Health Decision Aids To Facilitate Shared Decision Making in Office Practice

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For medical decisions with more than one reasonable option, patient participation in decision making is often necessary to optimally match management decisions with patient preferences. Health decision aids are designed to facilitate shared decision making by helping patients and their physicians choose among reasonable clinical options. Although these aids vary in content, common denominators are the presentation of more than one reasonable strategy for a clinical management question and a description of the possible outcomes of the various options. Although the number of published randomized trials assessing the impact of health decision aids on the quality of medical decisions is limited (but growing), various types of decision aids do generally appear to inform patients about their treatment options better than "usual care" can. Little evidence is available to determine whether one type of decision aid is optimal, but more complicated programs seem to have larger effects. The cost-effectiveness of decision aids has not been studied, although it is enticing to think that the pattern of more conservative decisions by users of some decision aids could reduce medical care costs in a manner that is dictated by patient preferences.

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In the day-to-day practice of medicine, patients and their physicians face an increasing number of complex choices regarding prevention, diagnosis, and treatment. The options usually have different profiles of potential benefits and risks (not to mention costs). Deber and colleagues (1, 2) have thoughtfully distinguished "problem solving" tasks in medicine, which involve one "right" course of action and provide little room for patient involvement, and "decision-making" tasks, in which there are several reasonable courses of action and patient involvement is important (1, 2). The optimal choice for a decision-making task depends not only on the probabilities of various outcomes with each strategy but also on the patient's relative preferences for the possible outcome states (and their timing) and his or her attitudes toward risk (3, 4).

Health Decision Aids

Health decision aids are designed to facilitate shared decision making by helping patients and their physicians choose among reasonable clinical options (5, 6). Although these aids vary widely in content, common denominators are the presentation of more than one reasonable strategy for a clinical management question and a description of the possible outcomes of the various options. Other components may include some form of vicarious experience with possible outcomes (through written or videotaped testimonies from former patients) or exercises designed to help clarify patients' values as they pertain to the decision at hand. More complicated, interactive decision aids allow patients to take an active part in determining the amount and type of the information they receive about their health problem. In general, decision aids are meant to supplement, not replace, the traditional process of patient counseling by clinicians.

Although decision aids generally present a menu of standard management options, they have also been used to present the additional option of a randomized clinical trial for informed patients who are at personal equipoise regarding two treatment options (7, 8).

Health decision aids take many forms. The most common are combinations of written and oral information (including audiotapes); personal counseling, sometimes supplemented by decision boards; linear videotapes; and interactive, computer-driven multimedia programs. Randomized trials have examined the effectiveness of each of these types of decision aids, addressing a variety of medical decisions. Of interest, although simple written brochures are probably the most widely used decision aids in office practice, they are the least well studied.

Measuring a Good Decision

Later in this paper I discuss the evidence on the impact of health decision aids. First, however, it is important to be clear about how one would expect such programs to affect patients and the process and outcomes of medical decision making. Several recent reviews have addressed this topic (9, 10). In the "big pic-

ture," use of health decision aids should result in "better decisions." But how does one measure a good decision? Commonly measured outcomes in trials of decision aids include patients' knowledge about the condition of interest and its management options, their satisfaction with the process of decision making or the decision, their perceived level of participation in the decision-making process, their level of conflict about the decision, the treatment choice actually selected, and overall or disease-specific health status.

If the choice of a screening or treatment strategy is to be truly "informed," patient knowledge about the decision seems a straightforward outcome measure. Investigators studying the impact of decision aids have usually used short, problem-specific questionnaires to assess the impact of decision aids on patient knowledge. Satisfaction with the decision-making process and the decision itself can be measured by using validated instruments (11, 12). Participation in decision making is commonly assessed by using a single-item (13) or multi-item scale (14), the Autonomy Preference Index (14). The degree of conflict a patient feels about a decision is often measured by using the Decisional Conflict Scale (5). Choice of treatment is also decision specific, but changes in what patients elect to do alone do not indicate whether the therapeutic choices are "better" with a decision aid. Another logical end point for choice of strategy is whether decision aids result in selections that are more consistent with a patient's assessed outcome preferences, risk attitudes, and time preferences.

Finally, improved decision making may lead to better health status in some situations, which can be measured by using a host of disease-specific or generic health status measurements. Of note, older research with coaching interventions used to encourage patient participation at their office visits has suggested that increasing patients' participation in their care appears to improve health status, independent of effects on their diseases (15, 16). More recently, we found similar results in a trial of a decision aid for men facing a decision about treatment for benign prostatic hyperplasia (12).

There is no clear consensus on which combination of these measures best assesses the impact of a decision aid. Other attributes, such as level of patient anxiety and trust in the physician, may be important as well. I believe that measurements of knowledge, satisfaction with the decision-making process, choice of management strategy, and decisional conflict form a core set of outcome measures for trials of health decision aids. Ideally, trials should also assess patients' preferences for the important outcomes of the candidate strategies (and perhaps risk attitudes and time preferences as well) to determine whether exposure to the decision aid indeed better tailors management choices to patient preferences.

The Thorny Issue of Balance

When patients face medical decisions with multiple options, there may be many stakeholders. Manufacturers of screening tests, pharmaceutical agents, and medical devices may have a financial interest in promoting a particular choice, as may different specialty groups. Financial conflicts aside, different parties may strongly feel that one particular course of action is "right." Recent debates about the value of screening mammography for women in their 40s (17–19) or the value of prostate-specific antigen (PSA) screening (20–23) demonstrate these passions in action. Obviously, decision aids should be developed to present the risks and benefits of candidate options in a nonbiased way; but bias, like beauty, is in the eye of the beholder. Avoiding real or apparent financial conflicts of interest in the development of decision aids and obtaining assessments of balance from viewers (patients and physicians without an obvious stake in the management decision) are two approaches for minimizing bias while developing decision aids. However, ratings of balance by viewers can be tricky. For example, my colleagues and I have shown that although men with benign prostatic hyperplasia rated a decision aid balanced overall, men leaning toward surgery rated the program as being somewhat more supportive of surgery whereas men leaning toward nonsurgical treatment rated the program as being somewhat more supportive of avoiding surgery (24).

Effectiveness of Health Decision Aids

Two recent systematic reviews have described the results of studies of health decision aids. O'Connor and colleagues (25) conducted a Cochrane systematic review of randomized trials of health decision aids, while Molenaar and colleagues (26) examined both noncontrolled and controlled studies (26).

O'Connor and colleagues' review covered trials published through early 1998. Only randomized, controlled trials comparing decision aids to controls or alternative

Table 1. **Effect of Decision Aids on Patients' Knowledge of Options and Outcomes***

Decision (Reference)	Decision Aid		Comparison Intervention		Weight	Mean Difference (95% CI)
	Patients, *n*	Mean Knowledge Score ± SD	Patients, *n*	Mean Knowledge Score ± SD		
Compared with usual care						
Benign prostate disease (12)	104	75 ± 45	123	54 ± 45	14.1	21 (9 to 33)
Ischemic heart disease (27)	86	75 ± 17	94	62 ± 17	29.4	13 (8 to 18)
Ischemic heart disease (28)	61	83 ± 16	48	58 ± 16	26.4	25 (19 to 31)
BRCA1 gene test (29)	122	69 ± 19	164	49 ± 21.7	30.1	20 (15 to 25)
Total	373		429		100	19 (14 to 25)
Compared with less intensive decision aid						
Hormone therapy (30)	83	87 ± 11	87	84 ± 12	47.4	3 (−0.4 to 6)
Hormone therapy (31)	81	75 ± 20	84	71 ± 21	14.3	4 (−2 to 10)
Prenatal screen (32)	67	88 ± 15	88	87 ± 16	24.7	0.9 (−4 to 6)
Mastectomy (33)	30	83 ± 12	30	76 ± 14	13.5	6 (−0.3 to 13)
Total	261		289		100	3 (0.7 to 5)

* Knowledge tests for options and outcomes were specific to the decision and were scored from 0 (0% items correct) to 100 (100% items correct). Reprinted with permission from O'Connor and colleagues (25).

interventions were included. Patients had to be facing actual management decisions, and the decision aids being evaluated had to include, at a minimum, information on options and outcomes relevant to the user's health. The authors identified 17 trials addressing 11 screening or treatment decisions.

One outcome measured in 8 trials was patient knowledge about the condition of interest and its management options (**Table 1**). Four trials comparing a decision aid against "usual care" showed a significant improvement in patients' knowledge; the weighted mean difference in scores was 19 points (95% CI, 13 to 25 points) on a scale of 0 (none correct) to 100 (all correct). Four trials comparing a more intensive with a less intensive decision aid found a more modest (but still significant) improvement with the more complex program, with a weighted mean difference of 3 points (CI, 0.7 to 5 points). The clinical significance of a difference of this magnitude is uncertain. Decision aids also positively affected decisional conflict in 3 of 4 trials measuring that outcome, with a weighted mean difference of 0.3 (CI, 0.1 to 0.4) on a 0 to 5 scale. Only 1 of 5 studies measuring some aspect of patient satisfaction showed significant improvement with a decision aid (on satisfaction with the decision-making process), and the overall measure of effect was not statistically significant.

Fourteen trials examined the impact of a decision aid on the choice of a management strategy (**Table 2**). Here, the results depended on the type of decision. For major surgery, decision aids led to more conservative therapeutic choices, with 21% to 42% reductions in selection of the most invasive treatment option and an overall relative risk for choosing the most invasive option of 0.74 (CI, 0.6 to 0.9). No significant effect was seen with decision aids for circumcision, *BRCA1* gene screening, amniocentesis, or hormone replacement therapy. One study found a significant increase in hepatitis B vaccination with exposure to a decision aid. Three included trials addressing PSA screening gave conflicting results: Two trials showed a reduction in PSA testing, and one showed no impact. Finally, 3 of 3 trials showed that a significantly increased proportion of patients exposed to decision aids assumed a more active role in their health care decisions compared with patients receiving usual care, and 4 of 4 trials showed no increase in anxiety with the use of decision aids.

The search strategy for Molenaar and colleagues' review covered the literature through mid-1998. The 16 randomized trials identified by Molenaar and colleagues differed in definitions of decision aids, inclusion criteria, and search strategies. As result, 9 of these 16 trials were also included in O'Connor and colleagues' review. Molenaar and colleagues did not attempt a quantitative meta-analysis of the outcomes of the trials they identified. In general, these authors found less consistent effects among the trials they examined on the outcomes studied by O'Connor and colleagues and noted more heterogeneity in study results.

In addition, Molenaar and colleagues identified 14 noncontrolled studies of decision aids. Four of these

Table 2. **Effect of Decision Aids on Patients' Decisions***

Decision (Reference)	Decision Aid		Comparison Intervention		Weight	Relative Risk (95% CI)
	Patients	Patients Choosing Option	Patients	Patients Choosing Option		
	n	%	*n*	%		
Major surgery						
Coronary revascularization (28)	61	41	48	58	26.4	0.7 (0.5–1.0)
Coronary revascularization (27)	86	59	94	76	57.2	0.79 (0.6–1.0)
Prostatectomy (12)	104	5	123	8	6.2	0.74 (0.3–2)
Mastectomy (33)	30	24	30	42	10.1	0.58 (0.3–1.0)
Total	281		295		100	0.74 (0.6–0.9)
Circumcision of newborn boys						
Maisels et al. (34)	23	91.3	28	96.4	67.3	0.95 (0.8–1.1)
Herrera et al. (35)	56	84	47	87	32.7	1.07 (0.9–1.3)
Total	79		75		100	0.96 (0.85–1.07)
Testing for prostate-specific antigen						
Davison et al. (36)	50	48	50	38	31.1	1.26 (0.8–2)
Flood et al. (37)	103	11.7	93	22.6	21.8	0.52 (0.3–1.0)
Wolf et al. (38)	103	60.2	102	76.5	47.2	0.79 (0.6–0.9)
Total	256		245		100	0.83 (0.6–1.3)
Other screening						
BRCA1 gene test (29)	122	69.7	164	65.2	38	1.07 (0.9–1.3)
Amniocentesis (39)	441	37	431	34.1	62	1.08 (0.9–1.3)
Total	563		595		100	1.08 (0.95–1.22)
Other†						
Hepatitis B vaccination (40)	753	23.4	263	13.3		1.76 (1.3–2.5)
Dental surgery (41)	37	85	37	70.3		1.19 (0.9–1.5)
Hormone therapy‡ (31)	81	13.6	84	15.5		0.88 (0.4–1.8)

* Reprinted with permission from O'Connor and colleagues (25).
† Results were not combined because of heterogeneity in topics.
‡ Comparison between more intensive and less intensive decision aids.

studies addressed the feasibility of a variety of decision aids in clinical practice, while 10 reported positive evaluations from patients on the decision aids they used. Of interest, 3 noncontrolled studies found correlations between participants' elicited preferences for outcomes and their preferences or choices about treatment. These findings suggest matching of patient preferences with a management strategy, perhaps the most important theoretical goal of shared decision making. Unfortunately, in the absence of controls, it is impossible to conclude that decision aids actually improved the degree of correlation between preferences and choice of management.

Overall, the literature suggests that patients respond favorably to decision aids. In general, knowledge appears to be improved (sometimes substantially) with the use of decision aids, although how "high tech" decision aids need to be to accomplish this end is still an open question. Thus, decision aids can help make "informed choice" for testing or treatment a reality. In theory, better-informed choices should reduce risks for malpractice allegations against clinicians, but no study has addressed this hypothesis directly. The impact on patients' treatment choices varies and may depend on the type of decision aid, the nature of the decision, and the background rates of treatment in "usual care." Randomized trials of decision aids for major surgical interventions suggest that decision aids lead to less invasive treatment choices. Decisional conflict appears to be reduced, with no increase in anxiety, but there is little evidence of impact in other areas, including patient satisfaction and health status.

The number of well-designed, adequately powered randomized trials assessing the effectiveness of decision aids is still relatively small. Given the variety of types of decision aids and the number of clinical problems for which such interventions would seem appropriate, the low number and poor quality of published studies are especially disappointing. On the other hand, in some cases, there are more randomized trials of decision aids for a particular clinical problem than there are randomized trials comparing the outcomes of the different management strategies for these problems themselves.

Case Study of Health Decision Aids: The PSA Screening Decision

The potential promise of decision aids for patients facing difficult, preference-driven decisions may be best appreciated by examining the results of studies of decision aids for one clinical problem. The PSA screening decision would seem an ideal issue to address with a decision aid. Randomized trials have not yet demonstrated whether early detection of prostate cancer is beneficial, ineffective, or harmful. Nevertheless, the PSA test has been available for more than a decade and is widely used for screening in the United States. Recent national guidelines on PSA screening suggest that the decision to test should be individualized on the basis of a discussion of the pros and cons of the test. Given the complexity of the decision, the amount of information that men (and their partners) think it would be helpful to have (42), the generally low level of knowledge about the advantages and disadvantages of the PSA test among men eligible to be screened (43), and limited time to discuss any one preventive intervention in primary care practice, it is perhaps not surprising that at least eight randomized trials have examined three different decision aids for PSA screening. Most of these trials were published after the end dates for the searches reported in the two overviews.

Three trials studied the impact of providing information about PSA screening in written or verbal form to men considering this test (36, 38, 44). In the first trial, patients in the intervention group assumed a significantly more active role in decision making and had lower levels of decisional conflict than controls. Levels of anxiety and the proportions of men selecting screening in the two groups did not significantly differ (36). In the second trial, the main outcome was interest in undergoing PSA screening, assessed on a five-point Likert scale. The intervention reduced interest in PSA screening by a group mean difference of 0.8 point ($P < 0.001$) (38). The last trial compared the provision of general written information about PSA screening with the provision of more specific quantitative visual information on the probability of false-positive and negative results. Knowledge and beliefs about PSA testing, as assessed by a pre- and a post-exposure test, were significantly more accurate in the intervention group (44).

More recently, results of five trials of the same linear videotape addressing the PSA screening decision have been reported (37, 45–47). The 22-minute videotape, developed by our group, includes testimonials by two physicians, one who has regular PSA testing for his own health care and another who does not. The first two trials were quasi-randomized trials of the PSA screening videotape in two settings: one among older men attending a free prostate cancer screening clinic and one among older men scheduled to visit a general medical clinic for a routine visit (37). In the first trial, men in the control group were assigned to review a videotape, funded by a drug company, that presented only the benefits of screening. In the second trial, the control group was assigned to receive "usual care"; group assignment depended on dates of clinic attendance. In both trials, assignment to the intervention group resulted in improved knowledge about prostate cancer screening. For example, the proportion of participants who answered "yes" to the question asking whether most men with an elevated PSA level do not have prostate cancer increased from 30% to 64% in the screening clinic and 14% to 72% in the general medical clinic ($P < 0.001$ for both comparisons).

Volk and colleagues randomly assigned 145 men to one of three interventions: a prostate cancer screening videotape only (the same videotape as that used in Flood and colleagues' two trials), the screening videotape plus a utility assessment exercise, or "usual care" (45, 48). Two weeks after enrollment, the number of knowledge questions answered correctly in both intervention groups together increased from a mean of 3.0 to 4.8 of 10 ($P = 0.001$), with no significant improvement in the control group. In addition, participants viewing the videotape rated the experience in many domains. In particular, 79% of viewers rated the videotape as completely balanced, while 16% thought it was slanted to favor screening and 5% thought it was slanted in favor of not screening; these findings suggest fairly good balance.

In a multicenter trial, Wilkins and colleagues (46) randomly assigned 422 men to a group that viewed the same PSA videotape before a scheduled primary care visit or to a group that received usual care. Patients assigned to the intervention group were more satisfied with the information they received, demonstrated significantly greater knowledge of PSA testing, and expressed significantly stronger preferences for active participation in making medical decisions about their health care.

Table 3. **Summary of Studies Evaluating the Effect of Decision Aids on Prostate Cancer Screening Behavior***

Source (Reference)	Participants	Type of Decision Aid	Screening Rate, % (*n per group*)		Odds Ratio (95% CI)
			Patients Receiving Decision Aid	Control Patients	
Flood et al. (37)	Unselected patients with scheduled ambulatory visits	Linear videotape†	11.7 (103)	22.6 (93)	0.45 (0.21–0.98)
Flood et al. (37)	Men presenting for free prostate-specific antigen screening	Linear videotape†	98.4 (184)	100 (188)	NA‡
Volk et al. (45, 48)	Unselected family medicine patients	Linear videotape†	34.3 (70)	59.7 (67)	0.35 (0.18–0.70)
Wilkins et al. (46)	Unselected Veterans Affairs patients recruited from outpatient clinics	Linear videotape†	54 (213)	80 (209)	0.30 (0.19–0.45)
Davison et al. (36)	Men presenting for a periodic health examination	Verbal and written discussion	28 (50)	21 (50)	1.38 (0.56–3.41)
Schapira and VanRuiswyk (44)	Veterans Affairs patients responding to a letter solicitation	Specific quantitative information	82 (122)	84 (135)	1.13 (0.59–2.16)
Frosch et al. (47)	Male patients participating in a Health Appraisal screening program	Discussion	82.2 (45)	97.7 (43)§	0.11 (0.02–0.67)
		Linear videotape†	60.0 (46)		0.04 (0.01–0.17)
		Linear videotape† and discussion	50.0 (42)		0.02 (0.01–0.10)

* Modified with permission from Volk and Spann (49). NA = not available.
† All these trials used the same linear videotape addressing the decision to have prostate-specific antigen screening.
‡ Odds ratio cannot be computed because all controls selected screening.
§ Control group was the same for all three comparisons.

Finally, Frosch and colleagues (47) most recently reported the results of a four-arm randomized trial among 176 men recruited through the Health Appraisal screening program of the Kaiser Permanente health plan. Participants were randomly assigned to usual care, a face-to-face discussion about the pros and cons of PSA testing, the same PSA videotape used in the previous trials, or a combination of the videotape and the discussion. The proportion of men selecting PSA testing was about 98% with usual care, 82% with the discussion, 60% with the videotape, and 50% with both the videotape and the discussion ($P < 0.001$).

Table 3 summarizes the impact of all the decision aids studied in these trials on participants' actual PSA screening decisions. In four of the seven trials that reported this outcome and four of the five trials of the videotape-based decision aid, the proportion of men having PSA testing significantly decreased. All six trials examining men's knowledge about PSA testing revealed large, statistically significant improvements, suggesting that the generally more conservative decisions about PSA screening in the intervention group were indeed better informed.

Challenges of Implementing Health Decision Aids To Facilitate Shared Decision Making in Primary Care

Barriers to the use of decision aids in office-based primary care practice are both psychological and logistic. From the psychological perspective, most physicians probably think they already are doing a good job of educating patients and involving them in decision making, despite some growing evidence to the contrary (50–52). Some clinicians undoubtedly prefer a more paternalistic role and genuinely feel that such an approach is better for their patients. In fact, in a recent small survey performed as part of the implementation of two interactive health decision aids addressing choice of treatments for breast cancer and ischemic heart disease, physicians generally agreed with the statement, "Most patients prefer the doctor to take responsibility for their medical problems" (53). Moreover, a 1996 survey comparing internists' and their patients' ratings of the importance of different elements of outpatient care found that physicians rated the importance of providing health-related information considerably lower than did their patients (54).

However, logistic problems with implementing shared decision making have been a real issue, too. Making time and space available in office practice for patient education in general and use of decision aids in particular is problematic, particularly for more complex videotape- or computer-based decision aids. Coordinating mailings or in-office viewings of videotapes, as was done in many of the trials of the PSA decision aid, may be too much for small offices to take on. Hospitals or larger practices might centralize these tasks, but the process of

referral can then become cumbersome and even rate-limiting (53). Finally, time spent by practice personnel in helping patients access and use decision aids often represents an extra burden and expense. As reflected in Molenaar and colleagues' review, however, patient acceptance of health decision aids does not appear to be a barrier, once the logistic difficulties in getting them together at the right place and time are overcome. Clinicians interested in a catalog of existing health decision aids for various medical conditions can access a list prepared by the Ottawa Health Decision Centre (available at www.LRI.ca/programs/ceu).

Conclusions

Health decision aids are a theoretically attractive option for informing patients about their management options and facilitating their participation in preference-driven medical decisions. Although the number of published randomized trials assessing the impact of health decision aids on the quality of medical decisions is limited (but growing), various types of decision aids generally appear successful in better informing patients about their treatment options than "usual care" does. For some, the ability of decision aids to make "informed choice" more truly informed may be sufficient to advocate their use. Moreover, exposure to decision aids for major elective surgical interventions and the PSA screening decision appears to lead to more conservative treatment choices by patients. However, the impact of decision aids on treatment choice probably depends on the setting, the decision, and the nature of the decision aid itself. Decision aids studied in randomized trials are heterogeneous in format and content; in particular, the volume of quantitative information in the programs and how that information is communicated vary considerably. Little evidence is available to determine whether one type of decision aid is "optimal," although more complicated programs in general seem to have larger effects. Relatively few trials have specifically studied potential side effects of health decision aids, including potentially heightened anxiety. The cost-effectiveness of decision aids has not been studied, although it is enticing to think that the pattern of more conservative decisions by users of some decision aids at least has the potential to reduce medical care costs in a manner that is dictated by patient preferences.

Further study of the impact of decision aids on patients and their decisions in randomized trials, including trials comparing different types of decision aids, is clearly needed (although a realist might argue that the body of evidence from randomized trials supporting the positive effects of decision aids for the PSA screening decision is already considerably more convincing than the randomized trial evidence in favor of the widely popular PSA screening test itself). Incorporating decision aids into office practice remains a formidable challenge. Major questions remain about how to avoid bias in decision aids, how much quantitative information to present and how it should be presented, and how to tailor presentations for users from different cultural and ethnic groups and with different education levels. However, all these questions are equally applicable to how clinicians themselves present information to patients about their medical decisions behind closed office doors, a process that has also been understudied.

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