THE ROLE OF DECISION ANALYSIS IN INFORMED CONSENT: CHOOSING BETWEEN INTUITION AND SYSTEMATICITY

P. A. UBEL and G. LOEWENSTEIN

Veterans Affairs Medical Center, Philadelphia, Pennsylvania, U.S.A., Division of General Internal Medicine, Center for Bioethics, Center for Clinical Epidemiology and Biostatistics, Leonard Davis Institute of Health Economics, University of Pennsylvania, Philadelphia, U.S.A. and Department of Social and Decision Sciences, Carnegie Mellon University, U.S.A.

Abstract—An important goal of informed consent is to present information to patients so that they can decide which medical option is best for them, according to their values. Research in cognitive psychology has shown that people are rapidly overwhelmed by having to consider more than a few options in making choices. Decision analysis provides a quantifiable way to assess patients' values, and it eliminates the burden of integrating these values with probabilistic information. In this paper we evaluate the relative importance of intuition and systematicity in informed consent. We point out that there is no gold standard for optimal decision making in decisions that hinge on patient values. We also point out that in some such situations it is too early to assume that the benefits of systematicity outweigh the benefits of intuition. Research is needed to address the question of which situations favor the use of intuitive approaches of decision making and which call for a more systematic approach.

INTRODUCTION

Informed consent doctrine recognizes the importance of patient autonomy by stating that physicians have a duty to provide adequate information to their patients. This information should include "those facts that all rational persons would want to know, namely, the various goods and evils that result from the alternative modes of treatment, including their severity and probability" (Culver and Gert, 1982). This doctrine has resulted from a moral sense that competent, informed patients can best decide which medical choices fit their values.

While most agree that physicians should strive to reach informed consent with their patients (Lidz et al., 1984; Wear, 1993), there is less agreement about how they should do this. An important goal of informed consent is to present information to patients so that they can decide which medical option is best for them, according to their values. This goal is not easily attained. Some argue that "(the physician's) duty is to give patients the best data available, untainted by (the physician's) personal feelings or symbolism, and let them plug these numbers into their value systems" (Lee, 1993). But others respond that this purely informational rendition of informed consent ignores limitations in people's decision making capabilities (Pauker and McNeil, 1981). Research in cognitive psychology has shown that people are rapidly overwhelmed by having to consider more than a few options in making choices. They quickly resort to simplifying strategies that ignore much of the information available to them, and that can lead to systematic errors (Redelmeier and Shafir, 1995; Simon, 1955, 1956; Tversky and Kahneman, 1974).

For example, imagine a patient trying to choose among colon cancer screening tests. For this patient to be able to choose among these tests in a way that reflects her values, she will need to understand the risks and benefits of at least four screening tests: flexible sigmoidoscopy, colonoscopy, barium enema and fecal occult blood testing. She will have to understand what side effects each of these screening tests have, how likely each screening test is to pick up colon cancer, how much discomfort is associated with each test, etc. In addition, since she can be screened by combinations of these tests, she will also need to evaluate mixed screening options. This is a very complicated task but one that, in an ideal world, we would still ask patients to do, because the proper screening test depends, in large part, on individual values; how much discomfort would one be willing to go through to reduce the chance of dying of colon cancer? In the experience of the first author, many patients are unable to comprehend the different screening tests well enough to answer this question.

*Author for correspondence. Center for Bioethics, University of Pennsylvania, 3401 Market Street, Suite 320, Philadelphia, PA 19104-3308, U.S.A.
If the information physicians give patients does not help patients make choices that fit their values, then informed consent doctrine loses much of its moral justification. To meet the moral goals of informed consent, physicians need to find a method to combine patients’ values with medical facts in a way that produces superior medical decisions.

Some have argued that such a method already exists—decision analysis. Proponents of decision analysis claim that physicians using decision analysis at the bedside should be able to integrate patient values with medical facts in a way that meets all the requirements of informed consent. (Pauker and Kassirer, 1987; Pauker and McNeil, 1981; Sox et al., 1988) As two leaders in the field of medical decision making said: “We are convinced that this quantitative approach warrants careful consideration as a tool for making decisions...for individual patients” (Pauker and Kassirer, 1987). Decision analysis, proponents argue, constitutes a rational framework for evaluating and making complex medical decisions. It provides a quantifiable way to assess patients’ values, and it eliminates the burden of integrating these values with probabilistic information. Thus, physicians using decision analysis should be able to recommend choices that best reflect their patients’ values.

If the benefits of decision analysis were more widely appreciated, then it is likely that more effort would be directed toward making decision analysis a part of every day practice. However, there seems to be a rather widespread distrust of formal decision making aids, both in the medical domain and in other areas. Part of this may result from the simple fact that performing a formal decision analysis takes time and expertise that most physicians do not have (Schwartz, 1979). But distrust goes deeper than this (Bretl, 1981). Indeed there is a story, perhaps apocryphal, that one of the main founders of decision analysis reacted when incredulity when asked whether he would use decision analysis when deciding whether to move from Columbia to Harvard.

One legitimate source of distrust, which is our main focus, is the suspicion that decision analyses fail to incorporate attributes and considerations that are important to decision makers. These include psychological feelings associated with anticipation (e.g. hope, fear, dread) (Feinstein, 1985), ethical and cultural “values,” inputs from other people, and other factors that are difficult to quantify. For lack of a better term, we refer to all factors that people consider important but that are left out of decision analyses as “intuition.” Intuition is the valid part of untutored decision making that decision analysis leaves out.

At the same time, however, untutored decision making has obvious negative features, which are exactly what decision analysis is designed to mitigate. Informal, heuristic, decision processes that incorporate intuition tend to produce behavioral inconsistencies and violations of widely accepted standards of optimal decision making. Many of these inconsistencies and violations result from a failure to think systematically about end-state values and probabilities, or to integrate them in a normatively defensible fashion. Decision analysis is ideally suited to overcome both of these failures. We refer to these benefits of decision analysis as “systematicity.” In the end, the usefulness of decision analysis hinges on the relative importance of intuition and systematicity.

In this paper we attempt to evaluate the relative importance of intuition and systematicity in the domain of medical decision making and informed consent. After a brief introduction to the general principles and procedures involved in decision analysis, we turn to a discussion of the likely benefits of intuition and systematicity, dealing with each of these elements separately. We point out that there is no gold standard for optimal decision making in decisions that hinge on patient values. We also point out that in some such situations, it is too early to assume that the benefits of systematicity outweigh the benefits of intuition. We conclude that in some decision settings, the systematic approach of decision analysis is likely to improve the informed consent process, but this conclusion may not hold in other decision settings. Research is needed to address the question of which situations favor the use of intuitive approaches of decision making and which call for a more systematic approach.

A BRIEF OVERVIEW OF DECISION ANALYSIS

Decision analysis reduces cognitive burdens on patients facing complex decisions by eliminating their need to remember and integrate the outcomes and probabilities of each choice. Patients are only required to express the relative values they place on each outcome they face, so the decision analysis can inform them of which choice is best.

How do patients express their values in a way that decision analysis can use? The most common method for measuring patients’ values (or “utilities”) is the standard gamble. In the standard gamble, patients are asked to state the maximum risk of death they would accept to rid themselves of a particular condition. Suppose a patient is indifferent between living with condition X or taking a pill that has a 90% chance of curing her and a 10% chance of killing her. The patient’s utility for this condition will lie 9/10ths of the interval between the utilities she places on being cured of the condition and being dead. In other words, condition X is assumed to have a utility of 0.9, on a scale in which death has a utility of 0 and normal health a utility of 1.
Decision analysis is based on the "expected utility model" of choice, in which people are expected or encouraged to choose those options which maximize their expected utility. (If a patient's goal is not to maximize her own welfare, but to obey for example a moral duty, then decision analysis would not be a useful aid.) For example, a patient deciding which colon screening test to take would not have to remember each test and the probability of every possible outcome that could occur after using each test. Instead, the patient could think about each of these outcomes, one at a time, and give the physician a utility value for each outcome. The physician's role at this point would be to create a decision tree which incorporates patient values with probabilistic information and explain to the patient how the tree will help her choose. The cognitive task for the patient would be greatly simplified and the patient could now be told, based on the result of the decision analysis, which colon screening test will maximize her expected utility.

The above example is the starkest application of decision analysis, and perhaps one that few decision analysts or physicians would endorse. Such a procedure is very outcome oriented, as opposed to process oriented. It assumes that there is a single best treatment option that expected utility analysis can determine, and that the physician's main goal should be to direct the patient toward this option.

One can imagine many modifications of this scenario that are more process oriented and less directive. The physician might take pains to explain each step of the decision analysis to the patient. She might elicit feedback from the patient about whether the elicited utilities seem intuitively reasonable. She might shy away from actually stating a final recommendation, and let the numbers "speak for themselves". Or she might adopt the general philosophy of decision analysis without its specific methods, and simply ask the patient to think systematically about the pros and cons of the various options. Even if we reject the most austere rendition of decision analysis, it is possible that one of these "weaker" versions might provide an attractive compromise.

**INTUITION VERSUS SYSTEMATICITY**

Decision analysis offers a systematic tool for integrating patients' values with medical facts. It is this systematicity and ability to factor multiple outcomes and probabilities into decision making that is decision analysis' greatest strength. But this systematicity comes at a price—namely that only those factors which are easily measured will be factored into the systematic weighting of the decision analysis. Factors that are harder to measure are unlikely to end up in the decision analysis and therefore will not influence the recommended course of action. If these factors are more easily accounted for in an intuitive-approach to decision making, then decision analysis will not necessarily produce "better" decisions.

Whether decision analysis improves patients' decision making in a particular choice situation depends on the relative importance of intuition and systematicity. In the next two sections, therefore, we examine the likely importance of these two factors in the context of medical decision making.

**The benefits of systematicity**

As mentioned in the introduction, decision analysis has many strengths. It elicits information from patients that only they possess (values), then combines this with probabilistic information that they would be unlikely to possess. Adhering as it does to an expected utility criterion, decision analysis satisfies the expected utility axioms, which are often cited as criteria for rational decision making (Elster, 1989; Gauthier, 1986; Luce and Raiffa, 1957). The choices of an individual who uses decision analysis should satisfy dominance, transitivity, and independence. Beyond these relatively obvious, and often touted, benefits, however, decision analysis has a number of additional strengths.

First, the expected utility models of decision analysis closely resemble those of linear models, which have proven to be successful in the domains of judgment and prediction. When such models are applied to real world problems, the judge's main role is usually only to supply the cue values to the model. Clinical prediction rules are an example of linear models that many physicians will be familiar with. For example, physicians have historically relied on their clinical judgment to decide when it was necessary to get radiographs of ankle injuries. However, statistically derived prediction rules have been shown to reduce the need for radiographs, essentially doing a better job than physicians at predicting when an ankle injury requires a radiograph (Stiell et al., 1994). The Goldman model for determining pre-operative cardiac risk is an example of a clinical prediction rule that has become a routine part of medical care (Goldman et al., 1977). A physician who collects data and puts them into the Goldman model will do better than a physician who tries to integrate the data in an intuitive manner.

Linear models of judgment outperform untutored human judgment in non-medical realms too, predicting such outcomes as students' future grades, company earnings, criminal recidivism and violence, and marital breakup (Camerer, 1981; Dawes, 1979). They have this beneficial effect by introducing a systematic weighting of attributes—a benefit that unambiguously compensates for any loss of configural thinking or intuition. That is, in the domain of judgment, including clinical judgment, the benefits of systematicity often far outweigh the costs associated with the loss of intuition.
Second, the act of conducting a decision analysis makes explicit the tradeoffs inherent in a decision. There is considerable research showing that people do not automatically consider trade-offs when making decisions, even though this would often improve their decisions (Bazerman et al., 1992; Loewenstein et al., in press). When people fail to consider trade-offs explicitly, they often put inordinate weight on trivial but emotional issues in decision making and lose sight of what they really care about.

Third, and consistent with this reasoning, decision analysis can bring a dispassionate arbitrator into a decision setting that is distorted by emotion. The negative effects of emotions on decision making are not only well documented (Janis and Mann, 1977), but are widely believed, as witnessed by the distinction often drawn between passions and reason, emotions and deliberation, etc. (Averill, 1974). The negative effects of emotion on decision making are so compelling that many legal systems draw a clear distinction between crimes of passion on the one hand and premeditated crimes on the other hand, and punish the former less severely.

Fourth, decision analysis can help to reduce the influence of physicians on patient’s decisions, by providing a quasi-independent source of advice. Physicians have a long history of influencing, even directing, the “choices” of their patients. Indeed, the notion of informed consent has developed in large part to reduce the influence of physicians on patients’ decisions, so that patients can make their own choices (Faden and Beauchamp, 1986). Yet, even in situations where patients are given decision-making power, physicians often influence patients’ choices. For example, an ethnographic study of women’s decisions regarding breast cancer therapy showed that, of all factors, physician recommendations had the largest effect on what choices patients made (Siminoff and Fetting, 1989). Women given the same information would make different choices depending on what their physicians recommended. A decision analysis performed using patient utilities with these same facts might reduce physicians’ influence on patients’ choices.

Fifth, and finally, decision analysis can accommodate conflicting information into its models. For example, suppose two studies documented the success rate of some health care intervention. If the rates were quite different from each other, the decision analysis could be done first using one rate then another. If the best choice stayed the same using both pieces of information, one could be more confident that it was the best choice. This is part of a technique called “sensitivity analysis.”

Given the paucity of outcomes information about many health care interventions, this allows physicians constructing or adapting decision trees to adjust probabilities up and down to see how robust the conclusion of the decision analysis is.

The benefits of intuition

Some values hard to quantify. Although decision analysis can, in principle, incorporate a wide range of considerations, in practice some types of attributes and values are more likely to be incorporated than others. Inevitably those which are quantifiable will receive more weight in a decision analysis. This problem is well known in managerial project appraisal. A firm deciding whether to produce a new product is likely to attempt to quantify the various costs and benefits of initiating production. Some values, such as investment costs and profits, are easily quantifiable and will surely be included in the analysis. Others, such as the benefits from employee learning or from establishing new contacts with suppliers, are difficult to quantify and likely to be left out of the analysis. This tendency to overweigh the quantifiable has been used to explain the short-term time horizons of American managers (who use these techniques) as contrasted with Japanese managers (who do not) (Myers, 1984).

In the domain of the medical decision making, some values are more difficult to incorporate into decision analyses than others. Take, as an example, an analysis of the costs and benefits of treating high cholesterol. It is relatively easy to collect data about how cholesterol lowering medicines affect outcomes such as cardiovascular mortality and morbidity, but it is more difficult to come up with a numeric value for the disutility associated with having to take cholesterol lowering medicines (Drummond et al., 1993). Most agree that there is some small disutility associated with taking medicines, beyond such occurrences as measurable side effects. For example, a person without any other medical problems may now regard himself as a sick person because he has to take a pill every day. In the person’s mind, a risk factor for illness, high cholesterol, has now become an illness itself. In many decision analyses, small disutilities such as the disutility of taking cholesterol lowering medicine are not factored into the analysis. Yet, these small disutilities are crucial components of an accurate decision analysis, because a large number of people need to take cholesterol lowering medicines to prevent even one adverse cardiovascular event (Drummond et al., 1993). Thus, by overweighing the more easily measurable end-points, decision analysis potentially leaves out crucial parts of the decision.

A second category of psychological considerations that are very important to decision makers in the medical realm, but that would be extremely difficult to incorporate in decision analyses, are the emotions people experience when waiting under conditions of uncertainty, or when they get good or bad news (Elster and Loewenstein, 1992; Loewenstein, 1987). To incorporate these psychological considerations is more than a problem of
quantification. Incorporation of factors such as fear, anxiety, hope and regret, all involve abandoning expected utility as the criterion for decision making, and moving to alternative models of choice (Bell, 1982, 1984; Feinstein, 1985; Hershey and Baron, 1987; Loomes and Sugden, 1982).

Consider regret: The theory behind decision analysis assumes that the utility that people have for various outcomes in a medical decision are independent of how that outcome is reached. Thus, for example, being blind has a certain utility for people, no matter how they became blind. It does not take much imagination to realize that this is not necessarily the way people experience outcomes. For example, suppose a physician elicits a patient’s utilities for blindness, blurry vision, and normal sight. Based on this, the decision analysis suggests that she try a risky surgery to improve her blurry vision. Unfortunately, she ends up blind and her reaction to blindness is flavored by regret: “If only I had been content with blurry vision!”. Having not factored this into the utility assessment, her reaction exceeds the disutility for blindness that was predicted by her answers to the standard gamble questions. This type of regret is not incorporated in standard decision analysis, and could only be incorporated by departing from the expected utility framework (Bell, 1982, 1984; Loomes and Sugden, 1982).

Defenders of expected utility could counter that regret, though an understandable reaction to some lotteries is nonetheless irrational. If the patient calculates that the expected utility of the normal sight/blindness lottery is higher than that brought by staying with blurry vision, then she should not regret the outcome of the lottery when, by chance, she ends up blind. It is irrational for her to wish, after the results of the lottery are known, that she had chosen to stick with her eyeglasses. She should not flog herself for making the right decision. Instead, she should recognize the blindness for what it is: an unfortunate outcome of the correct decision.

However, even if regret is “irrational,” most people cannot avoid feeling it. Thus, it would be irrational to ignore regret when making decisions. Put another way, suppose that a person has what everyone agrees is an irrational fear of enclosed spaces. Most would agree that until this fear can be eradicated, it is irrational for her to ignore this fear when deciding whether or not to enter a crowded elevator. Thus, whether rational or irrational, the possibility of regret deserves to be taken into consideration when patients make medical decisions, something the decision analytic model of clinical decisions does not do.

Another consideration that is not part of decision analysis but is likely to be important to patients is the utility experienced while waiting for outcomes to be revealed. Consider how it feels to wait for the results of an important medical test, or how it feels to wait with treated or untreated cancer that may metastasize at any time. Substantial research supports the intuition that the dread and anxiety caused by waiting for uncertain feared outcomes can have a strong effect on well-being (Scott, 1983)—even to the point where people feel better when they learn they have a disease (Moulton et al., 1991). For example, Perry et al. examined the psychological state of a sample of individuals at risk for HIV infection, before, immediately after, and at 2 and 10 weeks after receiving test results (Perry et al., 1990, 1993). A majority of subjects demonstrated high rates of anxiety prior to receiving their test results. The anxiety of those who tested negative, not surprisingly, decreased immediately after receiving their test result. More surprisingly, the anxiety and psychological distress of seropositives was actually lower 10 weeks after getting the results than prior to getting the results. Similar findings were obtained in a study examining people who were tested for Huntington’s disease (Wiggins et al., 1992).

Anxiety and fear are not only adversive in and of themselves, but have diverse effects on subjectively experienced pain and discomfort (Johnson, 1984). These types of indirect effects are extremely difficult to quantify for inclusion in a decision analysis. Moreover, people misremember their own past fear, and exaggerate the fear they are likely to experience in the future—calling into question the ability to quantify it accurately (Rachman and Bichard, 1988). Even apart from these problems of measurement, incorporating anxiety and fear in a decision analysis would introduce a major element of complexity. In conventional decision analyses, the only things that matter are end-states. If there is a procedure that leaves a patient with an ongoing small probability of an adverse reaction, this possibility is valued at $P$ times the utility associated with the adverse reaction. The fact that this small probability makes the patient miserable during the intervening period is not, in practice, taken into account. Doing so, like incorporating regret, would require a substantial departure from the expected utility criterion—one that would sufficiently complicate the procedure to preclude any kind of “on line” use of decision analysis.

The need for a gold standard of “good” decision making. Some decision analysts have worked out elaborate mathematical models showing the theoretical superiority of decision analysis (Nickerson and Boyd, 1980; Ravinder et al., 1988), and others have shown that physicians can use decision analysis to make difficult clinical decisions in the real world, such as deciding the best strategy to evaluate patients suspected of having pulmonary embolisms (Morabia et al., 1994). But very little research has actually compared the quality of patients’ decisions...
arrived at via decision analysis with those arrived at by untutored choice (Jungermann, 1980).

This lack of data is most likely attributable to the difficulty of establishing a gold standard for good decision making. Those convinced of the merits of expected utility theory use it to define the gold standard, thereby creating a circular argument: “Decision analysis is a normatively compelling approach to decision making under uncertainty. Patients’ decisions often differ from those recommended by decision analysis. Thus, physicians ought to use decision analysis to help patients improve their decision making.” This reasoning, of course, does nothing to show whether decision analysis leads to better decisions. To assess whether this is the case we need to have an independent criterion for measuring the quality of a decision.

Wilson et al. performed a series of studies where subjects’ decisions could be measured in ways that approximate a “gold standard.” They found that a systematic approach to decision making does not always lead to better decisions. Instead, they found situations in which people decomposing decisions into their component parts make worse decisions than those who do not engage in such decomposition. In one series of experiments using expert opinions as gold standards, they asked subjects to rate the quality of several strawberry jams, with half providing reasons why they liked or disliked the jams and the other half just stating their opinions about how much they liked the jams. They found that those asked to give reasons for liking and disliking the jams were less likely to agree with expert ratings than were subjects not asked to provide reasons (Wilson et al., 1989). In an even more convincing study, they asked subjects to choose among a group of posters to hang on their walls, with half providing reasons why they liked or disliked each poster and the other half just deciding which poster they wanted. Ten weeks later, they found that subjects asked to provide reasons why they liked or disliked the posters were less happy with their choice of poster, and more likely to have torn them off the wall, than were subjects who were not asked to provide reasons (Wilson et al., 1993).

The authors postulate that in certain circumstances, when people decompose decisions into smaller parts, they come up with reasons that conflict with their intuition. Thus, for example, subjects asked to think of reasons to like and dislike posters ended up choosing humorous posters that quickly became tiresome, whereas subjects choosing intuitively chose posters of famous Impressionist paintings. These findings were especially strong for subjects who did not come in with well articulated reasons for preferring one choice over another. These subjects, in essence, lost confidence in their intuitions when asked to introspect about their options (Wilson and Schooler, 1991).

Other researchers have found findings similar to Wilson’s. May and Jungermann conducted a study in which subjects chose between free subscriptions to several magazines. Half the subjects were assigned to engage in a “goal analysis” prior to choosing. One year after making their choice, subjects who had been undecided at the outset and who used goal analysis were less satisfied with their choice of magazine subscriptions than were subjects who were undecided at the outset but did not engage in goal analysis, instead engaging in an unstructured decision process (Jungermann and Schutz, 1992). Once again, systematically structuring decisions did not lead subjects toward more satisfying choices.

While it is often difficult to agree on a gold standard for good decision making, most would agree that when people choose posters or magazines their main goal is to be satisfied with the choice they have made. Thus, we should be concerned that those subjects who decided systematically about their choice of posters and magazines were less satisfied than those who decided intuitively. And the fact that those without well articulated reasons were least helped by decomposing their decisions should be especially concerning to those interested in improving medical decision making, since many patients faced with complex medical decisions may not have well articulated views about various treatment options. In short, Wilson et al.’s research shows that, at least in some contexts, systematicity does not lead to better decisions.

**WHEN AND HOW SHOULD DECISION ANALYSIS BE INCORPORATED INTO PATIENT-BASED DECISION MAKING?**

Decision analysis is a powerful tool that responds to some real deficiencies in the way that physicians reach informed consent with their patients. But it is not a panacea for all the difficulties of reaching informed consent. Instead, it is a tool that, in the right circumstances, deserves an important role in clinical decision making.

*What are the right circumstances?*

Decision analysis is most appropriate in clinical situations where consequences require patients to factor in highly complex information, where outcomes involve making difficult tradeoffs, and where decisions must be made relatively quickly and emotions are operative. Decision analysis is least appropriate in clinical situations where there are many intangible factors that cannot adequately be measured (or even estimated), where there are significant possibilities for regret, and where there are long time delays, making fear and hope important.

Consider the following guidelines. *Decision analysis is appropriate in cases where utilities do not determine the best choice*. This occurs in two situations:

1. **Complex medical decisions** where there are many critical factors to consider.
2. **Situation in which consequences are significant** and the patients need to make quick decisions.

In these situations, decision analysis can help patients make better decisions by providing a systematic approach to decision making.
when there are only two possible outcomes that could result from a choice (e.g., life and death), or when some courses of action dominate others. When there are only two possible outcomes, standard decision theory shows that utility scaling is irrelevant to making the proper decision. Instead, the decision should be made by selecting the action that provides the greater probability of obtaining the superior outcome. The specific utilities of the superior and inferior outcomes do not affect how one ought to choose. Likewise, specific utilities are irrelevant when one action dominates another. In this case, the simple decision rule is to reject dominated alternatives. Since dominance relations are difficult to detect when decisions become even moderately complex (Loomes et al., 1992), and since decision analysis will detect dominance relations when performed correctly, decision analysis can provide a benefit in this situation, even when the utility measurement stage of the procedure is bypassed.

Decision analysis is also useful in cases where it gives patients probabilistic information that they can easily plug into their value systems. For example, Pauker et al. studied the use of decision analysis in guiding couples through decisions about amniocentesis (Pauker et al., 1988). The decision that they faced was summed up in a question that Pauker asked them. “At what chance of a pregnancy’s producing a severely deformed child would you prefer elective abortion to the risk of having a live-born child affected by that deformity?” Decision analysis can help with this decision because it does a good job of informing couples of the probability that they will have a live-born child affected by a severe deformity. It can weigh in the many factors that affect the probability that a couple will have a deformed child, a task that one would not want to leave up to the parents. The parents can then easily integrate this probabilistic fact with their values about abortion and deformities.

Decision analysis also offers a role in clarifying disputes over difficult medical decisions. For example, a physician at one of our institutions was asked to help resolve a dispute between internists and surgeons about how to care for a patient with advanced liver disease. In this case, the internists, taking care of the patient wanted the patient to get a surgical procedure to help treat the liver disease and the surgeons refused. The physician took the internists aside and had them state what they thought were the important outcomes of the case under each of the two options, surgery or non-surgery. He then had them assign probabilities to each of those outcomes. He repeated this task with the surgeons and found that the two groups had created identical decision trees. He then went on to elicit the utilities that each group had for each of the outcomes. He found that the entire dispute hinged on the different values that the surgeons and internists placed on surgical mortality. Because the surgeons viewed death on the operating table as so much worse than death through the natural effects of disease, they felt the patient should not be operated on. In this case, explicitly structuring the decision helped clarify the dispute, thereby enabling the disputants to focus on what to do with their differing values.

While decision analysis seems to be a useful tool in clarifying difficult medical decisions, we must remain cautious. The studies discussed above by Wilson et al. show that, while in some cases a systematic approach to decision making may clarify those factors important in making a decision, it may nevertheless lead to worse decisions. We must also be cautious because even some complex and emotional decisions may not be suitable for decision analysis in the view of many patients faced with those decisions. In studies of kidney donation, for example, it has been shown that many donors do not contemplate the pros and cons of donation in a systematic fashion. Indeed, they do not even wait to learn the medical facts about donation—such as the potential pain, inconvenience, and long-term health risks of donating a kidney—before making up their minds to donate (Fellner and Marshall, 1970; Simmons et al., 1977). This situation involves a highly emotional, immediate decision involving a complex clinical trade-off between the kidney recipient’s chance of receiving a cadaveric transplant, and the relative benefits of receiving a related donation. Yet, most potential donors do not even wait to hear any of the clinical facts before making up their minds about donation. Should decision analysis be used to help guide their decisions? Some argue, on risk/benefit grounds, that family members should not even have an option to donate organs to their loved ones (Starzl, 1985). Should decision analysis be used to determine public policy about whether family members should be allowed to donate? Answers to these questions depend on societal and individual views of the limits of autonomy—personal and professional. It is impossible to determine the proper role of decision analysis in these kinds of matters without settling these other questions.

Even where decision analysis is most appropriate, patients and physicians may not accept it. Decision analysis can only become a part of informed consent if patients and physicians accept it. Some point out that this is no small obstacle (Jungermann and Schutz, 1992). People are likely to have difficulty understanding the rationale behind decision analysis. They may not want the additional burden of understanding decision analysis while facing a complex medical decision. And, finally, they may be more used to making decisions based on arguments than on numbers (Simonson, 1989) and thus may withdraw from the highly quantitative approach of decision analysis.
Given the difficulties in measuring patient utilities confidently, and given the many clinical situations where it is not clear that a rigorous decision analysis is the best way to reach a decision, it is not surprising that many in the decision community have looked for alternative ways of bringing the strengths of decision analysis to bear into clinical decisions. These “weakened” forms of decision analysis deserve attention.

### Weakened forms of decision analysis

The most obvious weakening of decision analysis is to eliminate the final stage of integrating probabilities and values, so as to make patients feel that they are arriving at their own decisions. A major advantage of this weakened procedure is that it leaves the door open for intuition, although such intuition may be muffled or distorted by the act of providing values or being provided with probabilities. A major drawback is that it eliminates the systematic integration of values and probabilities, which may be the single greatest benefit of decision analysis. As Jungermann and Schutz state: “The more decision analysis accommodates criticisms such as (its failure to introduce the “intuitive” or “nonrational”), the more it loses its specific character as a coherent approach based on a strong theory. The distinction between decision analysis and other counseling approaches becomes blurred if key elements are given up, e.g., separating beliefs and values, rules for aggregating both, or checking for inconsistencies” (Jungermann and Schutz, 1992).

There are other disadvantages as well. Researchers have recently begun developing decision aids to help patients incorporate their values into clinical decisions. The range of these decision aids includes written materials, lectures, decision boards, and interactive videodisks. Most organize information in ways that reflect the influence of decision analysis, but without telling patients what the “right” or “wrong” choices are (Holmes-Rovner, 1995). In developing and testing these instruments, researchers have been forced to decide on measures they can use to show that the decision aids lead to “better” decisions. One outcome measure they have used to evaluate decision aids is patient satisfaction (Holmes-Rovner et al., in press). Another outcome measured is the level of conflict that patients feel about their decisions (O’Connor, 1995).

Weakened forms of decision analysis of the type just described are likely to make patients feel that they must justify the decisions they reach. There is a substantial literature pointing to diverse negative effects that result from requiring someone to justify their decisions. Justification has been found to increase ambiguity aversion, which is considered by many to be a type of bias in decision making, to increase the “attraction effect” (Simonson, 1989)—again a pattern of choice that violates normative standards of decision making, and the dilution effect—the tendency for addition of useless information to dilute the quality of decisions (Tetlock, 1992; Tetlock and Boettiger, 1989). To psychologists versant in this literature, therefore, unlike to decision analysts, the findings of Wilson and his colleagues come as no surprise.

Another benefit of decision analysis that might be lost in weaker forms is a potential reduction of regret (Jungermann and Schutz, 1992; Weinstein et al., 1988). Although decision analysis ignores the psychological impact of regret, doing a decision analysis can actually reduce regret to the extent that the patient feels that the decision is taken out of his or her hands. If the decision analysis tells a patient that his leg must be amputated to avoid the spread of cancer, and the patient lives, the patient is unlikely to regret having agreed to the amputation. However, if it instead only presents the patient with information then gives him or her the choice of amputating his leg, in exchange for a small increase in the probability of surviving, the patient is much more likely to regret the decision subsequently. Indeed the regret might even be greater in the latter case if the cancer subsequently spreads.

The parallel development of decision aids and tools to evaluate them is an encouraging sign that the cognitive components of informed consent are being taken seriously by medical researchers. It may be impossible to develop a gold standard of good decision making. For example, patient satisfaction is an important measure, but what if patients are satisfied by bad decisions? It is notorious, for example, that programs that have been shown by evaluation research to confer no measurable benefits are often strongly acclaimed by the participants themselves (Campbell, 1969). Stress reduction, too, is an important measure. But what if patients feel least stressed when they allow physicians to tell them what to do? Or when they get less information rather than more? Or when they get bad information instead of good? These measures are neither necessary nor sufficient for informed consent. But they are still important aspects of decision making that need to be measured, for in the absence of a gold standard we will rely on evaluating decisions from a variety of standpoints. Measures of patients' satisfaction and stress, then, could be part of an evaluation that also included external standards of “good choice,” such as expert or consensus conferences, or the type of standards used by Wilson et al. in their research on decision making (Wilson et al., 1989, 1993; Wilson and Schoeler, 1991).

### CONCLUSION

Decision analysis and decision aids attempt to improve the process of informed consent by helping patients make choices that reflect their values. Decision analysis takes over the task of integrating
values and medical facts, showing patients what choices they ought to make to maximize their utility. Decision aids allow patients to integrate their values with the medical facts, while paying special attention to how the information is presented to patients. Both stand in contrast to a purely informative model of informed consent, where patients are given all the information without any help in integrating it, and to a purely paternalistic model, where physicians (without an understanding of patient values) tell patients what they should do.

We have argued that the best way to make medical decisions depends on the relative importance of intuition and systematicity. In the absence of a gold standard for good decision making, it would be premature to conclude that either intuition or systematicity is always preferable. A crucial task for those interested in improving the process of informed consent will be to begin to clarify this issue. It is no longer enough to simply say that patients need information and that physicians ought to give it to them. Instead, we must focus research on deciding when a systematic approach to decision making, such as that offered by decision analysis or by decision aids, will improve decision making and when this approach will make decisions worse. In addition, we must find ways to incorporate intuitive factors such as regret, hope, and fear into decision analyses. Those interested in improving informed consent should take decision analysis seriously enough to find ways to improve it.

Acknowledgements—The authors acknowledge David Asch M.D., M.B.A., Jon Merz J.D., Ph.D., Arthur Caplan Ph.D., Sankey Williams M.D., and Helmut Jungermann Ph.D. for commenting on earlier versions of the paper.

REFERENCES


