychiatrie adultes
EHRMANN Stephan .....Réanimation
FAUCHIER Laurent .....Cardiologie
FAVARD Luc.....Chirurgie orthopédique et traumatologique
FOUGERE Bertrand .....Gériatrie
FOUQUET Bernard.....Médecine physique et de réadaptation
FRANCOIS Patrick.....Neurochirurgie
FROMONT-HANKARD Gaëlle .....Anatomie & cytologie pathologiques
GAUDY-GRAFFIN Catherine.....Bactériologie-virologie, hygiène hospitalière
GOGA Dominique.....Chirurgie maxillo-faciale et stomatologie
GOUPILLE Philippe .....Rhumatologie
GRUEL Yves.....Hématologie, transfusion
GUERIF Fabrice .....Biologie et médecine du développement et de la reproduction
GUYETANT Serge .....Anatomie et cytologie pathologiques
GYAN Emmanuel.....Hématologie, transfusion
HAILLOT Olivier.....Urologie
HALIMI Jean-Michel.....Thérapeutique
HANKARD Régis.....Pédiatrie
HERAULT Olivier .....Hématologie, transfusion
HERBRETEAU Denis .....Radiologie et imagerie médicale
HOURIOUX Christophe.....Biologie cellulaire
LABARTHE François .....Pédiatrie
LAFFON Marc .....Anesthésiologie et réanimation chirurgicale, médecine d'urgence
LARDY Hubert.....Chirurgie infantile
LARIBI Saïd.....Médecine d'urgence
LARTIGUE Marie-Frédérique.....Bactériologie-virologie
LAURE Boris.....Chirurgie maxillo-faciale et stomatologie
LECOMTE Thierry.....Gastroentérologie, hépatologie
LESCANNE Emmanuel.....Oto-rhino-laryngologie
LINASSIER Claude .....Cancérologie, radiothérapie
MACHET Laurent .....Dermato-vénéréologie
MAILLOT François .....Médecine interne
MARCHAND-ADAM Sylvain .....Pneumologie

MARRET Henri .....Gynécologie-obstétrique
MARUANI Annabel .....Dermatologie-vénéréologie
MEREGHETTI Laurent .....Bactériologie-virologie ; hygiène hospitalière
MORINIERE Sylvain.....Oto-rhino-laryngologie
MOUSSATA Driffa .....Gastro-entérologie
MULLEMAN Denis.....Rhumatologie
ODENT Thierry.....Chirurgie infantile
OUAISSI Mehdi .....Chirurgie digestive
OULDAMER Lobna.....Gynécologie-obstétrique
PAGES Jean-Christophe .....Biochimie et biologie moléculaire
PAINTAUD Gilles .....Pharmacologie fondamentale, pharmacologie clinique
PATAT Frédéric .....Biophysique et médecine nucléaire
PERROTIN Dominique.....Réanimation médicale, médecine d'urgence
PERROTIN Franck .....Gynécologie-obstétrique
PISELLA Pierre-Jean.....Ophtalmologie
PLANTIER Laurent.....Physiologie
REMERAND Francis.....Anesthésiologie et réanimation, médecine d'urgence
ROINGEARD Philippe.....Biologie cellulaire
ROSSET Philippe.....Chirurgie orthopédique et traumatologique
RUSCH Emmanuel.....Epidémiologie, économie de la santé et prévention
SAINT-MARTIN Pauline.....Médecine légale et droit de la santé
SALAME Ephrem.....Chirurgie digestive
SAMIMI Mahtab .....Dermatologie-vénéréologie
SANTIAGO-RIBEIRO Maria .....Biophysique et médecine nucléaire
THOMAS-CASTELNAU Pierre .....Pédiatrie
TOUTAIN Annick.....Génétique
VAILLANT Loïc.....Dermato-vénéréologie
VELUT Stéphane.....Anatomie
VOURC'H Patrick.....Biochimie et biologie moléculaire
WATIER Hervé .....Immunologie

PROFESSEUR DES UNIVERSITES DE MEDECINE GENERALE

LEBEAU Jean-Pierre

PROFESSEURS ASSOCIES

MALLET Donatien.....Soins palliatifs
POTIER Alain.....Médecine Générale
ROBERT Jean.....Médecine Générale

MAITRES DE CONFERENCES DES UNIVERSITES - PRATICIENS HOSPITALIERS

BAKHOS David.....Physiologie
BARBIER Louise.....Chirurgie digestive
BERHOUET Julien .....Chirurgie orthopédique et traumatologique
BERTRAND Philippe.....Biostat., informatique médical et technologies de communication
BRUNAULT Paul .....Psychiatrie d'adultes, addictologie
CAILLE Agnès .....Biostat., informatique médical et technologies de communication
CLEMENTY Nicolas.....Cardiologie
DOMELIER Anne-Sophie .....Bactériologie-virologie, hygiène hospitalière
DUFOUR Diane .....Biophysique et médecine nucléaire
FAVRAIS Géraldine .....Pédiatrie
FOUQUET-BERGEMER Anne-Marie.....Anatomie et cytologie pathologiques
GATAULT Philippe.....Néphrologie
GOUILLEUX Valérie.....Immunologie
GUILLON Antoine.....Réanimation
GUILLON-GRAMMATICO Leslie.....Epidémiologie, économie de la santé et prévention
HOARAU Cyrille .....Immunologie
IVANES Fabrice .....Physiologie
LE GUELLEC Chantal.....Pharmacologie fondamentale, pharmacologie clinique
MACHET Marie-Christine .....Anatomie et cytologie pathologiques
MOREL Baptiste.....Radiologie pédiatrique
PIVER Éric.....Biochimie et biologie moléculaire

REROLLE Camille.....Médecine légale
ROUMY Jérôme.....Biophysique et médecine nucléaire
SAUTENET Bénédicte.....Néphrologie
TERNANT David.....Pharmacologie fondamentale, pharmacologie clinique
ZEMMOURA Ilyess.....Neurochirurgie

MAITRES DE CONFERENCES DES UNIVERSITES

AGUILLON-HERNANDEZ Nadia.....Neurosciences
BOREL Stéphanie.....Orthophonie
DIBAO-DINA Clarisse.....Médecine Générale
MONJAUZE Cécile.....Sciences du langage - orthophonie
PATIENT Romuald.....Biologie cellulaire
RENOUX-JACQUET Cécile.....Médecine Générale

MAITRES DE CONFERENCES ASSOCIES

RUIZ Christophe.....Médecine Générale
SAMKO Boris.....Médecine Générale

CHERCHEURS INSERM - CNRS - INRA

BOUAKAZ Ayache.....Directeur de Recherche INSERM – UMR INSERM 1253
CHALON Sylvie.....Directeur de Recherche INSERM – UMR INSERM 1253
COURTY Yves.....Chargé de Recherche CNRS – UMR INSERM 1100
DE ROCQUIGNY Hugues.....Chargé de Recherche INSERM – UMR INSERM 1259
ESCOFFRE Jean-Michel.....Chargé de Recherche INSERM – UMR INSERM 1253
GILOT Philippe.....Chargé de Recherche INRA – UMR INRA 1282
GOUILLEUX Fabrice.....Directeur de Recherche CNRS – UMR CNRS 7001
GOMOT Marie.....Chargée de Recherche INSERM – UMR INSERM 1253
HEUZE-VOURCH Nathalie.....Chargée de Recherche INSERM – UMR INSERM 1100
KORKMAZ Brice.....Chargé de Recherche INSERM – UMR INSERM 1100
LAUMONNIER Frédéric.....Chargé de Recherche INSERM - UMR INSERM 1253
LE PAPE Alain.....Directeur de Recherche CNRS – UMR INSERM 1100
MAZURIER Frédéric.....Directeur de Recherche INSERM – UMR CNRS 7001
MEUNIER Jean-Christophe.....Chargé de Recherche INSERM – UMR INSERM 1259
PAGET Christophe.....Chargé de Recherche INSERM – UMR INSERM 1100
RAOUL William.....Chargé de Recherche INSERM – UMR CNRS 7001
SI TAHAR Mustapha.....Directeur de Recherche INSERM – UMR INSERM 1100
WARDAK Claire.....Chargée de Recherche INSERM – UMR INSERM 1253

CHARGES D'ENSEIGNEMENT

Pour l'Ecole d'Orthophonie
DELORE Claire.....Orthophoniste
GOUIN Jean-Marie.....Praticien Hospitalier
PERRIER Danièle.....Orthophoniste

Pour l'Ecole d'Orthoptie
LALA Emmanuelle.....Praticien Hospitalier
MAJZOUB Samuel.....Praticien Hospitalier

Pour l'Ethique Médicale
BIRMELE Béatrice.....Praticien Hospitalier

Remerciements

A Monsieur le **Professeur Gilles Body**,

Vous me faites l'honneur de présider ce jury de thèse et de juger mon travail. Veuillez y trouver l'expression de toute ma reconnaissance.

A Monsieur le **Professeur Claude Linassier**,

Vous me faites l’honneur d’apporter votre expérience et votre jugement en siégeant dans mon jury de thèse. Je vous prie de bien vouloir accepter ma respectueuse considération.

A Monsieur le **Professeur Vincent Camus**,

Je vous prie de recevoir mes sincères remerciements pour avoir accepté de juger mon travail. Veuillez croire en l’expression de ma respectueuse considération.

A ma Directrice de thèse, Madame le **Docteur Sandrine Hild**,

Vous avez accepté de me soutenir et de m’accompagner tout au long de ce travail. Je vous remercie pour votre gentillesse, votre patience et vos conseils. Cela a été un plaisir de travailler avec vous. Recevez ma sincère gratitude.

A Madame le **Docteur Flore Laforest**,

Sans qui ce travail n'existerait pas. Tu auras été un binôme d'une grande valeur et d'une grande richesse. Merci pour ta disponibilité et ta participation. Je te souhaite réussite et bonheur pour la suite.

A Monsieur le **Docteur Cédric Rat**,

Vous avez m'avez confié ce sujet, veuillez recevoir l'expression de mes sincères remerciements.

Aux équipes de la **bibliothèque de Nantes et Paris-Descartes**,

Notamment Monsieur Alexandre Boutet de Paris-Descartes, pour votre aide dans le recueil des articles.

A Monsieur le **Professeur Jean-Pierre Lebeau**,

Pour m'avoir mis en contact avec l'équipe du DUMG de Nantes et me permettre d'effectuer ce travail.

A Monsieur le **Professeur Potier**, mon tuteur et toute l'équipe du **DUMG de Tours**

Pour m'avoir soutenue tout au long de mon parcours en Médecine Générale.

A Monsieur le **Professeur Lardy**,

Pour votre partage de connaissance, de la passion qui vous anime et de votre professionnalisme. Merci pour votre soutien tout au long de mon parcours. Merci à votre équipe.

A Madame le **Docteur Pondaven**, à **l'équipe d'ORL de l'Hôpital Clocheville** et également à **l'équipe d'ORL de l'hôpital de Bourges**, merci pour ces semestres enrichissants et qui me servent au quotidien.

Aux médecins généralistes passionnés qui m'ont transmis l'envie, qui m'ont montré et démontré combien la médecine générale était une discipline noble, passionnante et de proximité.

Je pense aux **Dr Bruno Donce, Dr Stéphanie Jousset, Dr Yannik Legeay, Dr Antoine Nicolas, Dr Samuel Bordeaux**. Et à tous ceux que j'ai oubliés, j'espère qu'ils ne m'en tiendront pas rigueur...

A ma famille,

À Jérémy, pour ton aide et ton amour inconditionnel. Merci, mon amour à l'infini !

À Augustin, pour ton amour si pur, le courage que tu me donnes. Tu ne te laisses jamais abattre et tu dévores la vie avec joie et bonheur !

À mes parents et ma belle-famille, qui m'entourent et me soutiennent.

A mes amis,

Pour votre présence et votre soutien, ce qui fait de vous de vrais amis (vous vous reconnaitrez, vous êtes dans mon cœur).

Table of contents

INTRODUCTION

1. Epidemiology of breast cancer

With an estimated 1.67 million new cancer cases diagnosed in 2012 (25% of all cancers), breast cancer is the second most common cancer in the world and by far the most frequent cancer among women. Incidence rates vary nearly fourfold across the world regions with rates ranging from 27 per 100 000 in Middle Africa and Eastern Asia to 96 per 100 000 in Western Europe. Breast cancer incidence in developed countries is higher, while relative mortality is greatest in less developed countries. Education of women is suggested in all countries for early detection and treatment.

Breast cancer is the first cause of women's mortality. Near 522 000 women died of breast cancer every year in the world (1), including 12 000 in France. Early detected, nine out of ten breast cancers would be treated successfully (2). Specific mortality related to breast cancer has decreased by 1.5% per year from 2005 to 2012 in the world (3). Therapeutic progress has contributed to this diminution. Another reason might be the development of early diagnosis and screening.

2. Mammography screening program

Gøtzsche and colleagues published a systematic Cochrane review of 2011 reporting that breast cancer screening based on mammography would lead to a reduction of specific mortality of 15% (4). In another systematic review of 2015, Myers and al. estimated this reduction of breast cancer mortality around 20% (5).

On one hand, there is no doubt that mammography screening decreases specific mortality (6). In accordance, many countries have implemented organized screening programs that vary regarding both age range and screening interval.

On the other hand, recent guidelines from USA, Europe, and Canada set out large variations between interpretations of the evidence around advantages and

disadvantages of mammography screening and adopt a cautious approach of breast cancer screening (7).

The most important harms associated with early detection of breast cancer by mammographic screening are false positive results with short-term negative psychological consequences for some women, overdiagnosis and overtreatment and possibly radiation-induced cancer. Estimation of cumulative risk of false positive for organized programs are around 20% for a woman who had 10 screens between the ages of 50 and 70 years (8). The Euroscreen Working Group calculated a summary estimate of overdiagnosis of 6.5% (8) versus 30% for Cochrane review (4). The estimated cumulative risk of death from breast cancer due to radiation from mammographic screening is 1 to 10 per 100 000 women, depending on age, frequency and duration of screening (8).

In 2016 Caverly and colleagues reported that 69% of the US cancer prevention and screening guidelines did not quantify benefits and harms or presented them in an asymmetric manner (9). The American Cancer Society has highlighted the confusion created by screening guidelines and proposes providing the public with clear guidance about the benefits, limitations and harms associated with taking a screening test (10).

3. Informed decision and shared decision making

“Informed decision-making” and “shared decision making” describe a process that enables a patient to participate in decisions about their health preferences (12).

Shared decision-making relates specifically to patient-clinician consultations where both parties collaborate by expressing preference and participating to decision (11).

Charles and al. conceptualized shared decision-making between a paternalistic and an informed decision-making model. This conceptualization highlights the importance of three components to the decision-making process: information exchange, deliberation, negotiation about and agreement to implement a treatment or screening decision (12, 13). But many health decisions are made outside of a clinical context and without any dialogue with a practitioner. It is the case for breast cancer: women

could accept or not a screening offer. Informed decision is the most appropriate term (11).

Stacey and al. explained that decision aids are tools designed to support people's decisions about tests and treatments when there is more than one reasonable option, and/or when people value benefits and harms differently. They reported that compared to usual care, people exposed to decision aids feel more knowledgeable, better informed, clearer about their values and they probably have a more active role in decision making and more accurate risk perceptions (14).

Reder and colleagues expressed that a decision aid can be widely used to support women in decision making. Decision aid also significantly increased women's knowledge about screening and decreased decisional conflict (15).

A remaining challenge is to determine the content of a decision aid and to assess the quality of such a document.

4. Creation of a decision aid

In France, there is no official decision aid for women about mammography screening. In 2017, the "Ministère de la Santé" presented an action plan to respond to the "Plan Cancer". It planned to invite all women aged from 50 years and older to a medical consultation with their general practitioner or gynaecologist. A leaflet would be attached to an invitation letter, in order to prepare this consultation and inform women about breast cancer screening. A web resource for personalized information would also be available to allow shared decision-making (2).

In order to create these tools, INCA (Institut National du CAncer) launched a call for projects in April 2017 (2). Nantes General Department of Medicine has responded to this call for projects and take part in it.

5. Objectives

Marion Johanet and Anna Valenza conducted a Pubmed review of decisions aids and evaluated their quality (16). Pubmed is one of the main medicine database, but not the only one source of information for an extended international review.

The aim of our study is to complete a review of decision aids according to the “International Patient Decision Aid Standards instrument v3” (IPDASi). IPDASi is an internationally recognized scoring system of decision aid quality, developed in 2009 (17). We actualised, completed and validated the review with other databases, following the same methods.

METHODS

1. Studies identification and selection

1.1 Pubmed actualisation

We conducted a systematic research to complete the first study made by Marion Johanet and Anna Valenza. Their Pubmed review went from January 1st, 1997 to April 20, 2017. We made an actualization up to June 20, 2018. The total period goes from January 1st, 1997 to June 20, 2018.

1.2 Other database analysis

We used international databases to incorporate studies about breast cancer and decision aids. Selected databases are Embase, Psychinfo, Cochrane, and “Banque de Données en Santé Publique” (BDSP).

References of identified articles were searched for additional relevant articles.

1. Analysis methodology

1.1 Algorithms

PUBMED

The algorithm used for Pubmed was similar to the algorithm previously made by Marion Johanet and Anna Valenza.

decision support techniques OR decision making OR decision aid OR decision tool OR computer assisted decision making OR risk assessment OR health communication OR patient participation OR decisions trees OR health knowledge, attitudes, practice OR choice behavior	AND	breast neoplasm OR breast cancer	AND	mass screening OR cancer early detection OR cancer screening

EMBASE

We adapted algorithm for Embase in order to keep similar analysis.

'decision making' OR 'decision aid' OR 'decision support system' OR 'risk assessment' OR 'medical information' OR 'patient participation' OR 'decision tree' OR 'attitude to health' OR 'decision tool'	AND	'breast tumor' OR 'breast cancer'	AND	'mass screening' OR 'early cancer diagnosis' OR 'cancer screening'

PSYCHINFO

We also adapted algorithm for Psychinfo in order to keep similar analysis.

Decision making OR Decision support System	AND	Breast neoplasm	AND	Cancer screening

COCHRANE

We adapted algorithm for Cochrane in order to keep similar analysis.

Decision making OR Decision aid	AND	Breast cancer OR Breast neoplasm	AND	Mass screening OR Cancer screening

BANQUE DE DONNÉES EN SANTÉ PUBLIQUE (BDSP)

We searched in BDSP all occurrences with these keywords:

Cancer du sein	ET	Dépistage	ET	Aide à décision

BDSP is a french database. Used keywords are equivalent to:

Breast cancer	AND	Screening	AND	Decision Aid

1.2 Process analysis

For process analysis, we used same methods as Marion Johanet and Anna Valenza. Searching results were exported in ABSTRACKR®, a data processing software.

The successive steps for analysis were:

- Analysis based on title,
- Analysis based on abstract,
- Full text analysis.

The work was made by two reviewers, Maïna Thabaud (General practitioner substitute) and Flore Laforest (General practitioner and honorary research associate at Cardiff university), who made selection independently.

Conflicts between reviewers were resolved by consensus. If the disagreement persisted, the third reviewer (Sandrine Hild, PhD supervisor and Clinic leader at the Department of General Medicine of Nantes) resolved it.

Thanks to algorithms, we included any type of study that contained a decision aid for mammography breast cancer screening in average risk women.

The 17 criteria of exclusion were as follows:

1) The paper was published before 1997;
2) The paper is centred on breast cancer screening in high risk or symptomatic patients;
3) The paper is about breast cancer treatment;
4) The paper reports guidelines;
5) The paper discuss the efficiency, the implementation, the cost related to mass screening or the screening participation rate;
6) The paper deals with breast cancer prevention without mentioning mammography screening;
7) The paper mentioned an educational intervention for which there is no material information available (oral information, video, interview, ...) ;
8) The paper mentions an educational intervention aiming to promote breast cancer screening but does not provide a complete information regarding the harms of it ;
9) The information provided by the paper is only addressed to health professionals about the screening controversy;
10) The paper gathers insights, practices, knowledge or training of health professionals on the matter of communication on breast cancer screening;

11) The paper emphasizes on the importance of shared decision making, decision aids and health communication without implementing or using a decision aid;

12) The paper either mention or evaluate a risk score, factors leading to breast cancer and their potential impact on screening participation rates;

13) The paper evaluates women's knowledge or means of information used by women regarding breast cancer screening ;

14) The paper reports the informational need of women and their willingness to share decision making ;

15) Observational and descriptive studies reviewing psychological characters' of patients and other factors associated with screening ;

16) The paper mention decision aids or information about breast cancer that have not been evaluated or justified in a study or a paper;

17) The paper contained a decision aid already studied by Marion Johanet and Anna Valenza in their Pubmed review.

2. Data extraction and synthesis

2.1 Rating score

After reading full articles, decision aids were extracted from the paper if available. Authors were contacted to obtain decision aids which were not reported in selected articles.

Decision aids were evaluated by Maïna Thabaud and Flore Laforest, using the International Patient Decision Aids Standards instrument (IPDASi) (17). It was particularly adapted for screening test with 47 items in 10 dimensions (Appendix 1).

Each item was scored on a 4-point rating scale with possible responses as follows:

- strongly agree=score 4 (the issue is addressed clearly and comprehensively);
- agree=score 3 (the issue is addressed but with room for improvement);
- disagree=score 2 (the decision aid fails to clearly address the issue);
- strongly disagree=score 1 (the decision aid totally fails to address the issue).

Dimensions included more or less items (between 1 and 8 items), so the weighting of each item is different in total rating. The overall score was express on 100 (from 0/100: worst rating, to 100/100: best rating).

Concerning “Plain language” dimension, we calculated the Fry readability score (18) used in the original IPDAS checklist (19). This criteria is perfectly adapted to evaluate if texts are understandable by everyone:

- score=4: Fry readability score under 8 is considered “comprehensive and clear to understand”.
- score=3: Fry readability score up to 8 is related to a language “difficult to be understand by a majority of people”.

2.2 Statistics analysis

IPDAS is a score used to evaluate the quality decision aid and not to the quality of the article. We used Excel® to calculate means and deviations standards for each dimension and overall score.

Our results can be combined to Marion Johanet and Anna Valenza results.

RESULTS

1. Study Selection

1.1 Flow chart

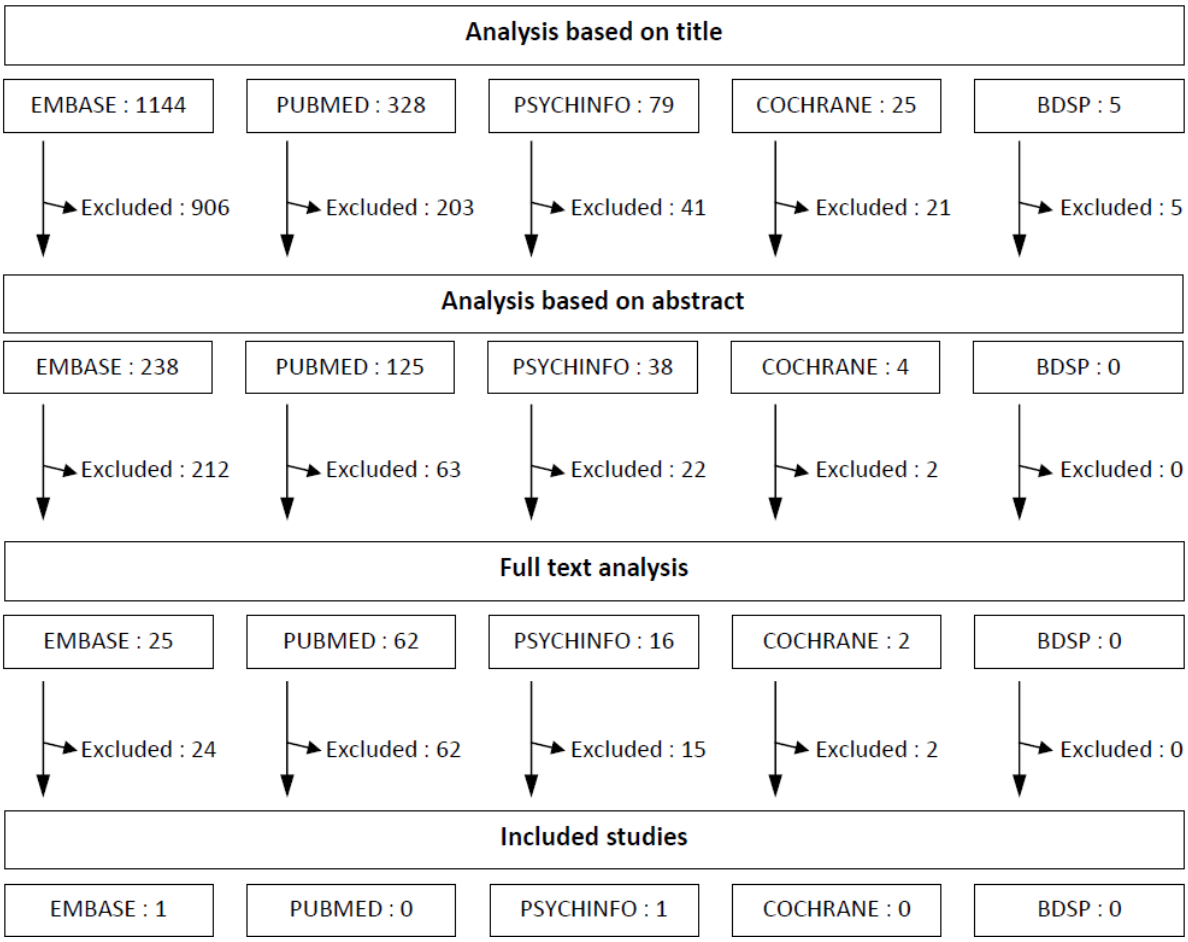


Figure 1: Global Flow-chart

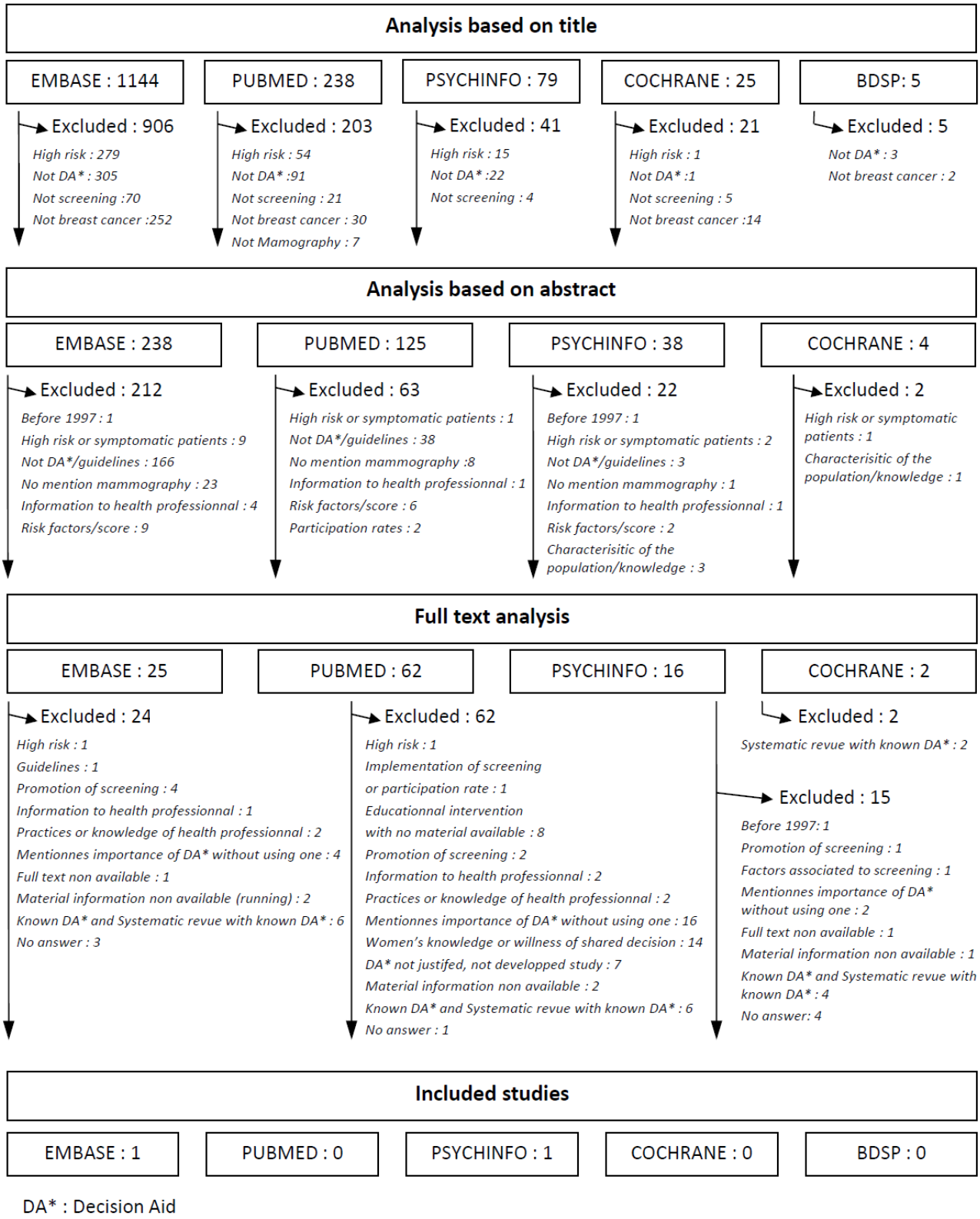


Figure 2: Detailed Flow-chart

581 titles, 405 abstracts, 105 full text-papers have been screened for eligibility using exclusion criteria. Finally, the review included only two papers (20; 21) corresponding to four decision aids (Appendix 2).

1.2 Precision about some exclusions

We precise some reasons of exclusion:

- Two studies were not available in their entirety (only abstract). Even the library of the university of Nantes couldn't obtain them. (22; 23),
- Seven articles were excluded after exchange with corresponding authors:
  - One study because the principal author was dead and their colleagues couldn't access to the decision aid (24),
  - Three studies were excluded because the studies were still running and no communication was allowed (25; 26; 27):
  - C.Gunn specified that his article was a descriptive study without intervention (28).
  - A.Krist did not use a decision aid: he gave information from the USPSTF (United States Preventive Services Task Force) (29).
  - T.Onega did not use a decision aid. She used "existing evidence "(30).
- Seven studies were excluded because the material was not available and the main authors did not respond (31; 32; 33; 34; 35; 36; 37; 38).
- We excluded articles using decision aids already rated by Marion Johanet and Anna Valenza. (39; 40; 41; 42; 43)

2. Synthesis of results

2.1 Overall score

Four decision aid tools were found and they get an overall score higher than 75/100. The overall mean is 89.10/100 with a standard deviation at 8.27 (low deviation).

Dimension very high rated (>75/100)	Dimension high rated (between 50/100 and 75/100)	Dimension low rated (between 25/100 and 50/100)	Dimension very low rated (<25/100)
Test : 99.31 Information : 99.23 ; Decision Guidance : 96.88 ; Probabilities : 94.53 ; Evidence : 93.75 ; Disclosure : 87.50 ; Language : 87.50 ;	Values : 73.44 ; Development 71.88 ; DST evaluation : 62.50	-	-

Table 1: Score classification for each dimension

2.2 Score for each dimension

Information (Appendix 3)

The providing information about the option give sufficient details to make a specific decision.

The mean was 99.23/100 (very high) with a standard deviation at 1.55 (strong homogeneity). Only Paul's decision aid was rated ¾ because it was less understandable about the natural course of the health condition, if no action was taken.

Keevil's decision aid was particularly well argued (Figure.3).

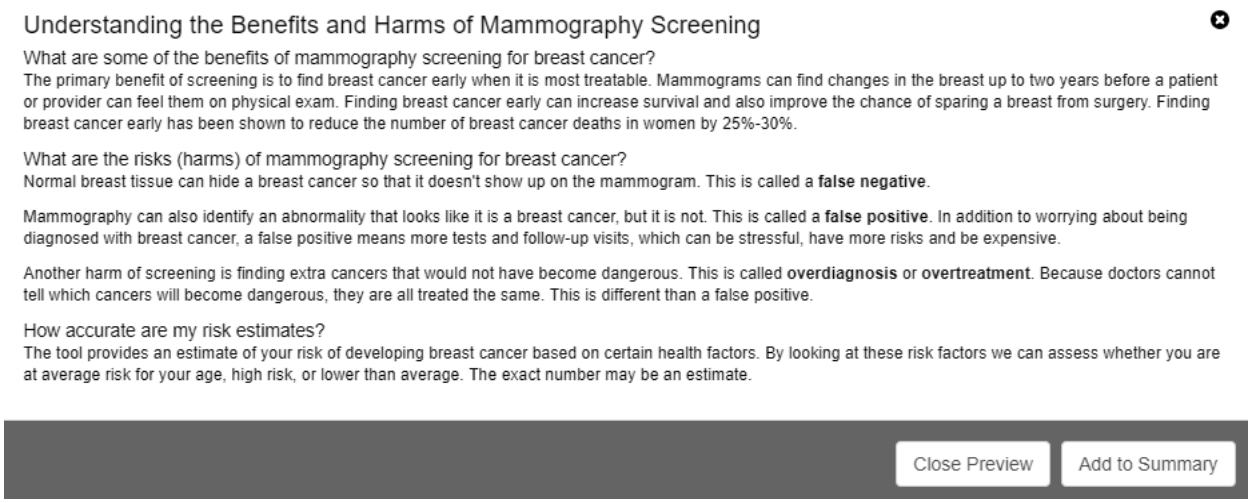


Figure 3: illustration of information dimension by J. Keevil

Probabilities (Appendix 4)

The presentation of outcome probabilities is understandable.

The mean was 94.53/100 (very high) with a standard deviation at 4.70 (small heterogeneity).

The Healthwise decision aid was rated 2/4 because of the item: “The decision support technology allows the user to compare outcome probabilities across options using the same denominator and time period”.

CeMPED (Centre for Medical Psychology & Evidence-based Decision-making, University of Sidney) decision aid was rated 2/4 because event or outcome probabilities were not well balanced.

Paul and Keevil were chosen to illustrate probabilities with points and figurines respectively (Figure 4 and Figure 5).

Figure 4: illustration of probabilities dimension by C.Paul

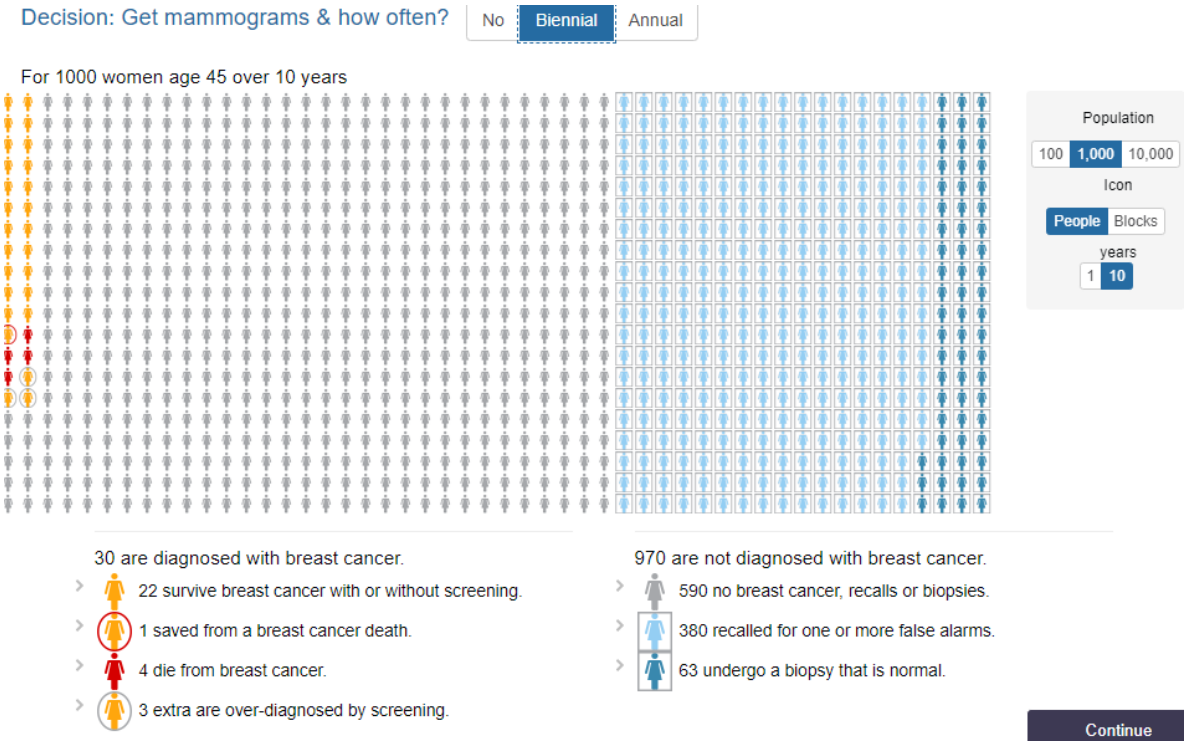


Figure 5: illustration of probabilities dimension by J.Keevil

Values (Appendix 5)

The patient can imagine positive or negative features, and choose considering his values.

The mean was 73.44/100 (high) with a standard deviation at 19.35 (significant deviation). This result presented a large heterogeneity.

Two were rated under 75/100 : CeMPED and Paul.

Two items had bad scores: options to imagine physical effects and social effects. Those were less comprehensive than psychological effects.

Keevil's decision aid was chosen to illustrate this dimension because it answered well to women's worries (Figure 6).

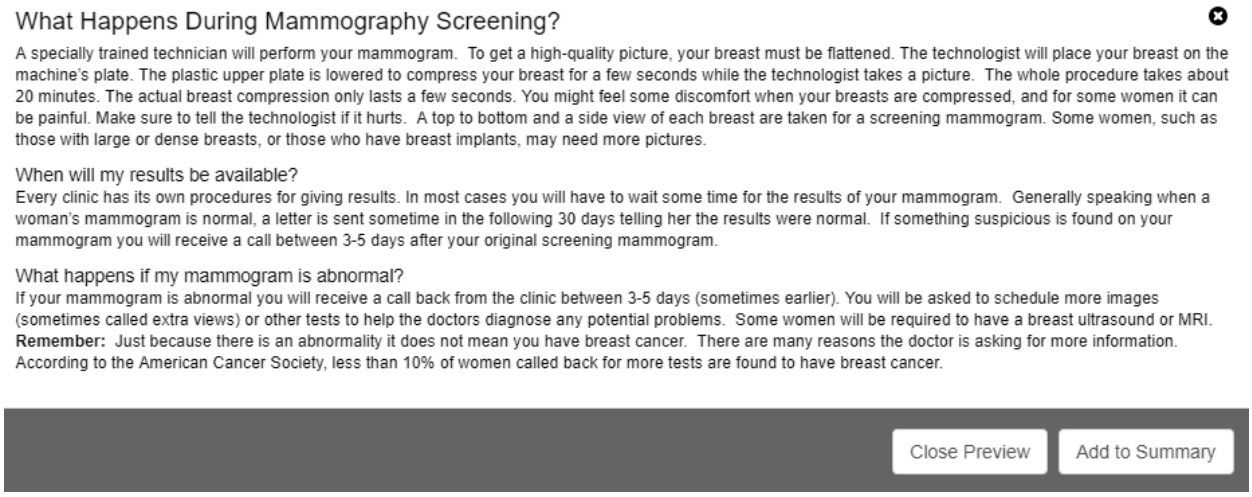


Figure 6: illustration of values dimension by J.Keevil

Decision Guidance (Appendix 6)

This dimension must give a structured guidance to prepare a dedicated consultation.

The mean was 96.88 with a standard deviation at 6.25 (little heterogeneity). Only the Keevil's decision aid did not have a dedicated tool for patient to ask question to practitioners.

CeMPED decision aid, the only one paper tool, gave a large place to scribe the pros and cons of mammography screening (Figure 7).

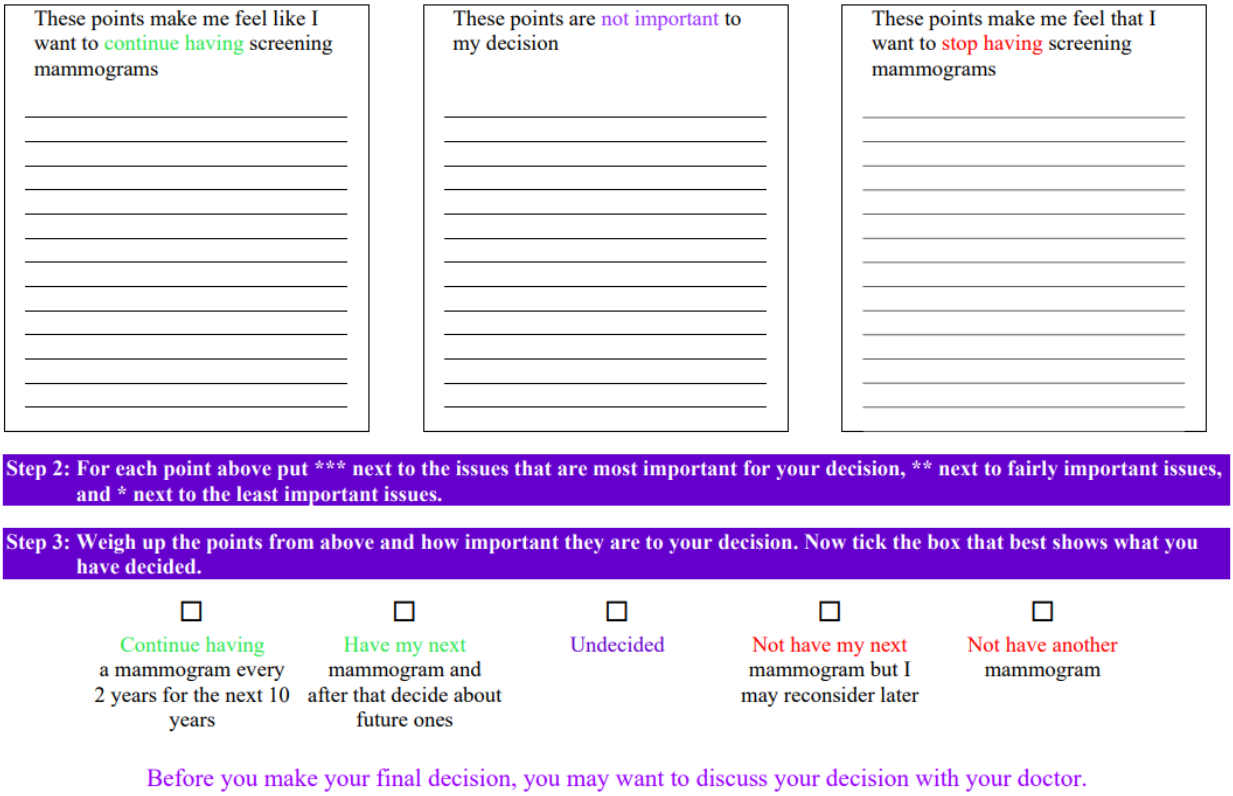


Figure 7: illustration of the dimension guidance CeMPED

Development (Appendix 7)

Development Dimension demonstrates if the authors used a systematic development process.

The mean was 71.50/100 and the standard deviation showed a big scatter (32.87).

We did not find the original article for three decisions aids: J. Keevil, CePMED and Healthwise :

- For Keevil, we found a poster (44), and more information about the development process on the website.
- For the CeMPED, we rated with the lowest global score 25/100 because we had no information about development process.
- For the Healthwise, we gave ¼ for the two items about the justification of the content of the information.

Evidence (Appendix 8)

It emphasizes integrity and quality of evidence.

The mean was 93.75/100 with a standard deviation at 12.50. CeMPED's decision aid is rated ¼ because the description how research evidence was selected was not written.

Disclosure (Appendix 9)

It discloses transparency of the decision aid project.

Regarding this dimension, the mean was 87.50/100.The standard deviation at 25.00 showed a relative important heterogeneity due to the CeMPED's decision aid.

There were no information about the authors, and no provided information about the funding used for development.

For example by C. Paul, we could easily open the window describing references, acknowledgments, and useful links (Figure 8).

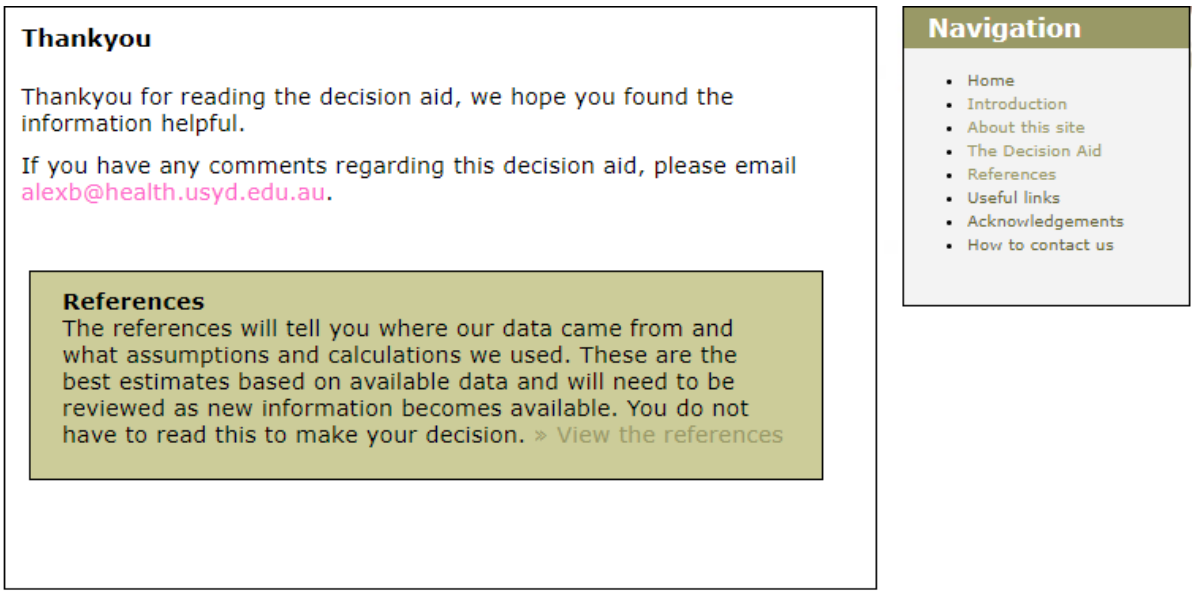


Figure 8: illustrate the dimensions evidence and disclosure by C.Paul

Plain language (Appendix 10)

It translates the level of readability.

The mean was 87.50/100 with a standard deviation at 14.43. The Paul's and the Keevil's decision aid had a Fry readability score upper than 8 but their decision tool was pedagogical so we rated ¾.

DST (Decision Support Technology) evaluation (Appendix 11)

The media helps patient to make a decision.

The means was 62.50/100 with the greatest scatter: standard deviation at 43.30.

Healthwise and CeMPED did respond at neither item:

- "There is evidence that the decision support technology helps patients improve the match between the features that matter most to the informed patient and the option that is chosen,"

- “The evidence that the patient support technology helps patients to improve their knowledge about options features”.

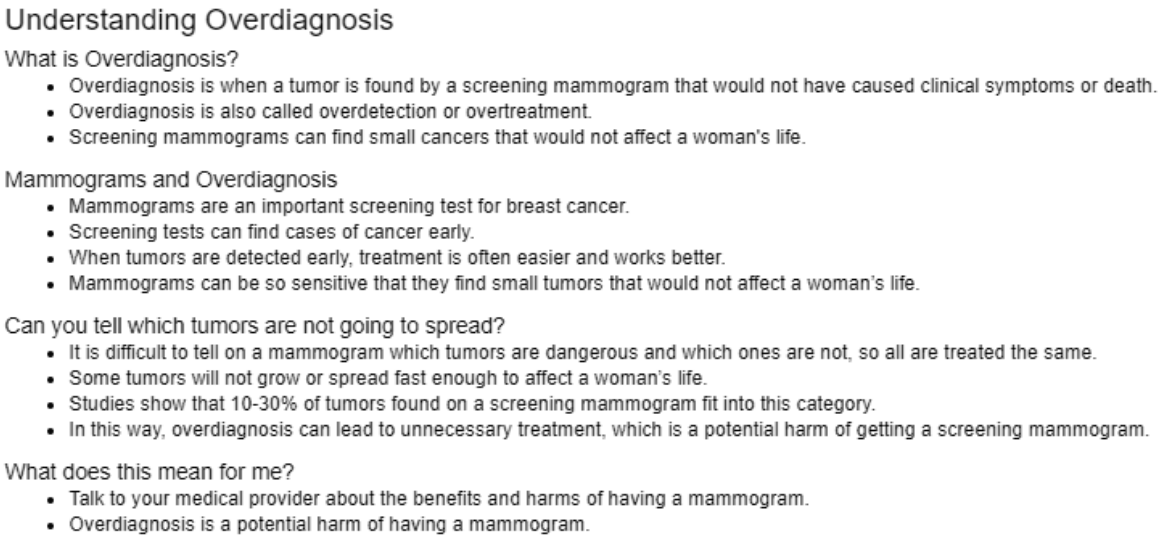
Test (Appendix 12)

As regards to the dimension Test, the aim of the screening is to be clearly understandable.

The mean was 99.31/100 with a good homogeneity (standard deviation at 1.39).

Only one decision aid about 2 items was rated equal or under 2/4. It was Paul’s DA about the description of “the next steps typically taken, if the test detects the condition or problem” and “the next steps if the condition or problem is not detected”.

J;Keevil and Healthwise broached overdiagnosis and false positive (figure 9 and figure 10).



Understanding Overdiagnosis

What is Overdiagnosis?

- Overdiagnosis is when a tumor is found by a screening mammogram that would not have caused clinical symptoms or death.
- Overdiagnosis is also called overdetection or overtreatment.
- Screening mammograms can find small cancers that would not affect a woman's life.

Mammograms and Overdiagnosis

- Mammograms are an important screening test for breast cancer.
- Screening tests can find cases of cancer early.
- When tumors are detected early, treatment is often easier and works better.
- Mammograms can be so sensitive that they find small tumors that would not affect a woman’s life.

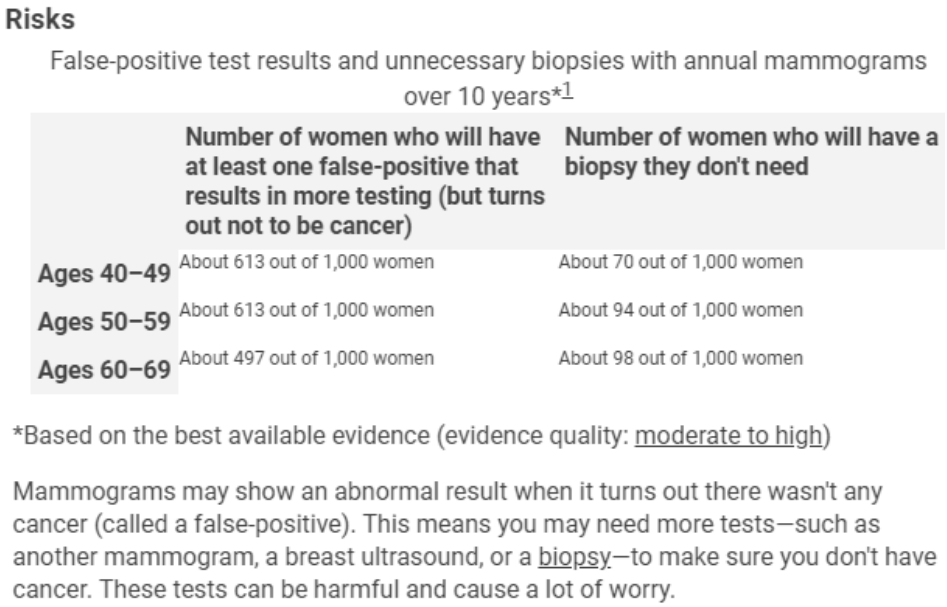
Can you tell which tumors are not going to spread?

- It is difficult to tell on a mammogram which tumors are dangerous and which ones are not, so all are treated the same.
- Some tumors will not grow or spread fast enough to affect a woman’s life.
- Studies show that 10-30% of tumors found on a screening mammogram fit into this category.
- In this way, overdiagnosis can lead to unnecessary treatment, which is a potential harm of getting a screening mammogram.

What does this mean for me?

- Talk to your medical provider about the benefits and harms of having a mammogram.
- Overdiagnosis is a potential harm of having a mammogram.

Figure 9: illustration of dimension Test by J.Keevil (overdiagnosis)



Risks

False-positive test results and unnecessary biopsies with annual mammograms over 10 years*[1]

	Number of women who will have at least one false-positive that results in more testing (but turns out not to be cancer)	Number of women who will have a biopsy they don't need
Ages 40–49	About 613 out of 1,000 women	About 70 out of 1,000 women
Ages 50–59	About 613 out of 1,000 women	About 94 out of 1,000 women
Ages 60–69	About 497 out of 1,000 women	About 98 out of 1,000 women

*Based on the best available evidence (evidence quality: moderate to high)

Mammograms may show an abnormal result when it turns out there wasn't any cancer (called a false-positive). This means you may need more tests—such as another mammogram, a breast ultrasound, or a biopsy—to make sure you don't have cancer. These tests can be harmful and cause a lot of worry.

Figure 10: illustration of dimension Test by Healthwise (false positive)

Overall results (Appendix 13)

The table resumed results for each dimension.

The overall mean was 89.10 /100 and the overall standard deviation at 8.27. All these decisions aids were well rated (upper than 75/100).

Systematic review (Appendix 14)

The table pointed out how our decision aids were situated among the review made by Marion Johanet and Anna Valenza.

DISCUSSION

1. Main results

In addition to the twenty-three decision aids of the precedent review, we extracted four decision aids from two articles.

We founded decision aids with high IPDAS evaluation. Three of the top five decision aids were found by our review (Appendix 14).

As regards of little results, overall results needed to put things into perspective.

1.1 IPDAS Dimensions

This study revealed that some dimensions were systematically well rated with good homogeneity: Information, Probabilities, Guidance, Evidence, Language, Disclosure and Test.

Others dimensions (Values, Development, DST evaluation) were often incomplete and heterogeneous. For dimension Values, options helping patients to imagine what is like to experience the physical and social effects, were less complete than the psychological effects. Moreover, for dimension Development, the content of information was not guided by needs of patients and health professionals. There was no proof that media helped patients to improve their knowledge and to make a decision.

1.2 Decision aids

On the four studies, CeMPED's decision aid made out because of wrong results.

First of all, we did not have associate documentation, in order to evaluate Development and to explain Decision Support Technology (DST).

Secondly, target population was women older than 70 years. Expectations could be different for younger and more active women than for older, but there is no justification about scientific content and information transmitted. They used a booklet, so personalization and need of information were not permitted.

Keevil's decision aid had the highest score. Only the systematisation of the development should be reviewed.

2. Comparison with first review

A comparison between the work of Marion Johanet and Anna Valenza (23 occurrences) and ours (4 occurrences) is not appropriate.

In their review, Marion Johanet and Anna Valenza found that only three dimensions were well rated: Information, Probabilities and Test. However, there was a large heterogeneity in Probabilities (standard deviation at 19.40). Others dimensions were often incomplete and heterogenous.

Three of the top five decision aids were found by our review. These high scores demonstrate the utility of our systematic review. These decision aids were not available in Pubmed so they were not accessible by health practitioner easily. Moreover, three decision aids were only cited in Sepucha's article, without dedicated articles.

3. Interpretation in light of literature

3.1 Dimensions Information and Probabilities.

Completed and equilibrated information on benefits and harms are actually considered as necessary for an enlightened choice. Informed choice may be assessed by combining measures of a person's knowledge, attitudes, and actual choice (11).

Dimensions Information and Probabilities were well rated because all of those decision aids included pictographs and more than one way of viewing probabilities. This presentation allowed to compare positives and negatives features of available options and showed them with equal details. According to the literature, risks presented with pictographs are easier to understand than natural frequencies (45). But in his study, Timmermans suggested that the affective evaluation of risks is higher when risks are presented as population figures, than percentage (46). Moreover, verbal translation with numeric risk may help people with a better comprehension in risks messages (47). Different view of probabilities assured more comprehensible and less influenced information (48).

3.2 Dimensions Values and Guidance

Dimensions Values and Guidance represent shared decision making. They integrate the patient in process decisions, in contrast with evidence based medicine which gives factual information. Decisions are influenced by emotions, feelings, fear, personal history and how people perceive the risk of cancer (49). In our decision aids, description of Values was respected.

It is easier with an internet based decision aid and a tool to print patient's question list and a resume of personalised information (50).

Patient involvement regarding the decision to have a mammogram requires a discussion about the pros and cons of mammography. So, the patient is able to participate as an active informed partner in this decision making process.

A space to express incertitude and questions is essential for decision aid to be a vector of balanced information (28).

3.3 Dimension Langage

About dimension Language, we had 2 Fry readability score which were higher than 8, related to a language "difficult to be understand by a majority of people".

Although we had a better score than Marion Johanet and Anna Valenza (73.90 for them; 87.50 for this study), those decision aids were not adapted for low literacy, numeracy skills or socially disadvantaged patients, while they are associated with greater cancer risk (51). Even for highly educated population, communication strategies with numerical risk might be complicated (47). Ethnic minority patients' numeracy, affect their ability to be involved in shared decision making, even if cancer risk information is discussed using both numerical formats and visual aids (52). We excluded also the studies which treat of dementia patients or minority specific class. A systematic review about those specific decision aids for multiple social disadvantages already exists. (51).

3.4 Dimension Test

The Feldman's systematic review argues that decision aid producers tend to rely more heavily on medical experts than on patients guidance. Content evaluations present that screening decision aids frequently focus on false positives but not on false negatives. The difficulty brought by incomplete information on probabilities or the accuracy of test results provides a lack of understanding for patients and therefore information distortion (53).

3.5 Dimension Development and DST evaluation

The dimension Development is the major lack in this evaluation. Similar results were obtained by Marion Johanet and Anna Valenza (68.30 for them; 71.88 for this study). It highlights that women needs are not well explored.

The practitioners are considered like a credible source of information and their advice could influence patient's decision (54). In literature, women's expectation is to spend time discussing with their doctor (55). However, whereas women trust their doctor's expertise in assessing these risk factors and applying associated guidelines, practitioners report using only minimal risk factors (most likely first degree relative history of breast cancer) to determine screening recommendations (56).

Professionals need to support patients making choices by turning raw data into information that is more helpful to the discussions than the data (48).

They need to tell explicitly to women that they have choice whether to get a mammography or not. Shared Decision Making process helps to spell out each step (57).

Even if internet is an excellent media to transmit information and to prepare a consultation dedicated to prevention, it could be improved. Developers of Web-based decision support tools should analyse what type of data want women, and then what they do with that information if they choose to receive it. Tools could be developed to allow women to choose and see their own individualized prognostic data or, alternatively, to receive valid but global information. The style of data presentation is an important consideration. (50)

3.6 Decision aid and Shared Decision making

Striking a balance between saying the importance of the screening and reducing the impact of fears is essential to implement mammogram decisions. (56) Many practitioners do not explain sufficiently the harms and benefits of breast cancer screening (58).

Despite good information, Elkin and colleagues underscore that women overestimate the benefits of mammography (59). Women are guided by their one experience and uncertainty.

Andersen and colleagues connect worries about the risk of breast cancer and explain that less information or too much information decrease the use of mammography. This association between information and mammography realization correspond with a bell-shaped curve. (60).

Edwards and colleagues emphasize the importance of information given and the worries reaction of the information received. Therefore, it is important to discuss about them during the consultation (48).

Women and clinicians recognize that screening pros and cons can be a complicated discussion which can (and from a patient's perspective, should) require a significant amount of time during the clinical visit (56).

4. Strengths and limitations

4.1 Strengths

At this time there is no systematic review about decision aid for mammography screening, which rated the quality of the decision aids with the IPDASi v3. A recent systematic review proposed a description of the shared decision key elements like specific content, type of communication and framework (57).

We conducted a systematic review of literature. We founded new decision aids in the different databases. The use of a PRISMA methodology gave us reliable results. We used the same exclusions/inclusions criteria as Marion Johanet and Anna Valenza to complete their review.

We didn't find many decision aids, as expected, which reinforce the strength of the work of Marion Johanet and Anna Valenza. Our decision aids were as diverse in term of population and medias, as theirs.

We used the IPDASi which is internationally recognized, to rate independently the decision aid. The work in trinomial reduces the subjective point of view.

4.2 Limitations

We couldn't use the same algorithm in the different databases. So we modified it for all the databases, adjusting to their criteria.

Many interesting articles were not available because the decision aid was still running (25; 26; 27) or because we didn't obtain an answer.

We did not have many results. Most of the articles were in Pubmed, Marion Johanet and Anna Valenza had already noted them. We found 16 articles which used decision aids already rated (figure.1).

Some decision aids could be actualized since Marion Johanet and Anna Valenza's analysis (april 2017 and june 2018). One example is the decision aid used by Reder and al (15), which was actualised between the article found by Marion Johanet and Anna Valenza (61)

Even if IPDAS is an international validated score, it remains an irreducible part of subjectivity. We reduced it by rating in double-blinded. However, our consensus was probably different from some decisions made by Marion Johanet and Anna Valenza.

Like Marion Johanet and Anna Valenza we didn't assessed risk of bias because the studies were not similar. Decision aids quality is independent of articles quality.

CONCLUSION

This update of literature confirms the existence of various decision aids. Through the IPDASi v3, our study highlighted the strengths and weakness of the existing decision aids concerning breast cancer screening by mammography for average risk women. The high quality of some of them is undeniable. The development and the evaluation of the decision support need to be clarified to understand better and respond to the women’s expectations.

Multiplying information support and way of communication (pictograph, text, and video) improve comprehension and affect a wider part of the population. Tools are a good support but do not substitute to the discussion with a practitioner.

These results might be taken in consideration for the elaboration of further decision aid.

APPENDIX 1 : IPDASi

Dimension	Item
Information	1. The decision support technology describes the health condition or problem (intervention, procedure or investigation) for which the index decision is required
Providing information about options in sufficient detail for making a specific decision	2. The decision support technology describes the decision that needs to be considered (the index decision)
	3. The decision support technology describes the options available for the index decision
	4. The decision support technology describes the natural course of the health condition or problem, if no action is taken.
	5. The decision support technology describes the positive features (benefits or advantages) of each option
	6. The decision aid describes negative features (harms, side effects or disadvantages) of each option.
	7. The decision support technology makes it possible to compare the positive and negative features of the available options.
	8. The decision support technology shows the negative and positive features of options with equal detail (for example using similar fonts, order, and display of statistical information).
Probabilities	1. The decision support technology provides information about outcome probabilities associated with the options (i.e. the likely consequences of decisions)
Presenting outcome probabilities	2. The decision support technology specifies the defined group (reference class) of patients for which the outcome probabilities apply.
	3. The decision support technology specifies the event rates for the outcome probabilities (in natural frequencies).
	4. The decision support technology specifies the time period over which the outcome probabilities apply.
	5. The decision support technology allows the user to compare outcome probabilities across options using the same denominator and time period.
	6. The decision support technology provides information about the levels of uncertainty around event or outcome probabilities (e.g. by giving a range or by using phrases such as "our best estimate is…")
	7. The decision support technology provides more than one way of viewing the probabilities (e.g. words, numbers, and diagrams).
	8. The decision support technology provides balanced information about event or outcome probabilities to limit framing biases.
Values	1. The decision support technology describes the features of options to help patients imagine what it is like to experience the physical effects.
Clarifying and expressing values	2. The decision support technology describes the features of options to help patients imagine what it is like to experience the psychological effects.
	3. The decision support technology describes the features of options to help patients imagine what it is like to experience the social effects.
	4. The decision support technology asks patients to think about which positive and negative features of the options matter most to them.
Decision Guidance	1. The decision support technology provides a step-by-step way to make a decision.
Structured guidance in deliberation and communication	2. The decision support technology includes tools like worksheets or lists of questions to use when discussing options with a practitioner.
Development	1. The development process included finding out what clients or patients need to prepare them to discuss a specific decision
Using a systematic development process	2. The development process included finding out what health professionals need to prepare them to discuss a specific decision with patients
	3. The development process included expert review by clients/patients not involved in producing the decision support technology
	4. The development process included expert review by health professionals not involved in producing the decision aid.
	5. The decision support technology was field tested with patients who were facing the decision.
	6. The decision support technology was field tested with practitioners who counsel patients who face the decision.
Evidence	1. The decision support technology (or associated documentation) provides citations to the studies selected.
Using evidence	2. The decision support technology (or associated documentation) describes how research evidence was selected or synthesized.
	3. The decision support technology (or associated documentation) provides a production or publication date.
	4. The decision support technology (or associated documentation) provides information about the proposed update policy.
	5. The decision support technology (or associated documentation) describes the quality of the research evidence used.
Disclosure	1. The decision support technology (or associated technical documentation) provides information about the funding used for development.
Disclosure and transparency	2. The decision support technology includes author/developer credentials or qualifications.
Plain Language	1. The decision support technology (or associated documentation) reports readability levels (using one or more of the available scales).
Using plain language	
DST Evaluation	1. There is evidence that the decision support technology improves the match between the features that matter most to the informed patient and the option that is chosen
	2. There is evidence that the patient decision support technology helps patients improve their knowledge about options' features
Test (for DSTs that are directed at investigations or screening tests)	1. The decision support technology describes what the test is designed to measure.
	2. The decision support technology includes information about the chances of having a true positive test result.
	3. The decision support technology includes information about the chances of having a true negative test result.
	4. The decision support technology includes information about the chances of having a false positive test result.
	5. The decision support technology includes information about the chances of having a false negative test result.
	6. If the test detects the condition or problem, the decision support technology describes the next steps typically taken.
	7. The decision support technology describes the next steps if the condition or problem is not detected.
	8. The decision support technology describes the chances that the disease is detected with and without the use of the test.
	9. The decision support technology has information about the consequences of detecting the condition or disease that would never have caused problems if screening had not been done (lead time bias).

doi:10.1371/journal.pone.0004705.t003

APPENDIX 2 – Characteristics of Identified Studies on Decision Aids

Research motor	Author/year	Target population	Design	Primary outcome	Presentation Decision Aid
EMBASE	Keevil, 2017	Women 35-74 years old	RCT: group wih tool and group control, logistic regression	Satisfaction	Internet (online Decision Aid)
EMBASE	Healthwise, 2016	Women with average risk for breast cancer.Start mammograms at age 40-50	Not applicable	Not applicable	Internet (online Decision Aid)
EMBASE	CeMPED, 2005	Women aged 70 years or older	Not applicable	Not applicable	Paper
PSYCHINFO	Paul 2007	Maori women, 40-49 years	One time uncontrolled intervention with pre/post test	Screening participation	Internet (online Decision Aid)

APPENDIX 3 – Dimension Information

IPDASi-Dimension Information										
Providing information about option in sufficient detail for making a specific decision										
Mean by item	4,00	4,00	4,00	3,75	4,00	4,00	4,00	4,00	31,75	99,23
Standard deviation	0,00	0,00	0,00	0,50	0,00	0,00	0,00	0,00	0,50	1,55
Decision aids	item 1	item 2	item 3	item 4	item 5	item 6	item 7	item 8	score /32	Mean/100
Keevil 2017 (Sepucha, EMBASE)	4	4	4	4	4	4	4	4	32	100,00
Healthwise, 2016 (Sepucha, EMBASE)	4	4	4	4	4	4	4	4	32	100,00
CeMPED 2005, sup 70 years (Sepucha, EMBASE)	4	4	4	4	4	4	4	4	32	100,00
Paul 2007, PSYCHINFO	4	4	4	3	4	4	4	4	31	96,90

APPENDIX 4 – Dimension Probabilities

IPDASi-Dimension Probabilities										
Presenting outcome probabilities										
Mean by item	4,00	4,00	4,00	4,00	3,50	3,50	3,75	3,50	30,25	94,53
Standard deviation	0,00	0,00	0,00	0,00	1,00	0,58	0,50	1,00	1,50	4,70
Decision aids	item 1	item 2	item 3	item 4	item 5	item 6	item 7	item 8	score /32	Mean/100
Keevil 2017 (Sepucha, EMBASE)	4	4	4	4	4	4	4	4	32	100,00
Healthwise 2016 (Sepucha, EMBASE)	4	4	4	4	2	4	3	4	29	90,62
CeMPED 2005, sup 70 years (Sepucha, EMBASE)	4	4	4	4	4	3	4	2	29	90,60
Paul 2007, PSYCHINFO	4	4	4	4	4	3	4	4	31	96,90

APPENDIX 5 – Dimension Values

IPDASi-Dimension Values						
Clarifying and expressing values						
Mean by item	2,25	3,00	2,50	4,00	11,75	73,44
Standard deviation	1,26	0,82	1,29	0,00	3,10	19,35
Decision aids	item 1	item 2	item 3	item 4	score /16	Mean/100
Keevil 2017 (Sepucha, EMBASE)	4	4	4	4	16	100,00
Healthwise 2016 (Sepucha, EMBASE)	2	3	3	4	12	75,00
CeMPED 2005,sup 70 years (Sepucha, EMBASE)	2	2	2	4	10	62,50
Paul 2007, PSYCHINFO	1	3	1	4	9	56,25

APPENDIX 6 – Dimension Guidance

IPDASi-Dimension Decision Guidance				
Structured guidance in deliberation and communication				
Mean by item	4,00	3,75	7,75	96,88
Standard deviation	0,00	0,50	0,50	6,25
Decision aids	item 1	item 2	score /8	Mean/100
Keevil 2017 (Sepucha, EMBASE)	4	3	7	87,50
Healthwise 2016 (Sepucha, EMBASE)	4	4	8	100,00
CeMPED 2005, sup 70 years (Sepucha, EMBASE)	4	4	8	100,00
Paul 2007, PSYCHINFO	4	4	8	100,00

APPENDIX 7 – Dimension Development

IPDASi-Dimension Development								
Using a systematic developpement process								
Mean by item	2,25	2,50	3,00	3,00	3,25	3,25	17,25	71,88
Standard deviation	1,50	1,73	1,41	1,41	1,50	1,50	7,89	32,87
Decision aids	item 1	item 2	item 3	item 4	item 5	item 6	score /24	Mean/100
Keevil 2017 (Sepucha, EMBASE)	3	4	3	3	4	4	21	87,50
Healthwise 2016 (Sepucha, EMBASE)	1	1	4	4	4	4	18	75,00
CeMPED 2005, sup70 years (Sepucha, EMBASE)	1	1	1	1	1	1	6	25,00
Paul 2007, PSYCHINFO	4	4	4	4	4	4	24	100,00

APPENDIX 8 – Dimension Evidence

IPDASi-Dimension Evidence							
Using evidence							
Mean by item	4,00	3,25	3,75	3,75	4,00	18,75	93,75
Standard deviation	0,00	1,50	0,50	0,50	0,00	2,50	12,50
Decision aids	item 1	item 2	item 3	item 4	item 5	score /20	Mean/100
Keevil 2017 (Sepucha, EMBASE)	4	4	4	4	4	20	100,00
Healthwise 2016 (Sepucha, EMBASE)	4	4	4	4	4	20	100,00
CeMPED 2005, sup 70 years (Sepucha, EMBASE)	4	1	3	3	4	15	75,00
Paul 2007, EMBASE	4	4	4	4	4	20	100,00

APPENDIX 9 – Dimension Disclosure

IPDASi-Dimension Disclosure				
Disclosure and transparency				
Mean by item	3,50	3,50	7,00	87,50
Standard deviation	1,00	1,00	2,00	25,00
Decision aids	item 1	item 2	score /8	Mean/100
Keevil 2017 (Sepucha, EMBASE)	4	4	8	100,00
Healthwise 2016 (Sepucha, EMBASE)	4	4	8	100,00
CeMPED 2005, sup 70 years (Sepucha, EMBASE)	2	2	4	50,00
Paul 2007, PSYCHINFO	4	4	8	100,00

APPENDIX 10 – Dimension Plain Langage

IPDASi-Dimension Plain Langage				
Using plain langage				
Mean by item		3,50	3,50	87,50
Standard deviation		0,58	0,58	14,43
Decision aids	FRY	item 1	score /4	Mean/100
Keevil 2017 (Sepucha, EMBASE)	9	3	3	75,00
Healthwise 2016 (Sepucha, EMBASE)	7	4	4	100,00
CeMPED 2005, sup 70 years (Sepucha, EMBASE)	6	4	4	100,00
Paul 2007	13	3	3	75,00

APPENDIX 11 – Dimension Decision Support Technology (DST)

IPDASi-Dimension DST evaluation				
Mean by item	2,50	2,50	5,00	62,50
Standard deviation	1,73	1,73	3,46	43,30
Decision aids	item 1	item 2	score /8	Mean/100
Keevil 2017 (Sepucha, EMBASE)	4	4	8	100,00
Healthwise 2016 (Sepucha, EMBASE)	1	1	2	25,00
CeMPED 2005, sup 70 years (Sepucha, EMBASE)	1	1	2	25,00
Paul 2007, PSYCHINFO	4	4	8	100,00

APPENDIX 12 – Dimension Test

IPDASi-Dimension Test											
Mean by item	4,00	4,00	4,00	4,00	4,00	3,50	3,25	3,75	4,00	34,50	99,31
Standard deviation	0,00	0,00	0,00	0,00	0,00	1,00	1,50	0,50	0,00	3,00	1,39
Decision aids	item 1	item 2	item 3	item 4	item 5	item 6	item 7	item 8	item 9	score /36	Mean/100
Keevil 2017 (Sepucha, EMBASE)	4	4	4	4	4	4	4	4	4	36	100,00
Healthwise 2016 (Sepucha, EMBASE)	4	4	4	4	4	4	4	4	4	36	100,00
CeMPED 2005, sup 70 years (Sepucha, EMBASE)	4	4	4	4	4	4	4	4	4	36	100,00
Paul 2007, PSYCHINFO	4	4	4	4	4	2	1	3	4	30	97,22

APPENDIX 13 – IPDASi Overall Results

IPDASi-Total												
Mean by item	31,75	30,25	11,75	7,75	17,25	18,75	7,00	3,50	5,00	34,50	167,50	89,10
Standard deviation	0,50	1,50	3,10	0,50	7,89	2,50	2,00	0,58	3,46	3,00	15,55	8,27
Decision aids	Information /32	Probabilities /32	Values /16	Guidance /8	Develop-ment /24	Evidence /20	Disclosure /8	Langage /4	DST /8	Test /36	Score /188	Mean /100
Keevil 2017 (Sepucha, EMBASE)	32	32	16	7	21	20	8	3	8	36	183	97,34
Healthwise 2016 (Sepucha, EMBASE)	32	29	12	8	18	20	8	4	2	36	169	89,89
CeMPED 2005, sup 70 years (Sepucha, EMBASE)	32	29	10	8	6	15	4	4	2	36	146	77,66
Paul 2007, PSYCHINFO	31	31	9	8	24	20	8	3	8	30	172	91,49

APPENDIX 14 – Quality of Decision Aid. Evaluation based on IPDASi

Mean by item		27,1	25,7	10,5	5,6	16,5	13,4	4,7	3,0	5,6	30,2	142,3	75,7
Standard deviation		4,2	6,2	3,2	2,2	4,8	5,3	2,3	0,6	2,6	5,4	28,4	15,1
Decision Aids		Information **/32**	Probabilities **/32**	Values **/16**	Decision Guidance **/8**	Development **/24**	Evidence **/20**	Disclosure **/8**	Plain language **/4**	DST Evaluation **/8**	Test **/36**	Score **/188**	Mean **/100**
Keevil 2017	*Maïna/Flore*	32	32	16	7	21	20	8	3	8	36	183	**97,3**
Schonberg 2014	*Anna /Marion*	31	32	13	8	21	20	4	4	8	35	176	**93,6**
Reder 2015	*Anna /Marion*	30	32	14	8	21	18	6	3	6	36	174	**92,6**
Paul 2007,	*Maïna/Flore*	31	31	9	8	24	20	8	3	8	30	172	**91,5**
Scariati 2015	*Anna /Marion*	32	31	14	8	21	11	6	3	7	36	169	**89,9**
Healthwise 2016	*Maïna/Flore*	32	29	12	8	18	20	8	4	2	36	169	**89,9**
Hersch 2015	*Anna /Marion*	29	32	10	6	21	15	4	3	8	34	162	**86,2**
Elkin2017	*Anna /Marion*	26	23	14	8	20	18	8	4	8	32	161	**85,6**
Mathieu 2007	*Anna /Marion*	30	31	11	8	20	15	4	3	8	31	161	**85,6**
Mathieu 2010	*Anna /Marion*	30	31	11	8	20	15	4	3	8	31	161	**85,6**
Eden 2015	*Anna /Marion*	23	22	14	8	20	18	8	4	8	30	155	**82,4**
Bourmaud 2016	*Anna /Marion*	29	30	15	8	18	11	4	3	4	32	154	**81,9**
Webster 2007	*Anna /Marion*	30	27	11	4	19	14	5	4	7	32	153	**81,4**
Baena-Canada 2015	*Anna /Marion*	28	29	6	3	18	20	8	2	6	31	151	**80,3**
Wong 2015	*Anna /Marion*	30	20	12	4	18	20	4	3	8	32	151	**80,3**
CeMPED 2005	*Maïna/Flore*	32	29	10	8	6	15	4	4	2	36	146	**77,7**
Toledo- Chavarri 2017	*Anna /Marion*	30	25	10	4	19	8	4	3	4	31	138	**73,4**
Gummersback 2015	*Anna /Marion*	26	17	10	4	13	12	4	2	8	34	130	**69,1**
Nekhlyudov 2009	*Anna /Marion*	25	24	11	5	13	14	2	3	2	30	129	**68,6**
Petrova 2015	*Anna /Marion*	24	29	10	4	13	5	2	3	8	31	129	**68,6**
Pasternack 2011	*Anna /Marion*	23	17	11	3	19	10	4	3	6	29	125	**66,5**
Rimer 2002	*Anna /Marion*	20	15	10	4	13	12	8	3	6	25	116	**61,7**
Pace 2014	*Anna /Marion*	25	20	8	2	10	6	2	3	2	28	106	**56,4**
Barrat 2005	*Anna /Marion*	22	29	4	3	10	5	2	2	2	23	102	**54,3**
Fuller 2015	*Anna /Marion*	23	9	9	4	10	10	2	2	2	22	93	**49,5**
Marschall 2003	*Anna /Marion*	19	24	4	3	10	5	2	3	2	17	89	**47,3**
Marschall 2005	*Anna /Marion*	19	23	4	3	10	5	2	2	2	16	86	**45,7**

BIBLIOGRAPHY

1. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, et al. Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012: Globocan 2012. International Journal of Cancer. 1 mars 2015;136(5):E359-86.

2. Institut national du cancer ; plan-actions-renov-cancer-sein-2.pdf [Internet]. [cité 15 sept 2018]. Disponible sur: https://solidarites-sante.gouv.fr/IMG/pdf/plan-actions-renov-cancer-sein-2.pdf

3. Institut national du cancer. Les cancers en France. 2016.

4. Gotzsche PC, Hartling OJ, Nielsen M, Brodersen J, Jorgensen KJ. Breast screening: the facts--or maybe not. BMJ. 27 janv 2009;338(jan27 2):b86-b86.

5. Myers ER, Moorman P, Gierisch JM, Havrilesky LJ, Grimm LJ, Ghate S, et al. Benefits and Harms of Breast Cancer Screening: A Systematic Review. JAMA. 20 oct 2015;314(15):1615.

6. Weedon-Fekjær H, Romundstad PR, Vatten LJ. Modern mammography screening and breast cancer mortality: population study. BMJ. 17 juin 2014;348:g3701.

7. Jørgensen KJ, Kalager M, Barratt A, Baines C, Zahl P-H, Brodersen J, et al. Overview of guidelines on breast screening: Why recommendations differ and what to do about it. The Breast. févr 2017;31:261-9.

8. Lauby-Secretan B, Scoccianti C, Loomis D, Benbrahim-Tallaa L, Bouvard V, Bianchini F, et al. Breast-Cancer Screening — Viewpoint of the IARC Working Group. New England Journal of Medicine. 11 juin 2015;372(24):2353-8.

9. Caverly TJ, Hayward RA, Reamer E, Zikmund-Fisher BJ, Connochie D, Heisler M, et al. Presentation of Benefits and Harms in US Cancer Screening and Prevention Guidelines: Systematic Review. J Natl Cancer Inst. juin 2016;108(6):djv436.

10. Brawley OW. Risk-Based Mammography Screening: An Effort to Maximize the Benefits and Minimize the Harms. Annals of Internal Medicine. 1 mai 2012;156(9):662.

11. Hersch J, Jansen J, McCaffery K. Decision-making about mammographic screening: pursuing informed choice. Climacteric. juin 2018;21(3):209-13.

12. Charles C, Gafni A, Whelan T. Decision-making in the physician-patient encounter: revisiting the shared treatment decision-making model. Soc Sci Med. sept 1999;49(5):651-61.

13. Murray E, Charles C, Gafni A. Shared decision-making in primary care: tailoring the Charles et al. model to fit the context of general practice. Patient Educ Couns. août 2006;62(2):205-11.

14. Stacey D, Légaré F, Col NF, Bennett CL, Barry MJ, Eden KB, et al. Decision aids for people facing health treatment or screening decisions. Cochrane Database Syst Rev. 28 janv 2014;(1):CD001431.

15. Reder M, Kolip P. Does a decision aid improve informed choice in mammography screening? Study protocol for a randomized controlled trial. BMC Womens Health [Internet]. 22 juill 2015 [cité 15 sept 2018];15. Disponible sur: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC451089

16. Johanet M, Valenza A. Decision aid for women eligible to mammography breast cancer screening. Pubmed review and evaluating according to the international standards. Thèse; 2018.

17. Elwyn G, O'Connor AM, Bennett C, Newcombe RG, Politi M, Durand M-A, et al. Assessing the quality of decision support technologies using the International Patient Decision Aid Standards instrument (IPDASi). PLoS ONE. 2009;4(3):e4705.

18. Fry E. A Readability Formula That Saves Time. Journal of Reading. 1968;11(7):513-78.

19. Elwyn G. Developing a quality criteria framework for patient decision aids: online international Delphi consensus process. BMJ. 26 août 2006;333(7565):417-0.

20. Sepucha KR, Belkora J. Putting shared decision making to work in breast and prostate cancers: tools for community oncologists. Community Oncology. nov 2007;4(11):685-90.

21. Paul C, Nicholls R, Priest P, McGee R. Making policy decisions about population screening for breast cancer: the role of citizens' deliberation. Health Policy. mars 2008;85(3):314-20.

22. Byram S. Breast cancer and mammogram screening: Mental models and quantitative assessments of beliefs. 1998;

23. Bryan T, Snyder E, Estrada C, Castiglioni A. Education in delivering patient-centered care: Provider comfort level in counseling women ages 40-49. J Gen Intern Med.

24. Lawrence VA, Streiner D, Hazuda HP, Naylor R, Levine M, Gafni A. A cross-cultural consumer-based decision aid for screening mammography. Prev Med. mars 2000;30(3):200-8.

25. Roberto A, Colombo C, Candiani G, Giordano L, Mantellini P, Paci E, et al. Personalised informed choice on evidence and controversy on mammography screening: study protocol for a randomized controlled trial. BMC Cancer. 19 juin 2017;17(1):429.

26. Roberto A, Colombo C, Candiani G, Giordano L, Mantellini P, Paci E, et al. Decision aid and informed decision on breast cancer screening: the donna informata-mamografia project. Recenti progressi in medicina.

27. Bowen DJ, Robbins R, Bush N, Meischke H, Ludwig A, Wooldridge J. Effects of a Web-based intervention on women's breast health behaviors. Transl Behav Med. mars 2011;1(1):155-64.

28. Gunn CM, Soley-Bori M, Battaglia TA, Cabral H, Kazis L. Shared Decision Making and the Use of Screening Mammography in Women Younger Than 50 Years of Age. J Health Commun. 2015;20(9):1060-6.

29. Krist AH, Woolf SH, Hochheimer C, Sabo RT, Kashiri P, Jones RM, et al. Harnessing Information Technology to Inform Patients Facing Routine Decisions: Cancer Screening as a Test Case. Ann Fam Med. 2017;15(3):217-24.

30. Onega T, Beaber EF, Sprague BL, Barlow WE, Haas JS, Tosteson ANA, et al. Breast cancer screening in an era of personalized regimens: A conceptual model and National Cancer Institute initiative for risk-based and preference-based approaches at a population level: Breast Cancer Screening Conceptual Model. Cancer. 1 oct 2014;120(19):2955-64.

31. Schapira M, Hubbard R, Seitz H, Conant E, Schnall M, Harrington T, et al. A randomized controlled trial of a risk based mammography screening decision aid for women 39-48 years of age. J Gen Intern Med.

32. Ufomata E, Huang Y, Corbelli J. An evidence-based patient handout for breast cancer screening shared decision making in primary care. JGen.internMed.

33. Gøtzsche PC, Nielsen M. Screening for breast cancer with mammography. Cochrane Database Syst Rev. 18 oct 2006;(4):CD001877.

34. Bientzle M, Cress U, Kimmerle J. The role of tentative decisions and health concepts in assessing information about mammography screening. Psychol Health Med. 2015;20(6):670-9.

35. Tisnado DM, Moore AA, Levin JR, Rosen S. Developing and Testing a Decision Aid for Use by Providers in Making Recommendations: About Mammography Screening in Older Women. J Appl Gerontol. 1 avr 2015;34(3):343-58.

36. Toviessi P. The Family Health Decision-Making Model: Family. :121.

37. Kukafka R, Yi H, Xiao T, Thomas P, Aguirre A, Smalletz C, et al. Why Breast Cancer Risk by the Numbers Is Not Enough: Evaluation of a Decision Aid in Multi-Ethnic, Low-Numerate Women. J Med Internet Res [Internet]. 14 juil 2015 [cité 12 sept 2018];17(7). Disponible sur: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4526996/

38. Totzkay D, Silk KJ, Sheff SE. The Effect of Electronic Health Record Use and Patient-Centered Communication on Cancer Screening Behavior: An Analysis of the Health Information National Trends Survey. J Health Commun. juill 2017;22(7):554-61.

39. Toledo-Chávarri A, Rué M, Codern-Bové N, Carles-Lavila M, Perestelo-Pérez L, Pérez-Lacasta MJ, et al. A qualitative study on a decision aid for breast cancer screening: Views from women and health professionals. Eur J Cancer Care (Engl). mai 2017;26(3).

40. Carles M, Martínez-Alonso M, Pons A, Pérez-Lacasta MJ, Perestelo-Pérez L, Sala M, et al. The effect of information about the benefits and harms of mammography on women's decision-making: study protocol for a randomized controlled trial. Trials. 12 sept 2017;18(1):426.

41. Hersch J, Jansen J, Irwig L, Barratt A, Thornton H, Howard K, et al. How do we achieve informed choice for women considering breast screening? Prev Med. sept 2011;53(3):144-6.

42. Rimer BK, Halabi S, Sugg Skinner C, Lipkus IM, Strigo TS, Kaplan EB, et al. Effects of a mammography decision-making intervention at 12 and 24 months. American Journal of Preventive Medicine. 1 mai 2002;22(4):247-57.

43. Eden KB, Scariati P, Klein K, Watson L, Remiker M, Hribar M, et al. Mammography Decision Aid Reduces Decisional Conflict for Women in Their Forties Considering Screening. J Womens Health (Larchmt). 1 déc 2015;24(12):1013-20.

44. Keevil J. Patient survey results after use of integrated EHR decision tool.. In Smdm; 2015 [cité 21 sept 2018]. Disponible sur: https://smdm.confex.com/smdm/2015mo/webprogram/Paper8973.html

45. Ancker JS, Senathirajah Y, Kukafka R, Starren JB. Design Features of Graphs in Health Risk Communication: A Systematic Review. J Am Med Inform Assoc. 2006;13(6):608-18.

46. Timmermans DRM, Ockhuysen-Vermey CF, Henneman L. Presenting health risk information in different formats: the effect on participants' cognitive and emotional evaluation and decisions. Patient Educ Couns. déc 2008;73(3):443-7.

47. Lipkus IM, Samsa G, Rimer BK. General performance on a numeracy scale among highly educated samples. Med Decis Making. févr 2001;21(1):37-44.

48. Edwards A, Elwyn G, Mulley A. Explaining risks: turning numerical data into meaningful pictures. BMJ. 6 avr 2002;324(7341):827-30

49. Rosenbaum L. « Misfearing »--culture, identity, and our perceptions of health risks. N Engl J Med. févr 2014;370(7):595-7.

50. Schwitzer G. A Review of Features in Internet Consumer Health Decision-support Tools. J Med Internet Res [Internet]. 22 nov 2002 [cité 23 sept 2018];4(2). Disponible sur https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1761935/

51. Enard KR, Dolan Mullen P, Kamath GR, Dixon NM, Volk RJ. Are cancer-related decision aids appropriate for socially disadvantaged patients? A systematic review of US randomized controlled trials. BMC Med Inform Decis Mak [Internet]. 6 juin 2016 [cité 12 sept 2018];16. Disponible sur: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4896023/49.

52. Wong ST, Pérez-Stable EJ, Kim SE, Gregorich SE, Sawaya GF, Walsh JME, et al. Using Visual Displays to Communicate Risk of Cancer to Women From Diverse Race/Ethnic Backgrounds. Patient Educ Couns. juin 2012;87(3):327-35.

53. Feldman-Stewart D, Brennenstuhl S, McIssac K, Austoker J, Charvet A, Hewitson P, et al. A systematic review of information in decision aids. Health Expect. mars 2007;10(1):46-61.

54. Ahn HS, Welch HG. South Korea's Thyroid-Cancer "Epidemic" — Turning the Tide. New England Journal of Medicine. 10 déc 2015;373(24):2389-90.

55. Davey C, White V, Gattellari M, Ward JE. Reconciling population benefits and women's individual autonomy in mammographic screening: in-depth interviews to explore women's views about « informed choice ». Aust N Z J Public Health. févr 2005;29(1):69-77.

56. DuBenske LL, Schrager S, McDowell H, Wilke LG, Trentham-Dietz A, Burnside ES. Mammography Screening: Gaps in Patient's and Physician's Needs for Shared Decision Making. Breast J. mars 2017;23(2):210-4.

57. DuBenske LL, Schrager SB, Hitchcock ME, Kane AK, Little TA, McDowell HE, et al. Key Elements of Mammography Shared Decision-Making: a Scoping Review of the Literature. J Gen Intern Med. oct 2018;33(10):1805-14.

58. Hoffman RM, Elmore JG, Fairfield KM, Gerstein BS, Levin CA, Pignone MP. Lack of shared decision making in cancer screening discussions: results from a national survey. Am J Prev Med. sept 2014;47(3):251-9.

59. Elkin EB, Pocus VH, Mushlin AI, Cigler T, Atoria CL, Polaneczky MM. Facilitating informed decisions about breast cancer screening: development and evaluation of a web-based decision aid for women in their 40s. BMC Med Inform Decis Mak [Internet]. 21 mars 2017 [cité 14 sept 2018];17. Disponible sur: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5359988/

60. Andersen MR, Smith R, Meischke H, Bowen D, Urban N. Breast Cancer Worry and Mammography Use by Women with and without a Family History in a Population-based Sample. Cancer Epidemiol Biomarkers Prev. 1 avr 2003;12(4):314-20.

61. Reder M, Kolip P. Does a decision aid improve informed choice in mammography screening? Results from a randomised controlled trial. PLoS One [Internet]. 13 déc 2017 [cité 22 sept 2018];12(12). Disponible sur: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5728514/

LIST OF ABBREVIATIONS

BDSP : Banque de Données en Santé Publique

CeMPED : Centre for Medical Psychology & Evidence-based Decision-making

DST: Decision Support Technology

INCA : Institut National du CAncer

IPDAS: International Patient Decision Aid Standards

IPDASi : International Patient Decision Aid Standards instrument

Serment d’Hippocrate

En présence des Maîtres de cette Faculté, de mes chers condisciples et selon la tradition d’Hippocrate, je promets et je jure d’être fidèle aux lois de l’honneur et de la probité dans l’exercice de la Médecine.

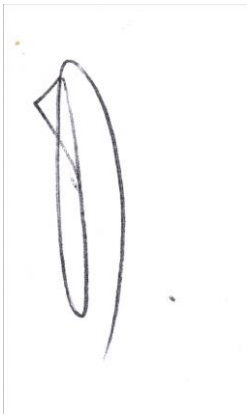
Je donnerai mes soins gratuits à l’indigent, et n’exigerai jamais un salaire au-dessus de mon travail.

Admis dans l’intérieur des maisons, mes yeux ne verront pas ce qui s’y passe, ma langue taira les secrets qui me seront confiés et mon état ne servira pas à corrompre les mœurs ni à favoriser le crime.

Respectueux et reconnaissant envers mes Maîtres, je rendrai à leurs enfants l’instruction que j’ai reçue de leurs pères.

Que les hommes m’accordent leur estime si je suis fidèle à mes promesses. Que je sois couvert d’opprobre et méprisé de mes confrères si j’y manque.

Vu, le Directeur de Thèse



Vu, le Doyen

De la Faculté de Médecine de Tours

Tours, le

Thabaud Maïna

Nombre de pages : 72 – Tableaux : 14 – Figures : 10

Résumé :

Introduction: Le cancer du sein est le cancer le plus fréquent et également la première cause de mortalité chez les femmes dans le monde. Le développement des thérapeutiques et la détection précoce sont à l'origine d'une diminution de la mortalité spécifique. Cependant, le risque de faux positifs est élevé et entraîne des surdiagnostics. Le bénéfice à l'échelle individuelle est différent du bénéfice à l'échelle globale. L'information des femmes pour une décision médicale partagée, tenant compte de leurs valeurs, peut être réalisée au moyen d'outils d'aide à la décision. Les objectifs de ce travail sont de compléter le répertoire des outils existants et d'en évaluer la qualité dans le cadre du dépistage du cancer du sein par mammographie.

Méthode: Nous avons actualisé et complété une revue de la littérature déjà existante issue de Pubmed. Les titres, puis les résumés, puis les textes entiers ont été examinés indépendamment par deux lecteurs. La qualité des outils d'aide a été évaluée selon les critères IPDAS (International Patient Decision Aid Standards instrument), en double aveugle également.

Résultat: Nous avons étudié quatre outils d'aide à la décision. Ils ont une note au-dessus de 75/100 et sont donc intéressants. Les seules dimensions qui nécessitaient une amélioration étaient l'apport de précision sur le développement du processus d'élaboration de l'outil et d'évaluation de celui-ci.

Conclusion: L'actualisation de cette revue met en évidence l'existence d'outils de qualité à destination des femmes à risque moyen pour permettre un choix éclairé et partagé dans la réalisation du dépistage par mammographie.

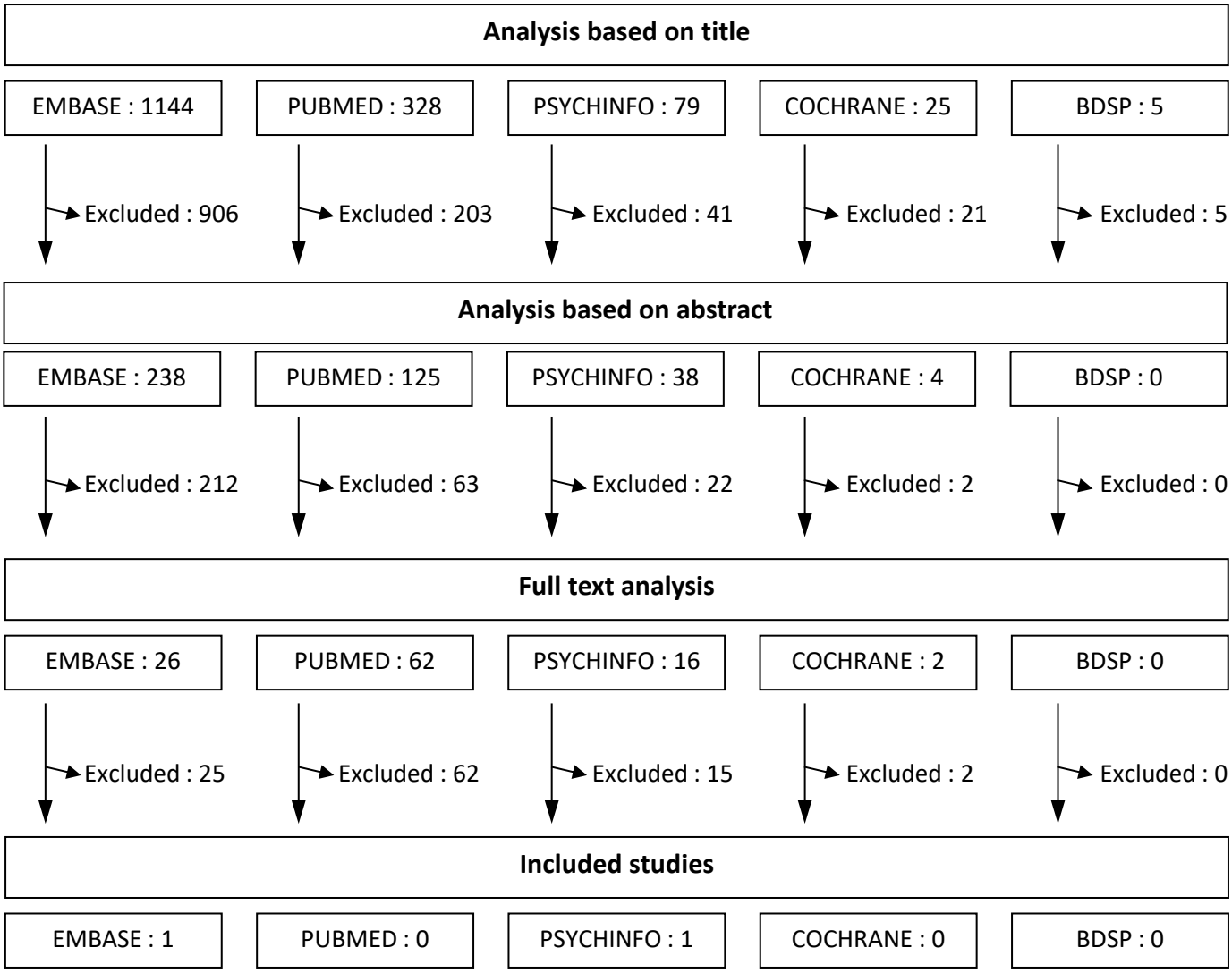
Mots clés :

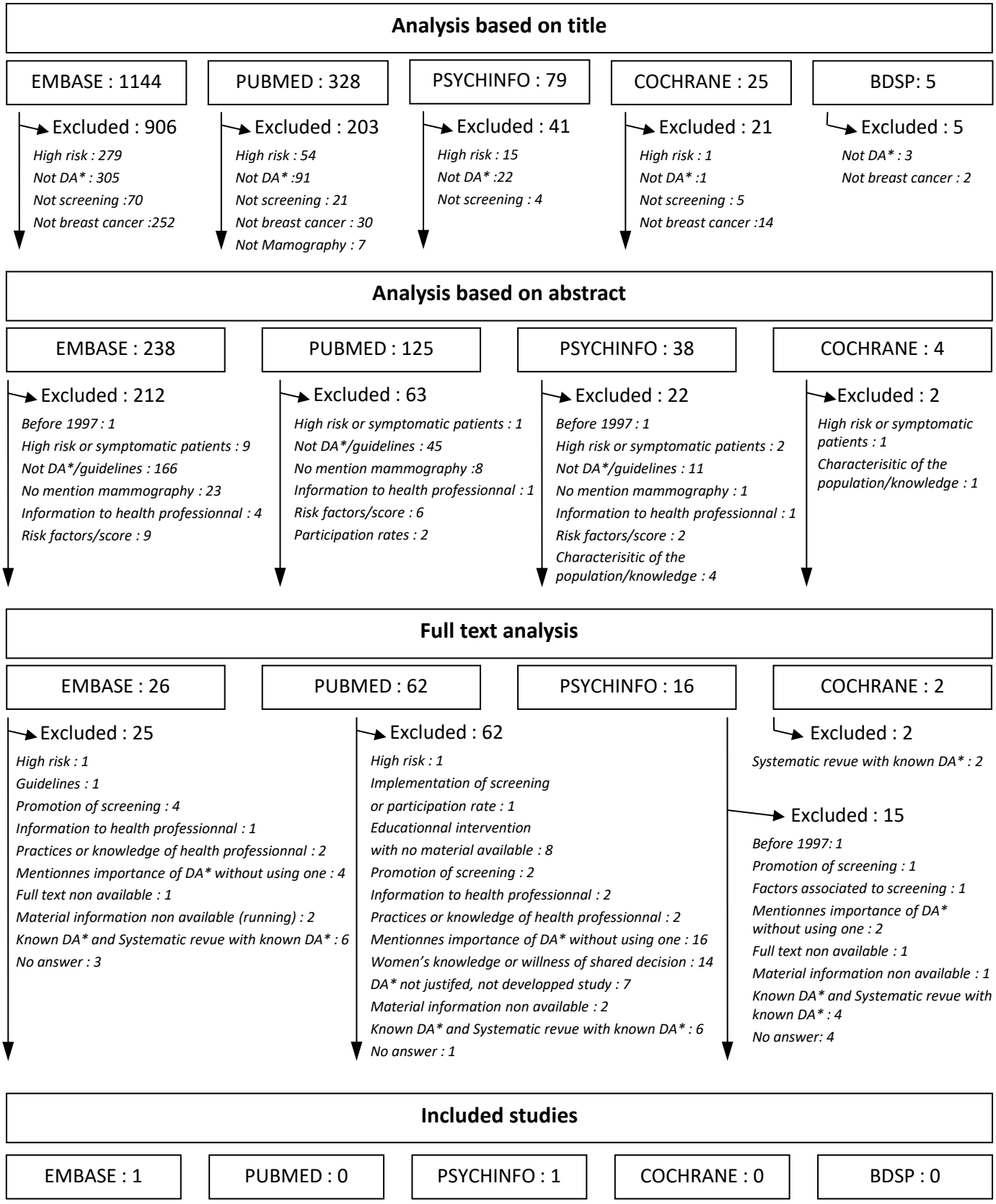
Cancer du sein, Dépistage, Mammographie, Outils d'aide, Décision partagée, Dépistage précoce du cancer, Communication en santé, Soins primaires.

Jury :

Président du Jury :	Professeur Gilles BODY
Directeur de thèse :	Docteur Sandrine HILD
Membres du Jury :	Professeur Vincent CAMUS
	Professeur Claude LINASSIER
	Docteur Cédric RAT
Date de soutenance :	le 8 novembre 2018

ERRATA


Analysis based on title
EMBASE : 1144
PUBMED : 328
PSYCHINFO : 79
COCHRANE : 25
BDSP : 5
Excluded : 906
Excluded : 203
Excluded : 41
Excluded : 21
Excluded : 5
Analysis based on abstract
EMBASE : 238
PUBMED : 125
PSYCHINFO : 38
COCHRANE : 4
BDSP : 0
Excluded : 212
Excluded : 63
Excluded : 22
Excluded : 2
Excluded : 0
Full text analysis
EMBASE : 26
PUBMED : 62
PSYCHINFO : 16
COCHRANE : 2
BDSP : 0
Excluded : 25
Excluded : 62
Excluded : 15
Excluded : 2
Excluded : 0
Included studies
EMBASE : 1
PUBMED : 0
PSYCHINFO : 1
COCHRANE : 0
BDSP : 0



DA* : Decision Aid