

The implementation of patient decision support interventions into routine clinical practice: a systematic review

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Abstract

Background: Two decades of research has established the positive effect of using patient-targeted decision support interventions: patients gain knowledge, greater understanding of probabilities and increased confidence in decisions. Yet, despite their efficacy, their effectiveness in routine practice has yet to be established and widespread adoption has not occurred. The aim of this review was to search for and analyze the findings of published peer-reviewed studies that investigated the effectiveness of strategies, methods or approaches to *implement* patient-targeted DESIs into routine clinical settings.

Method: An electronic search strategy was devised and adapted for the following databases: ASSIA, CINAHL, Embase, HMIC, Medline, Medline-in-process, OpenSIGLE, PsycINFO, Scopus, Social Services Abstracts and the Web of Science. In addition, we used snowballing techniques. Studies were included after dual independent assessment.

Results: After assessment, 5322 abstracts yielded 51 articles for consideration. After examining full-texts, 17 studies were included and subjected to data extraction. The approach used in all studies was one where clinicians and their staff used a referral model, asking eligible patients to use decision support. The results point to significant challenges to the implementation of patient decision support using this model, including indifference on the part of health care professionals. This indifference stemmed from a reported lack of confidence in the content of DESIs and concern about disruption to established workflows, ultimately contributing to organisational inertia regarding their adoption.

Conclusions: It seems too early to make firm recommendations about how best to implement patient decision support into routine practice because approaches that use a 'referral model' consistently report difficulties. We sense that the underlying issues that militate against the use of patient decision support and, more generally, limit the adoption of shared decision making, are under-investigated and under-specified. Future reports from implementation studies could be improved by following guidelines, for example the SQUIRE proposals, and by adopting methods that would be able to go beyond the 'barriers' and 'facilitators' approach to understand more about the nature of professional and organisational resistance to these tools. The lack of incentives that reward the use of these interventions needs to be considered as a significant impediment.

Background

The difficulty of translating knowledge into practice is well established and is a familiar phenomenon to researchers who promote the adoption of patient decision support interventions (DESIs) [1][2]. Two decades of research has established the positive effect of using these interventions; patients gain knowledge, greater understanding of probabilities and increased confidence in decisions [3].

The policy context has gradually become much more supportive in recent years. In the USA, the 2010 Affordable Care Act (USA) [4] was explicit about the promotion of shared decision making (SDM) and the use of DESIs. Some states have passed legislation supporting their use [5]. Similarly in the UK, shared decision making has been at the center of policy developments [6] and investments have been made in the development of online DESIs [7]. Canada is supporting province-wide work in the use of DESIs in Saskatchewan [8]. Many other countries are alert to the benefits and are considering policy developments in this area [9].

Yet, despite these policy developments and the existence of 86 controlled trials that have demonstrated the efficacy of these interventions [3], their effectiveness and adoption into mainstream clinical practice has yet to be established. There are reports of early implementation efforts in the field but many are not yet published in the peer-reviewed literature [10]. The Dartmouth-Hitchcock Medical Center, New Hampshire, has routinely provided many patients with DESIs (DVDs and booklets) for over a decade through their Center for Shared Decision Making [11] and Group Health in Seattle has reported organization-wide adoption of DESIs for selected conditions [12][13]. However, these well-known settings remain isolated examples of adoption. Though there are many who develop and evaluate these tools in academic settings, no studies of sustained wide-scale adoption have been reported.

In 2006, Gravel described clinicians' reluctance to use patient DESIs because they did not believe that they were applicable to their patients and clinical situations [1]. Légaré examined 6764 titles and abstracts and analyzed five RCTs [2], tentatively concluding that the promotion of shared decision making may depend on a) training healthcare professionals and b) the adoption of patient targeted DESIs [2]. A conceptual analysis using the normalization process model highlighted some of the intra-organisational issues that might underlie the difficulties that are being experienced [14].

The stimulus for this review arose from work being undertaken by the International Patient Decision Aids (IPDAS) Collaboration which has produced a checklist [15] and an instrument to assess the quality of these interventions [16]. The Collaboration initiated a review of its quality dimensions in 2010. As part of this work, we wanted to know whether we could identify evidence to inform recommendations about how best to implement patient DESIs into practice. We wanted to reflect the increasing emphasis being given to delivery research encompassing implementation or improvement science [17]. Pronovost highlights an issue that is becoming of central importance for policy makers – to examine why interventions that have positive effects for patients under controlled conditions do not become established in routine settings [17]. To address this gap in knowledge, the aim of this review was to search for and analyze the findings of peer-reviewed studies that investigated the effectiveness of strategies, methods or approaches to *implement* patient-targeted DESIs into routine clinical settings and workflows.

Method

We undertook a systematic review using the following definitions and approach to search, selection and data processing.

Definition of the Dimension: This review is focused on work designed to *implement* patient DESIs into routine clinical settings. We adopted the following definitions: "... implementation is the constellation of processes intended to get an intervention into use within an organization" [18] and "... implementation is the critical gateway between an organisational decision to adopt an intervention and the routine use of that intervention, i.e. the transition period in which targeted stakeholders become increasingly skillful, consistent and committed in their use of an intervention" [19]. We are aware that the nature of patient DESIs can vary [20]. We focus on the following types of DESIs in this review: 1) brief tools designed for use in synchronous encounters (face-to-face or mediated by other means) and 2) more extensive tools (booklet, video, DVD or websites) that clinicians recommend patients to use, either before or after clinical encounters.

Search strategy: An electronic strategy was devised in collaboration with an information scientist (MM) and adapted for the following databases (1947- 24 January 2012): ASSIA, CINAHL, Embase, HMIC, Medline, Medline-in-process, OpenSIGLE, PsycINFO, Scopus, Social Services Abstracts and the ISI Web of Science (Science Citation Index Expanded, Social Science Citation Index and ISI Proceedings). Specific author searches were performed on the following researchers: M. Holmes-Rovner, K. R. Sepucha, J. Belkora, D. Frosch and D. Stacey. In addition, we used range of 'snowballing' techniques to increase the sensitivity of the search, including reference list follow up, contact with subject experts and searched content tables of relevant journals. We used Google Scholar and also searched the Kings Fund website. Articles included in a review of strategies to implement shared decision making were also considered [2]. Research colleagues were alerted to the review using two electronic networks, e.g. the SDM listserv (n=470), and the SDM Facebook group members (n=346).

Inclusion and exclusion criteria: Studies published in peer-reviewed journals were considered if they reported on the use of methods to promote the use of patient DESIs in routine practice. Studies were included if they assessed barriers to implementation and/or investigated the process of introducing organizations to the potential use of these interventions. RCTs that studied *implementation* strategies were included, provided their outcome measurements included assessments of whether these interventions became integrated into routines, at the system level or equivalent. All health care settings and all patient groups were considered, including systems where patients were directed to access DESIs by contacting a telephone call-center or using the web. No date or language restrictions were used. Studies were excluded if they did not attempt to implement DESIs in routine practice, if their sole aim was to measure effectiveness of DESIs at the patient level or if they evaluated more general interventions to 'activate' patients.

Study identification, data extraction and analysis: Search outputs were merged and duplicates were removed. Titles and abstracts were assessed independently by two reviewers and disagreement was resolved by discussion. Data extraction forms were piloted and adapted. Data from each publication were extracted, even if articles reported the same study. The following fields were used: study identifiers, study type (RCT, quasi-experimental, observational, quality improvement report, case study report, other), intervention or implementation strategy, research method, country and study setting, underpinning conceptual framework, healthcare delivery funding model (general taxation, voluntary or private insurance, other), groups described (implementation group, professional group, patient group),

study purpose, duration, funder, incentives for patients or professionals, organizational level (microsystem or team, department, institution), DESI type, point at which the DESI is introduced to the patient (e.g. before, during or after the clinical encounter), method of distribution. Data were also extracted on implementation outcomes, including the number of patients who were eligible, referred to or provided with DESIs, used DESIs and were seen by a health professional after using DESIs. Finally, data about outcomes related to professionals and systems, e.g. views, barriers and facilitators were extracted. Independent data extractions, completed by IS and CT, were compared and discussed. Disagreements resolved by discussion with GE. Each study was summarized, and a synthesis of the results was produced. Anticipating significant diversity in methods, we did not assess the study quality.

Assessment of implementation level: Each study was assessed independently by GE and IS and categorized according to the intervention described and the level of implementation achieved, using an adapted model of implementation – see Table 1 [21] [22]. Disagreements were resolved by discussion.

Results

Studies included: Databases searches in July 2011 and January 2012 generated 4911 abstracts. 411 additional abstracts were identified using other sources. After removing duplicates 2848 abstracts remained. Examining Légaré's review of interventions to implement shared decision making [2] did not lead to further study inclusion. After independent review by IS, CT and GE, 51 studies were retained for further discussion by two raters (IS and GE). After examining full-text articles, 17 were retained for data extraction, see flow diagram in Figure 1. A total of 34 studies were excluded at this stage. Further details of the studies excluded are provided in Table 2.

Overview of studies: The studies are summarized in Table 3 and Table 4. The majority of studies included used mixed methods (n=11). Three studies used qualitative methods [23][24][25], and three relied on quantitative methods [26][27][28]. Eleven studies were based in the USA and two in the UK. Four were based in call-centers (three in Canada[29][30][27] and one in Australia [31]) and two in the UK [32] [23]. Implementation was studied in both primary and secondary care settings, often involving multiple professions. Decision support for 'screening' tests was mostly based in primary care or in internal medicine organizations. Clinical topics were varied, with several studies on breast and prostate cancer. Notwithstanding their common focus, there was significant diversity in both approach and evaluation. Eight of the 17 studies had been supported by the then Foundation for Informed Medical Decision Making.

Conceptual frameworks: Of the 17 studies, few describe an explicit implementation framework as the basis of their evaluations. Stacey cites the Ottawa model of research use in four similar studies [29][30][27][31], a model based on knowledge translation [33]. Roger's 'theory of innovation diffusion' is cited by Feibelman [34]. Holmes-Rovner [35] and Belkora [36], use a logic model as the basis for their evaluations.

Implementation strategies: Of the 17 studies, six were based on recruiting organizations at an institutional level and eight at a microsystem (team or department) level. Evaluation was often based on counts of the number of DESIs given to patients and counts of patient use based on follow-up surveys. Studies in nurse-led call-centers used training events and simulated patient callers to assess professional willingness to use patient DESIs.

Almost all of the studies used a 'referral' model of DESI implementation, where patients were either sent the DESI by post and asked to view it, or were directed to use the DESI (at home or in clinic) by either the clinician or another member of the clinical team. Most studies reported difficulties in operationalizing the referral model. One study compared different methods of delivering DESIs to patients eligible for a preventive-type decision (e.g. colorectal cancer screening) [26]. The authors found that systematic automated delivery was most efficient in reaching the greatest number of eligible patients, although it led to 20% of patients being inappropriately offered the interventions [26]. Irrespective of delivery mode, the patient viewing rate was estimated to be 25% of those sent out [26]. Belkora's approach of getting pre-medical students to coach patients to list questions and use DESIs ahead of clinical encounters is a variant of the referral method, and relies on the identification of eligible patients ahead of encounters with clinicians [37][36]. All methods required organizational commitment. Only one study reported implementation costs, using estimates of the staff time used to identify patients [28].

The existence of barriers: The dominant theme in a majority of the studies was the existence of barriers to efficient delivery. Stacey [31], Feibelman 2011 [34] and Frosch [24] reported professionals' attitudes and their call for more training in how to use decision support and undertake SDM [29][30][27][31]. There are also reports that clinicians may not trust or agree with the *content* of DESIs [38][23][34]. Some professionals were reported to hold the view that patients did not want decisional responsibility when facing difficult diagnoses [39] and that DESIs were in 'competition' with other information designed for patients, suggesting that the intended aim of the DESIs, (i.e. to support patients in engaging in decisions), was not always understood [23][30][34].

Studies also reported that clinicians did not view the task of referring patients to use DESIs as part of their role, often citing competing demands and time pressure as the main reason why they could not incorporate this task into their usual care [38][23][40][39][30][37][26][36][34][24]. As Brackett reports, when clinicians were responsible for identifying patients, distribution of DESIs failed because they were 'distracted by other duties' [26]. Frosch [24] and Uy [25] describe two such studies, characterized essentially by implementation failure, particularly in organizations where team work was poor. One study illustrated this disinterest by using a modest financial incentive to encourage DESI distribution to patients; although effective while in operation, this strategy had no lasting impact as distribution ceased completely once the incentive ceiling had been met [25].

The studies demonstrate significant gaps between those patients who were deemed eligible, those who are successfully provided with the tools and those who made use of them [38][40][39][26][34][28]. Patient-level measures were, for the most part, not reported and were not the focus of this review.

To overcome the problem of competing demands and low prioritization, system-based approaches were tested and found to be more successful [26][37][36][28]. However, system-based approaches rely on clinical problems where patients can be identified ahead of visits to the clinic. In situations where patients can potentially be identified ahead of clinic visits, logistical problems were reported. Mailing DESIs to patients will only be effective if patients use them. Brackett reported viewing rates of 25% [26], and, in a referral model, Uy reports 37% [25]. Inviting patients to view the DESIs in-clinic prior to a visit requires space, equipment and a well-organized scheduling system. All require organizational commitment. Call-center settings also report organizational tension, notably a concern that call-handling efficiency might be disrupted by the adoption of decision support protocols [31].

Facilitators: Some studies report factors that facilitated the use of DESIs. The provision of training and skills development [29][30][35] and the identification of a clinical champion, especially in a leadership position, were important positive factors [40][25]. However, the most often cited predictor of success was the introduction of a system where eligible patients were systematically identified [40][26], or supported to use DESIs ahead of relevant clinical consultations [37][36]. In other words, methods of distribution that did not to rely on clinicians to initiate access to these tools proved to be the most effective by far.

Levels of implementation achieved: The levels of DESI adoption achieved were generally framed by the studies as being ‘less than expected’. However, the studies did not explicitly report whether or not sustained use of DESIs had been achieved although testing ‘feasibility’ was often the primary aim and reported early stages in learning about the potential use of these tools. Nevertheless, the implicit goal in most studies was to encourage the adoption of patient DESIs and so it remains of interest to assess the outcomes using an implementation model (Table 1). We do acknowledge that lack of detail and data made it difficult to assess the ‘degree of implementation’ achieved (see Table 4).

Judged against the implementation model, 10 of the 17 studies were categorized as achieving ‘insight’ (see Table 4), 4 achieved a level of ‘change’ [26][36][34][28] and none of the studies indicated that organizations had been able to achieve ‘maintenance’ levels, where DESIs were in sustained use. This may be due to the barriers identified in the studies, which contributed to recruitment patterns that showed low interest in participation and in less-than-anticipated distribution of these interventions to patients.

Discussion

Principal findings

Despite the increasing interest in moving patient decision support from the world of randomized trials to that of routine settings, this review points to major implementation challenges. In contrast to the positive findings reported in trials [3], these studies paint a picture of professional indifference and organisational inertia. Many of the barriers are similar to those encountered in other attempts to improve practice performance, where other competing priorities take precedence and where uncertainty about the added value of the proposed intervention favors the status quo [41]. Note that the organizations in these studies were willing volunteers and so implementation might be even more difficult in other settings. Although many countries are considering shared decision making in their policy developments, most of the implementation work to date has been located in North America. Ten studies were based in the USA and three in Canada, an illustration that this work remains in the research domain [9]. The majority of the work was conducted with limited resources in comparison to research funded by mainstream sources, such as the National Institute for Health, and so in appraising these studies we need to recognize the constraints imposed by these limitations.

The studies do however reveal issues that are specific to the challenge of implementing patient DESIs. Reliance on clinicians to refer patients to these tools leads to limited utilization, and so using system-based approaches, where feasible, reaches more patients. Unfortunately, system approaches rely on identifying eligible patients ahead of visits and this task is only possible for a limited number of conditions. Even when this is feasible, logistical and infrastructure challenges still impede integration into practice. When patients present with undifferentiated problems, identifying their decision support needs ahead of a visit may be impossible. This issue limits the scope for studies that adopt a referral model: most are based on clinical issues where prior identification is possible, e.g. invitations for

screening and prevention. Yet, even in secondary care where it is often possible to predict the clinical decisions that will be needed, the process of ensuring patients use DESIs ahead of encounters is a challenge because the windows of opportunity are often short. Ultimately, the studies indicate that this degree of capital and logistical infrastructure is challenging to initiate and maintain and will require sustained investment [40][37][36][34][24][28]. These issues also make the limits of system-based approaches apparent and highlight the fact that referral by clinicians at the point of care will continue to be necessary for many clinical issues for which decision support is available.

The included studies use a 'referral model' of DESI dissemination whereby practitioners or their support staff identified patients eligible for decision support. The referral model proposes that these tools are 'adjuncts' that support shared decision making, when used ahead of visits, or shortly afterwards [42]. However, the concept that these tools are positively viewed as 'adjuncts' by clinicians does not seem to be supported in practice. Many of the studies report that professionals distrust the content of the tools, question their evidence-base, believe that they do not reflect 'local' data, think that patients will decline to take part in decisions and, critically, that offering options is not what they would advocate from a 'best practice' perspective. These findings suggest that the reluctance to prioritize the use of DESIs might lie deeper than a general resistance to change. The referral model might be based on assumptions about their contribution that is not shared by front-line clinicians [43], a suggestion we discuss further below. An alternative model where SDM is initiated by the practitioner in the space of clinical encounters, using briefer DESIs to catalyze dialogue about options, which in turn lead to the use of more extensive tools [44], does not seem to have been extensively investigated, although a few trials exist [45][46].

Although many barriers to implementation were described (see Table 4), these were seldom examined in depth, with the exception of three studies that employed qualitative interviews [23][24][25]. Additional insights might have been gained if more studies had explored the views of professionals regarding the use of DESIs and specifically about their impact on practice workflows.

Strengths and weaknesses of the study method

The search strategy was developed in consultation with an information scientist and piloted before application to multiple electronic databases. We deliberately excluded work from conference proceedings and non-peer reviewed material. The review does not attempt to pool the data from the studies nor assess their quality: we judged the methods and results to be too heterogeneous. The study team was experienced in the field and was familiar with the evidence-base. Dual independent review was accomplished at key stages of the review process. There was low inter-rater agreement on the first round of assessing implementation levels achievement and this required attention in a second round. The results were seldom organized in a way that assisted this assessment: more work is required to set clear criteria for assessing implementation attainment levels.

Relation to other literature

The challenge of implementing patient DESIs is already well documented [1] [2] and we also know that practitioners do not achieve shared decision making [47]. However, we must be careful not to equate the successful introduction of DESIs into clinical pathways as automatically leading to SDM. For instance, Frosch found that the use of a PSA DESI ahead of a clinical encounter led to less SDM if a patient was not in favor of screening [48]. While we can be confident that these interventions have positive results at the patient level [3], we do not as yet fully understand their impact on clinician-patient dialogue. Other models where practitioners might use brief tools and take more responsibility for initiating the process of shared decision making face-to-face with patients deserve further investigation.

More use could have been made of developments in the evaluation of complex interventions [49], implementation and evaluation studies [50]. Realist evaluations provide a way to study why interventions that have good effect in some settings fail when attempts are made to introduce them in other clinical settings: context matters [51]. Many opportunities exist to bring these worlds of inquiry to bear on how best to implement patient DESIs. Damschroder et al provided a consolidated framework for advancing implementation science [50]: a synthesis of 19 models that describes five domains, namely, intervention characteristics, outer setting, inner setting, characteristics of the individuals involved and the process of implementation. Future studies should consider the reported utility of these conceptual frameworks to guide implementation.

Conclusions

The goal for this review was to make recommendations about how best to implement patient targeted DESIs into practice. Having reviewed the existing studies, it seems too early for such recommendations. Perhaps the effort to implement was done too soon, ahead of any work done to achieve levels 1 and 2 of Grol's model - 'orientation' and 'insight' - in the recruited organizations. Without these first steps, it is unlikely that level 3, 'acceptance', would have occurred, and so the motivation to use patient DESIs might have been absent. Although it would not be difficult for us to suggest general principles of successful adoption [52], we feel that it might be more helpful to emphasize that the specific underlying issues that militate against the use of patient DESIs and, more generally, limit the adoption of shared decision making, are under-investigated and under-specified.

However, we do have two substantive research recommendations. It would be helpful to have a framework for reporting these studies, based on the SQUIRE guidelines [53], adapted to cover the reporting of the patient identification processes, the numbers of patients eligible for specific DESIs (initial denominator), the inevitable attrition in numbers along the delivery pathway, the delivery mechanism, the evaluation of use by the patient and the impact on decision outcomes (process and quality). In addition, approaches not previously used in this field should be considered as a means to investigate and measure the challenges of implementing new delivery-systems [54]. For instance, methods such as cognitive task analysis, ethnography and action research, tools to assess the 'adaptive reserve' of teams [55] or their 'readiness for change' [56], are approaches that would pay more attention to the role of the participants in shaping and using the technologies [57], and how they fit into the demands of other technologies, such as the electronic medical record and demands for performance metrics. Amidst all of this will be the need to monitor which professional and team-related behaviors will be rewarded as health systems increasingly seek to ensure patients experience better quality of care [58]. As a final comment, we need to acknowledge that all the existing studies operated in a policy context where no rewards or incentives existed to promote the use of patient decision support and were being done in parallel in a period where considerable resources were being invested in the adoption of electronic health care records.

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Figure 1 Flow diagram: search outputs, study identification and inclusion

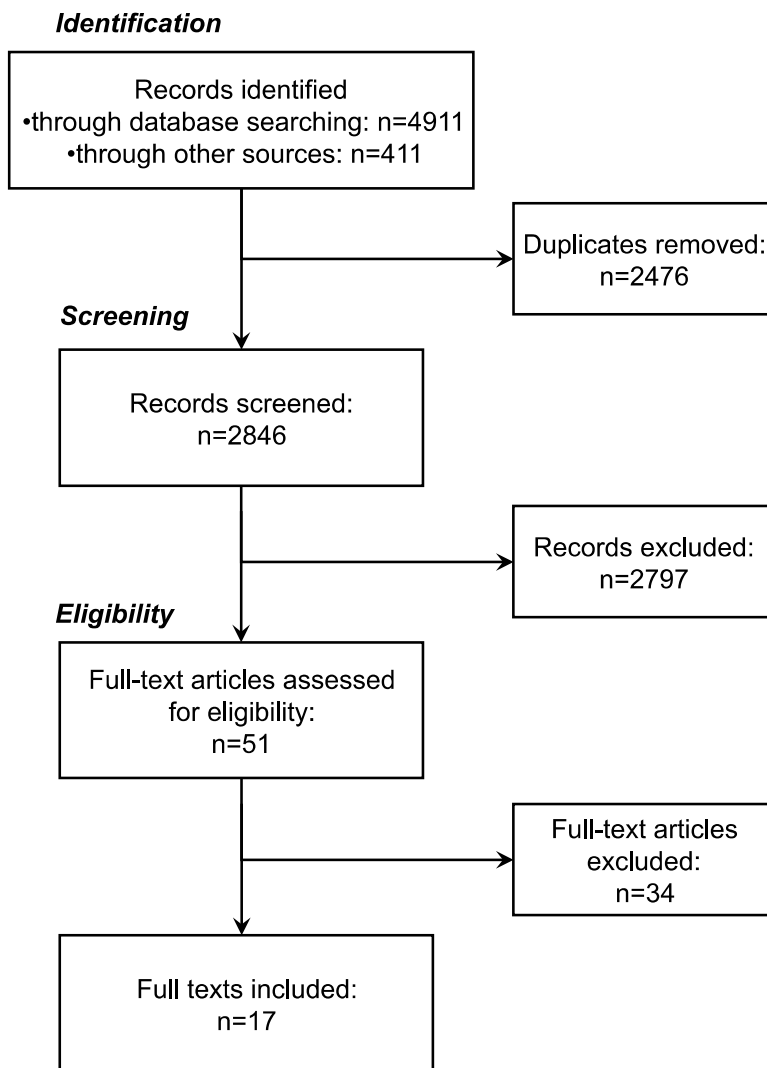


Table 1 Five stages of achieved implementation (adapted from Grol et al) [21][22]

Stage	Description	Criteria for assessment
1. Orientation	Awareness and interest in the innovation	Distribution of messages, key figures and networks approached and informed.
2. Insight	Understanding and insight into the implications for routines	Provision of instruction materials, using methods of audit and feedback on performance.
3. Acceptance	Positive attitude to change, positive intentions/decision to change	Adaptation of innovation by target group, identification of resistance to change, involvement of key individuals, pilots and demonstration of feasibility, detection of barriers and search for solutions.
4. Change	Actual adoption, try out change in practice, exploratory use, confirmation of value of change	Provision of resources, support for skills training, redevelopment of processes, temporary resource support, inventory of barriers and solutions attempts.
5. Maintenance	New practice integrated into routines/routine use, new practice embedded in organisation, sustainability over time	Long-term monitoring, feedback and reminder systems, integration into routine pathways, provision of resources and support from management.

Table 2 Studies Excluded after review of full-text articles

Reason for Exclusion (assessment of 51 full text articles)	Author, year and study citation	Number of studies excluded
Intervention was not a DESI	Belkora 2008 [59], Kotecha 2009 [60].	2
Not an implementation study (i.e. the primary aim was efficacy or other).	Bhavnani 2010 [61], Charles 2004 [62], Doran 2009 [63], Frosch 2008 [64], Graham 2007 [65], Hamann 2007 [66], Lewis 2008 [67], Ossebaard 2009 [68], Stacey 2009 [69], Stacey D, O'Connor 2003 [70], Thistlethwaite 2007 [71], Towle 2006 [72], Watson 2008 [73], Hirsch 2011 [74].	14
The article was an editorial, a model, a review or had not been subjected to peer reviewed.	Billings 2004 [75], Demilew 2004 [76], Holmes-Rovner 2007 [77], Lenert 2010 [78], Lewis 2009 [79], Légaré 2008 [80], Légaré 2010 [2], McCaffery 2007 [81], O'Connor 2005 [82], Pignone 2009 [83], Scott 1998 [84], Sepucha 2009 [85], Sepucha 2003 [86], Simmons 2010 [87], Wen 2010 [88], Wirmann 2006 [89], Vandemheen 2011 [90].	17

Table 3 Summaries of patient decision support implementation studies: aims, implementation strategy and outcomes

Author Year, Country, Setting, Study Type. Funding.	Study aims / Conceptual framework.	Intervention and implementation strategy / Study duration	Implementation outcomes Provider outcomes
Holmes-Rovner 2000 [38], USA, Secondary care hospital; observational study. Funding: Blue Cross and Blue Shield, Health Insurers.	To determine the feasibility of using DESIs in a fee-for-service hospital system (physicians' offices and in-patient facilities). Framework: nil reported.	Invitations to express interest in an evaluation of DESI implementation were sent to hospitals in Michigan. Five hospitals were selected based on their interest, physician leadership, patient volumes and evidence of supportive staff and systems. On-site study coordinators acted as participant observers, tracking patient flows and the use of DESIs, noting barriers and facilitators. Study duration: Oct-Dec 1996 for pilot, Jan-May 1997 for initial implementation period (8 months).	Implementation outcomes: Across all sites, the potential numbers of eligible breast cancer patients were estimated to be 1319 per year; 1222 per year for ischemic heart disease. The use of DESIs was far lower than anticipated: 4 of 27 eligible breast cancer patients were referred in one site; across all sites, a total of 24 patients referred over 7 months in 3 hospitals. The number of eligible and referred patients not reported for ischemic heart disease.
Stapleton 2002 [23], UK, secondary care maternity units, quasi-experimental and observational study. Funding: Department of Health.	To evaluate the use and impact of evidence-based leaflets on informed choice in maternity services. Framework: nil reported.	13 maternity units allocated to 10 clusters: the 5 intervention clusters that received the DESIs (leaflets) were compared to 5 controls. Study duration: not reported.	Implementation outcomes: 70% of women recruited reported receiving at least one leaflet. Health professionals were rarely observed discussing leaflets with patients.
Stacey 2005 [29], Canada; call centers, observational study. Funding: Sources related to Canada Research Chair.	To evaluate barriers and facilitators influencing the provision of decision support by call-center nurses. Framework: Ottawa model of research use and Ottawa Decision Support Framework.	The performance of call-centre nursing staff introduced to patient decision support was evaluated using simulated callers. A survey, semi-structured interviews and focus groups were used to collect data. Study duration: December 2003 - January 2004 (2 months).	Provider outcomes: 99 nurses were approached and 38 consented to undertake evaluation by simulated calls. During these simulated calls, 28 nurses used decision support, to variable extents.

Author Year, Country, Setting, Study Type. Funding.	Study aims / Conceptual framework.	Intervention and implementation strategy / Study duration	Implementation outcomes Provider outcomes
Silvia 2006 [40], USA, secondary care oncology, observational study. Funding: FIMDM.	To characterize patterns of use and perceived barriers to implementation in clinical sites that had shown expressed interest in providing patient DESIs. Framework: nil reported.	Convenience sample of 15 sites identified in the USA, and informed about availability of DESIs. Each site was sent 10 copies (DVDs). Follow-up interviews were scheduled at 6-12 months. Study duration: DESIs allocated January - August 2003. Total duration: not reported.	Implementation outcomes: All 15 sites requested additional DVDs. However, only 6 of the 15 sites had implemented the DESIs and 9 were willing to be interviewed. Patient exposure to the DESI varied. Five sites reported reaching between 40 to 80% of eligible patients.
Stacey CS 2006 [30], Canada, call-center; case study. Funding: Canadian Institute for Health Research.	To describe and evaluate a nurse-staffed call-center experience of using a decision support protocol. Framework: Ottawa model of research use.	The intervention consisted of: online tutorial, skills workshop, provision of a decision support protocol and feedback on the quality of decision support provided to pre-arranged simulated calls. Study duration: Dec 2003 - June 2004 (7 months).	Provider outcomes: 31 nurses received the intervention; 25 responded to a survey. The majority of the nurses reported positive future intentions to use decision support protocol, however, a month after the workshop, 11 of the 25 reported actual use.
Stacey, O'Connor et al, 2006 [23], Canada, call center; randomized controlled trial. Funding: Ontario Ministry of Health.	To evaluate the implementation of decision support and decision coaching in a nurse-led call center. Framework: nil reported.	The intervention included education regarding coaching and a skills workshop. Baseline and post-intervention data were collected using calls by simulated patients. Study duration: Second simulated call one month after intervention. Duration: not reported.	Provider outcomes: compared with controls (n=20), nurses in the intervention group (n=21) had greater knowledge and had improved decision coaching skills. Provision of decision support did not increase call duration.

Author Year, Country, Setting, Study Type. Funding.	Study aims / Conceptual framework.	Intervention and implementation strategy / Study duration	Implementation outcomes Provider outcomes
<p>Garden 2008 [32], UK, Secondary care urology clinics, observational study. Funding: Department of Health, UK.</p>	<p>To evaluate a two-phase implementation of a DESI (from USA) in a number of urology clinics in the UK. Framework: nil reported.</p>	<p>Exploring the use of DESIs for benign prostatic hypertrophy and prostate cancer in urology clinics in the UK. Phase 1 was exploratory in two sites. In phase 2, training in the use of decision support was provided and the study extended to six sites. Study duration: Phase I was launched May 2004, Phase II launched September 2005. Duration: not reported.</p>	<p>Implementation outcomes: The study demonstrated variable use of the DESIs across the study sites.</p>
<p>Silvia 2008 [39], USA, secondary care oncology, observational study. Funding: FIMDM.</p>	<p>To investigate the barriers to implementing DESIs for breast cancer decision aids into clinical practice settings. Framework: nil reported.</p>	<p>50 breast care centers in Massachusetts were invited to participate in study of DESI dissemination. Sites that expressed interest were provided with DESIs (DVDs). Follow up calls examined their wish for further supplies. Follow up interviews were conducted. Study duration not reported.</p>	<p>Implementation outcomes: Of the 50 sites contacted, 44 agreed to participate and at follow-up calls, 23 wanted additional copies. However, only 12 sites were willing to be interviewed. Sites had been using the DESIs for an average of 11.23 months (range 6-14 months) at the time of the interviews. Of the 44 initial sites, 9 sites provided the DESIs to patients, reaching on average 39% of eligible patients.</p>
<p>Stacey 2008 [31], Australia, Cancer Helpline Service; pre and post- assessment. Funding: Not reported.</p>	<p>To evaluate professionals' views about providing decision support in a cancer call-center. Framework: Ottawa model of research use.</p>	<p>The intervention included a decision support tutorial, skills workshop, decision coaching protocol and simulated telephone calls by a simulated patient, at two time points. A pre and 3 months post-intervention survey assessed professional views and knowledge. Study duration: June - December 2005 (6 months).</p>	<p>Provider outcomes: After the intervention, participants (n=32) reported being more prepared and confident in providing decision support. Participants provided higher-quality decision support to simulated callers without increasing call duration.</p>

Author Year, Country, Setting, Study Type. Funding.	Study aims / Conceptual framework.	Intervention and implementation strategy / Study duration	Implementation outcomes Provider outcomes
Belkora 2009 [37], USA, secondary care breast care; case study. Funding: FIMDM	To determine how organizational plans facilitated the delivery of DESI for patients with breast cancer / assess patient views about the effectiveness of decision support.	A case study of one patient's experience, including case record analysis. Study duration: not reported.	Comparison of records to program logic model provided positive appraisal.
Brackett 2010 [26], USA, Primary care, rural academic medical centers, quasi-experimental study. Funding: FIMDM.	To compare different distribution methods for decision support. Framework: nil reported.	Four distribution methods were compared: 1) Automated pre-visit mailing of PSA screening DESIs to eligible men prior to scheduled visit, 2) Elective pre-visit mailing of colorectal cancer screening DESI to eligible people prior to scheduled visit, 3) post-visit eligibility check by administration staff and offer of PSA screening DESI, 4) post-visit check for eligible patients and clinician referral to collect PSA screening or colorectal cancer screening DESI. Study duration: from June 2006 to May 2008 (23 months).	Implementation outcomes: Automatic mailing led to near universal receipt but also led to ineligible patients receiving the tools (20%). Three different elective (non-automatic) strategies led to low rates of receipt, i.e. less than 10% of eligible patients. Viewing rates for each strategy, as judged by questionnaire return rates, were the same (25%). Provider outcomes: Clinicians preferred automated distribution systems.

Author Year, Country, Setting, Study Type. Funding.	Study aims / Conceptual framework.	Intervention and implementation strategy / Study duration	Implementation outcomes Provider outcomes
<p>Belkora 2011 [36], USA, Secondary care, quality improvement study. Funding: FIMDM.</p>	<p>To increase the use of DESIs for patients with breast cancer without increasing costs by addressing three key barriers: 1) Improve scheduling services; 2) Identify how to deliver question-listing tools to patients; 3) Match staff availability to patient visits.</p> <p>Framework: nil reported.</p>	<p>Continuous quality improvement strategies, using regular meetings between implementation team, program director and coordinators, based on observational data and other records. Proposals for change were agreed and implemented using policy and procedure amendments, training, supervision meetings, case reviews, audit and feedback. Changes included: 1) using staff marginal time to conduct question-listing sessions for patients using telephone calls; 2) focus on delivering decision tools to patients. Study duration: 2005-2006 - analysis of program data; 2006-2008 continuous quality improvement program. Duration: not reported.</p>	<p>Implementation outcomes: improvements reported. Pre-intervention 25% (208/821) patients were given access to decision support and 17% (142/821) received enhanced decision support (question listing, audio recording and note-taking). Post intervention: 70% (936/1331) patients were given access to decision support and 21% (285/1331) received enhanced support.</p>
<p>Feibelman 2011 [34], USA, mixed care settings for breast cancer, quasi experimental study. Funding: FIMDM.</p>	<p>Evaluation of a structured approach to disseminating DESIs to community sites, examining factors associated with sustained implementation of at these sites.</p> <p>Framework: Rogers theory of innovation diffusion.</p>	<p>Sites and contacts were identified and invited to provide patients with the DESIs. Evaluation was based on site interviews 6-12 months after sign-up and annual surveys assess use. Study duration: 3 phases of dissemination activities of Breast Cancer Initiative since 2002. Phase 1 and 2 are described in separate papers included in this review. Duration: not reported.</p>	<p>Implementation outcomes: 94% (104/111) of sites contacted sites wanted information, 41% (46/111) signed participation agreements, 28% (31/111) distributed DA to at least one patient (their definition of adoption). After one year 25% (28/111) of the sites were using DESIs, to variable extents.</p>

Author Year, Country, Setting, Study Type. Funding.	Study aims / Conceptual framework.	Intervention and implementation strategy / Study duration	Implementation outcomes Provider outcomes
Holmes Rovner 2011 [35], USA, primary care internal / family medicine clinics; observational study. Funding: FIMDM.	To evaluate the implementation of DESIs for stable coronary artery disease into clinical practice. Framework: evaluation logic model provided.	Identification and provision of DESI to eligible patients by providers. Patients also invited to group meetings and for clinic visits after viewing the DESI. Providers received short introduction and training in the use of DESIs. Study duration: Nov 2009 - April 2010 patients recruited, Oct 1 - Dec 15 2009 providers recruited and trained. Duration: not reported.	Implementation outcomes: Of 247 patients identified as eligible to take part, 168 could be contacted and of these 168, 42 (30%) consented to the evaluation and received the DESI. Research process seemed to hinder implementation.
Frosch 2011 [24], USA, primary care practices, observational study. Funding: FIMDM.	To examine the feasibility of implementing DESIs for cancer screening in primary care practices serving low-income communities. Framework: nil reported.	Recruited 12 practices were asked to identify patients eligible for prostate or colon cancer screening and to provide them with DESIs. Study duration: total days to meet project goals: range 47 - 210 days. Duration: not reported.	Implementation outcomes: Target goal was achieved for 9 practices, i.e. 20 patients per practice. Additional financial incentives were required to motivate action. Only 2 practices achieved the target independently of researcher support.
Miller 2011 [28], USA, academic internal medicine practice, observational study. Funding: FIMDM.	To evaluate the feasibility and effectiveness of an in-clinic distribution model, using a clinical staff member to identify eligible patients. Framework: nil reported.	Using three identification models, patients were asked to attend prior to a clinic visit to view a DESI (DVD). Study duration not reported.	Implementation outcomes: Of 1229 eligible patients identified, 913 attended for assessment. Of 268 patients found to be eligible and who agreed to view the DESI, 222 viewed at first visit and 46 viewed at either second or third visit. Mean time spent watching the DVD was 13 minutes. Provider outcomes: Estimated time spent on DESI allocation was 292 hours. Staff time cost estimate \$3504, average of \$13 per DESI.

Author Year, Country, Setting, Study Type. Funding.	Study aims / Conceptual framework.	Intervention and implementation strategy / Study duration	Implementation outcomes Provider outcomes
<p>Uy 2011 [25], USA, primary care practices, observation, qualitative. Funding: FIMDM.</p>	<p>To explore: 1) the use of DESIs in community-based primary care settings, 2) barriers and facilitators to prescribing DESIs, and 3) the impact of a financial incentive on DESI prescribing.</p> <p>Framework: nil reported.</p>	<p>Four clinics were chosen based on their previous successful involvement in an earlier project. In Phase I, practices were asked to identify eligible patients for a range of DESIs and provide them with DESIs. Distribution logistics were individually established by practices. Weekly visits were conducted to identify barriers and develop potential solutions. In Phase II, financial incentives were introduced.</p> <p>Study duration: October 2007 - November 2008 (13 months)</p>	<p>Implementation outcomes: number of eligible patients not reported. Across the four practices, 457 DESIs were offered to patients. Average provision per month in Phase I: 6.5 DESIs (range 3.6-9.2). In Phase II provision per month increased to 11 DESIs per month (range 3.5-21.4). Estimated viewing rate was 37.9% for Phase I and 43.9% for Phase II.</p>

Table 4 **Reported barriers, facilitators and levels of implementation**

Author, Date, Country, Setting, Study Type	Identified barriers	Identified facilitators	Level of implementation achieved 1. Orientation 2. Insight 3. Acceptance 4. Change 5. Maintenance
Holmes-Rovner 2000 [38], USA, Secondary care hospital; observational study. Funding: Blue Cross and Blue Shield, Health Insurers.	DESI provision not integrated into role or task expectations, i.e. clinicians ‘forgot’ to give the tools to patients. Logistical challenges also reported, e.g. collection of the tools from a separate center and rapid scheduling of patients for surgery did not provide time for patients to consider decisions fully. Professional skepticism about the value of decision support was reported and accounts that the tools were viewed as good sources of information but not as means to involve patients in decisions.	Not reported.	2 – Insight
Stapleton 2002 [23], UK, secondary care maternity units, quasi-experimental and observational study. Funding: Department of Health.	Competing demands in clinical environments, time pressures, clinical unavailability of some treatments (leaflets described options that were not available locally) and staff disagreement with leaflet content, hierarchical professional power structures, where obstetricians defined "right" choices, failure to distinguish leaflets from other information related to pregnancy, packaging of leaflets in advertising or maternity folders, failure to understand shared decision making and the lack of continuity of care during pregnancy.	Not reported.	2 – Insight

Author, Date, Country, Setting, Study Type	Identified barriers	Identified facilitators	Level of implementation achieved
<p>Stacey 2005 [27], Canada; call centers, observational study. Funding: Sources related to Canada Research Chair.</p>	<p>Difficulty in using DESIs via the telephone, lack of ability and confidence to address callers' decisional needs, increased call length and a lack of knowledge regarding available health services within the caller's community.</p> <p>Organizational factors: e.g. pressure to minimize call length and the novelty of providing decision support at a call centre and the lack of performance standards.</p>	<p>Prior nursing experience of patient decision support. Existence of a tailored call-center infrastructure.</p>	<p>2 – Insight</p>
<p>Silvia 2006 [40], USA, secondary care oncology, observational study. Funding: FIMDM.</p>	<p>Lack of clinical motivation to use DESIs and a reported shortage of time and resources.</p> <p>Logistical challenge of providing patients the time and space to view DVDs.</p> <p>Decision support was also viewed as being in competition with other existing patient information and to concerns about 'overwhelming' patients.</p>	<p>The existence of a clinical champion, especially when in a leadership position.</p> <p>Systematic approach for integrating the provision and use of patient DESIs support into clinical pathways.</p>	<p>2 – Insight</p>
<p>Stacey, Pomey et al 2006 [30], Canada, call-center; case study. Funding: Canadian Institute for Health Research.</p>	<p>Difficulty in using decisions support materials over the telephone. Concern that call efficiency might be compromised. Perceived inadequate skills and low confidence in providing decision support.</p>	<p>The provision of training and the introduction of a patient decision support protocol.</p>	<p>2 – Insight</p>

Author, Date, Country, Setting, Study Type	Identified barriers	Identified facilitators	Level of implementation achieved
Stacey, O'Connor et al, 2006 [23], Canada, call center; randomized controlled trial. Funding: Ontario Ministry of Health.	Not reported.	Not reported.	2 – Insight
Garden 2008 [32], UK, Secondary care urology clinics, observational study. Funding: Department of Health, UK.	No barriers reported.	Not reported.	2 – Insight
Silvia 2008 [39], USA, secondary care oncology, observational study. Funding: FIMDM.	Lack of clinician support for using DESI, due to lack of time and unfamiliarity with the content. The resistance of other professionals, e.g. nursing staff, was also reported, specifically due to a concern that patients resist engaging in decisions at a time of cancer diagnosis.	Accepting the added value of using DESIs facilitated implementation: more patients received and used DESIs when nurses were involved in recommending their use.	2 – Insight
Stacey 2008 [31], Australia, Cancer Helpline Service; pre and post- assessment. Funding: Not reported.	The reported barriers were limited awareness of patient decision support, potential organisational ambivalence for the task and low confidence in new specific skills.	Implementation was facilitated by positive attitudes to patient involvement in decision-making, having sufficient time for more complex calls, the provision of training and orientation.	2 – Insight
Belkora 2009 [37], USA, secondary care breast care; case study. Funding: FIMDM.	Costs of producing and distributing decision support, lack of infrastructure for patients to view DESIs, lack of patient access to telephones and delivery of decision support was not integrated into role or task expectations.	Re-engineer the pathway so that viewing DVDs and decision coaching is provided to eligible patients prior to clinical encounters.	3 - Acceptance

Author, Date, Country, Setting, Study Type	Identified barriers	Identified facilitators	Level of implementation achieved
Brackett 2010 [26], USA, Primary care, rural academic medical centers, quasi-experimental study. Funding: FIMDM.	Distribution failed due to clinicians being 'distracted by other duties'. The identification of eligible patients and referral of patients to DESIs are not part of existing routines.	Systematize the distribution of patient DESIs. This is made easier when categories of patients can be identified, e.g. due for screening or preventative visits.	4 - Change
Belkora 2011 [36], USA, Secondary care, quality improvement study. Funding: FIMDM.	Delivery of decision support was not integrated into role or task expectations.	Telephone delivery of decision coaching and flexible scheduling to maximize use of marginal staff time. Removing the task of identifying patients eligible for decision support from clinical roles. Systematize the distribution of patient DESI— for example, use mail rather than use referral dependent loan services.	4 - Change
Feibelmann 2011 [34], USA, mixed care settings for breast cancer, quasi experimental study. Funding: FIMDM.	Difficulty identifying eligible patients. Lack of time and resources contribute to the logistical challenge of distributing DESIs. The diversity and volume of other existing educational materials. Resistant professional attitudes were reported: for example, a lack of 'trust' in the DESI content and design and a view that patients lack sufficient literacy and 'do not want' to be involved in decisions.	Not reported.	4 - Change (28 of 111 sites)
Holmes Rovner 2011 [35], USA, primary care internal / family medicine clinics; observational study. Funding: FIMDM.	No barriers reported.	Clinician skill development using simulations and reimbursement for undertaking shared decision making.	3 - Acceptance

Author, Date, Country, Setting, Study Type	Identified barriers	Identified facilitators	Level of implementation achieved
Frosch 2011 [24], USA, primary care practices, observational study. Funding: FIMDM.	Lack of adequate infrastructure, inefficient identification of eligible patients, work environment tensions among physicians and support staff, patient frustration due to long wait times, staff juggling competing demands, disinterested physicians.	Efficient infrastructure, efficient identification of eligible patients, good rapport between physicians, staff and patients, interested motivated professionals who provide 'warm hand-offs' as they refer patients to DESIs.	3 - Acceptance
Miller 2011 [28], USA, academic internal medicine practice, observational study. Funding: FIMDM.	Difficulty identifying eligible patients, infrastructure required for DVD viewing and time needed view DESIs in clinic.	Not reported.	4 - Change
Uy 2011 [25], USA, primary care practices, observation, qualitative. Funding: FIMDM.	Scare workforce capacity, competing clinical demands, language barriers (DESIs only available in English), clinician perception of patient resistance to DESIs, low levels of staff interest.	Lead physician engagement and buy-in. Other facilitators: DESI storage and accessibility, clear lists of available DESI, content summaries for use by staff, posters advertising the availability of DESIs to patients.	2 – Insight

Appendix 1 Search Strategy

1 exp Decision Making/ (95638)
2 exp Patient Participation/ (14669)
3 (share* adj decision adj mak*).ti,ab. (1164)
4 (decis* adj mak*).mp. (97836)
5 (decis* adj choic*).tw. (42)
6 shared decision making.mp. (1142)
7 (patient adj3 decision making).tw. (1211)
8 or/1-7 (146942)
9 exp Decision Support Techniques/ (46924)
10 exp Decision Support Systems, Clinical/ (3461)
11 decision making techniques.tw. (36)
12 decision support method*.tw. (34)
13 (decision adj3 aids).tw. (592)
14 decision support intervention*.tw. (48)
15 decision making strat*.tw. (224)
16 decision making approach*.tw. (110)
17 or/9-16 (50838)
18 exp Organizational Culture/ (10369)
19 (embed* or set in or rooted).tw. (65537)
20 (integrat* adj3 organi?ational).tw. (159)
21 "put into practice".tw. (544)
22 (routine adj3 (care or practice)).mp. (11645)
23 organi?ational system.mp. (89)
24 (apply or application or utili?e or utili?ation or usage).tw. (544512)
25 (disseminat* or implement*).mp. (228214)
26 or/18-25 (832290)
27 (implement* adj3 patient decision*).mp. (11)
28 (implement* adj3 decision aid*).mp. (27)
29 (appl* adj3 decision aid*).mp. (12)
30 (utili?* adj3 decision aid*).mp. (5)
31 or/27-30 (48)
32 8 and 17 and 26 (1259)
33 31 or 32 (1279)