Investigating Patients' Preferences for Different Treatment Options

Hilary A. Llewellyn-Thomas

Cet article offre un aperçu de deux approches méthodologiques utilisées pour cerner les préférences du patient en matière de traitement. La première approche est issue de l'analyse de décision formelle et est grandement recommandée dans le cadre de l'élaboration de politiques sur la santé et de principes directeurs pour les activités cliniques. Selon l'argumentation de l'auteur, l'utilisation de cette approche n'est pas nécessairement appropriée en ce qui à trait au comportement d'un individu face à la prise de décisions. L'auteur présente la conceptualisation, le développement et l'application d'une autre approche qui permet de quantifier les préférences relatives du patient face à un traitement. Cette approche – le «compromis de probabilités» – peut être structurée pour illustrer, de manière très graphique, les véritables dilemmes complexes auxquels les patients doivent souvent faire face. Les étapes de cette approche peuvent être présentées de manière à aiguiller le patient vers un démarche par le biais de laquelle il examinera, de manière explicite, les compromis possibles. Étant donné les éléments visuels et interactifs de cette approche ainsi que sa bonne performance jusqu'à présent, le compromis de probabilités semble être une technique particulièrement prometteuse, non seulement pour intégrer les préférences des patients dans la conception d'essais cliniques mais aussi pour aider les patients à comprendre d'importantes données probabilistes. Ces données peuvent être alors utilisées pour clarifier les valeurs des patients et les communiquer à l'équipe soignante. Les futures étapes de ce travail cumulatif seront consacrées à la vérification d'hypothèses selon lesquelles la technique de compromis de probabilités est vraiment efficace dans l'exécution de cette fonction.

This paper provides an overview of two methodologic approaches to investigating patients' treatment preferences. The first approach is derived from formal decision analysis, and is widely advocated for formulating health policy and constructing clinical guidelines. The author argues that it may not be suitable for application in the context of individuals' decisional behaviour, and then describes the conceptualization, development, and application of an alternative approach to quantifying patients' relative treatment preferences. The approach — the "probability trade-off" — can be structured to illustrate in a highly graphic way the actual complex dilemmas patients often face, and its procedures can be arranged so as to engage the patient in explicitly considering the trade-offs involved. Given these visual and interactive characteristics, and its performance to date, the probability trade-off seems to be a particularly promising technique not only for incorporating patients' preferences into the design of clinical trials, but also for helping patients to comprehend important probabilistic information and then use that information to clarify and communicate their values to the health-care team. The future phases of this cumulative work will be devoted to testing hypotheses that the probability trade-off technique actually can fulfil this function.

Hilary A. Llewellyn-Thomas, R.N., B.Sc., M.Sc., Ph.D., is Professor, Faculty of Nursing, University of Toronto, and Senior Scientist, Clinical Epidemiology Unit, Sunnybrook Health Science Centre, Toronto.

Introduction

In health care, empirical enquiry into patients' decisions is motivated by current debates about resource allocation, rising consumerism, increasing complexity of choice, and the ethical imperative to foster, in appropriate ways, autonomous and informed patient decision-making (Llewellyn-Thomas, 1995; O'Connor, Llewellyn-Thomas, & Drake, 1995). Keeney (1992) argues that a person's decisions are ultimately determined by his or her values or preferences. In the context of health care, "preference" refers to the degree of satisfaction or desirability that a person attributes to a particular decision-making role or style (Degner & Russell, 1988; Pierce, 1993), to a particular state of health (Froberg & Kane, 1989; Llewellyn-Thomas, 1996), to a particular time period (Llewellyn-Thomas, Williams, & Arshinoff, 1994; Palda et al., 1994a; Palda, Llewellyn-Thomas, MacKenzie, Pritchard, & Naylor, in press), or to a particular treatment process (Levine, Gafni, Markham, & MacFarlane, 1992; Liao et al., 1996; O'Connor, Boyd, Warde, Stolbach, & Till, 1987; O'Connor, Tugwell, & Wells, 1994).

This paper will concentrate on the empirical investigation of patients' strength of preference for various treatment options. The different disciplines represented by anthropologists, ethicists, cognitive scientists, and economists use a wide variety of empirical approaches to investigate these preferences; for the purposes of this paper the techniques derived from economics merit focused attention because they are becoming widespread in health-services research (Hammond, McClelland, & Mumpower, 1980; Llewellyn-Thomas et al., 1992).

There are two general strategies that could be used to reveal relative strength of preference for various treatment options. The first approach is formal decision analysis (described below). In health research, it is traditionally used when the purpose is to quantify a *group's* strength of preference for different treatment options in order to devise health policies or treatment guidelines. Decision analysis has a strong axiomatic basis and is an extremely powerful and appropriate approach that primarily serves the needs of the clinician or policy-maker facing decision problems involving patient populations.

Because of its successful application in the aggregate context, there has been a tendency on the part of investigators to assume that formal decision analysis can also be used to help *individual* patients with the process of "values clarification" (O'Connor, 1993). The purpose of this paper is to challenge this assumption, to argue that exclusive reliance

on formal decision analysis would be unwieldy in the context of working with individual patients, and to present an alternative approach. This second approach — the probability trade-off technique — is emerging in the research literature. It is designed to reveal an *individual's* strength of preference as part of the process of providing decision support within the clinical context. The first approach will be merely outlined here, since it is described in depth elsewhere; the primary focus of this paper will be the rationale, construction, and application of the second approach.

The Group Perspective: Using Traditional Decision Analysis

As noted above, the formulation of health policy or the construction of clinical guidelines often requires health-care decision-makers to identify and prescribe a treatment plan for groups of patients. Formal decision analysis has traditionally been used to satisfy this prescriptive need.

The Steps in Decision Analysis

The overall structure of a decision analysis is illustrated in Figure 1. This example has been distilled to the barest outline in order to present the general principles of the approach; the reader seeking greater detail on the procedures and their rationale should consult a formal text in clinical decision analysis (Sox, Blatt, Higgins, & Marton, 1988; Weinstein & Fineberg, 1980).

A decision analysis begins with construction of a formal decision analytic "tree," which specifies the various outcome health states (e.g., X, Y, and Z) that could be obtained from the different treatment options under consideration (e.g., Treatment A, with moderate side effects, or Treatment B, with serious side effects).

Then, the likelihood or probability that a particular treatment option will lead to each of the health states is estimated. (For example, in our illustration, given Treatment A, the chances of entering states X, Y, and Z are 0.30, 0.55, and 0.15, respectively; with the more intrusive Treatment B, the chances of entering states X, Y, and Z are 0.70, 0.10, and 0.20, respectively.) These probabilistic estimations often are obtained from the clinical literature on the particular health-care problem.

Figure 1 *Clinical Decision Analysis: An Example*

	Available Treatments	Probabilities of Various Outcomes	Utilities for Outcomes
		X (p=.30)	.75
	"A" (relatively milder side effects)	Y (p=.55)	.60
Diagnosis		Z (p=.15)	.20
		X (p=.70)	.75
	"B" (relatively more severe side effects)	Y (p=.10)	.60
		Z (p=.20)	.20

"Expected Utility" for Treatment A = (.30) (.75) + (.55) (.60) + (.15) (.20) = .585
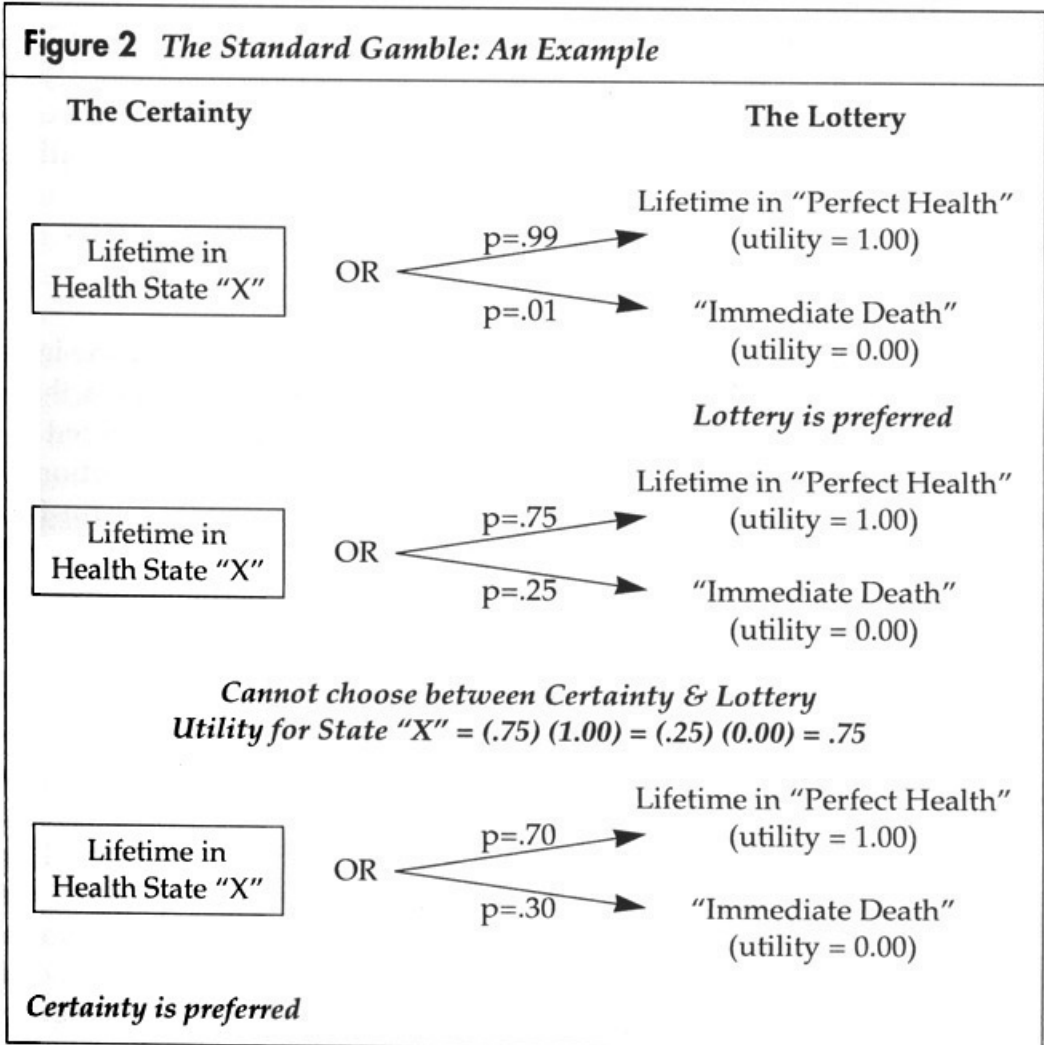"Expected Utility" for Treatment B = (.70) (.75) + (.10) (.60) + (.20) (.20) = .626

Next, subjective evaluations of the relative desirability of each outcome health state are estimated, often using the judgements of groups of relevant raters. There are a number of ways to elicit these evaluations (see Froberg & Kane, 1989), but the standard gamble, a technique that generates "utilities," is considered the criterion method (Llewellyn-Thomas et al., 1982; Llewellyn-Thomas et al., 1984; Sox et al., 1988; Weinstein & Fineberg, 1980).

Suppose we are interested in obtaining the utility score for health state X for a group of raters. The standard gamble procedure for doing this is outlined in Figure 2. The procedure begins with asking a rater to consider a hypothetical choice between the certainty of a lifetime continuously in state X and a hypothetical lottery. The lottery has two possible outcomes. The positive outcome is a much better health state,

arbitrarily assigned a utility of 1.00. The negative outcome is a much worse health state, arbitrarily assigned a utility of 0. The probabilities in the lottery are systematically altered until the rater cannot choose between the certainty of continued life in state X and the lottery. Thus, as in the example presented in Figure 2, suppose the rater indicates that he or she cannot choose between the certainty of continued life in state X and the lottery when the chance for Perfect Health is .75 and the risk of Death is .25.

At this point, the lottery's expected utility is (.75)(1.00) + (.25)(0.00) = .75. According to the axioms of rationality that underlie the standard gamble, the expected utility of this lottery is, by substitution, the utility for health state X. Thus, in our example, for this rater the utility score for health state X is .75. (Note that this utility score can range from 0 to 1.00, with higher scores indicating a relatively more desirable health state.)

Figure 2 *The Standard Gamble: An Example*

The Certainty   **The Lottery**

Lifetime in "Perfect Health"
(utility = 1.00)

Lifetime in Health State "X"   OR   p=.99 →

p=.01 →   "Immediate Death"
(utility = 0.00)

Lottery is preferred

Lifetime in "Perfect Health"
(utility = 1.00)

Lifetime in Health State "X"   OR   p=.75 →

p=.25 →   "Immediate Death"
(utility = 0.00)

Cannot choose between Certainty & Lottery
Utility for State "X" = (.75) (1.00) = (.25) (0.00) = .75

Lifetime in "Perfect Health"
(utility = 1.00)

Lifetime in Health State "X"   OR   p=.70 →

p=.30 →   "Immediate Death"
(utility = 0.00)

Certainty is preferred

Since health-policy decision problems often require comparisons across decision analytic trees for different diseases or illnesses, a common scale for outcome evaluations is necessary to permit such later comparisons. Standard gamble utilities are particularly useful in this regard, since, if they are obtained using "Good Health" and "Death" as the gamble anchors, they can be considered to rest on this common scale.

The standard gamble steps are then repeated for each of the other outcome states in the decision tree. The entire process is repeated for the full sample of raters to yield a distribution of utility scores for each outcome state. Then the sample's mean utility scores (e.g., .75 for state X, .60 for state Y, and .20 for state Z) are incorporated into the decision model and are used in conjunction with the associated probabilities to compute the expected utility of each treatment option. See Figure 1 for an example of these computations for a particular hypothetical decision tree. Thus the expected utility for a treatment arm in a decision analytic tree is a proxy measure of the group's overall strength of preference for that treatment. Finally, the option with the highest expected utility is identified as the "best" overall treatment strategy for the aggregated patient population facing the particular health-care problem.

The Limits of Decision Analysis

Figuratively speaking, in formal clinical decision analysis the investigator stands at the outcome end of the decision tree, looks back through the tree using probabilistic and evaluative information gathered in the past to compute the expected utility of each treatment option, and draws conclusions about what the decision "should" be for future patients in the same clinical situation. For the policy-maker or clinical investigator who is studying decision problems involving patient populations, this can be an extremely powerful and appropriate approach, provided careful attention is paid to a few caveats (Llewellyn-Thomas, 1996).

First, decision analysis requires philosophical and scientific justification for using aggregated data about probabilities and utilities. In addition, in any particular clinical decision analysis some methodologic issues associated with the standard gamble need to be satisfactorily addressed. One of these is the fact that the technique is more tractable when the outcome health states in the tree are stable, chronic conditions. Other issues include whether evaluations should be obtained from the general public or from groups of patients actually experienc-

ing the outcome states, and which measure of central tendency should be used in aggregating a group's utilities. A further issue is the interpretation of the highly skewed utility distributions that are generated by the standard gamble when the health state under consideration is not life-threatening and yet "Death" is used as a gamble outcome. (These issues are discussed in more detail in Nichol, Llewellyn-Thomas, Naylor, and Thiel, 1996.)

However, even when these issues are resolved, the applicability of decision analytic techniques is questionable when the research objective is not to resolve a health-policy question, but to understand and help an individual patient who is making an actual decision about his or her care. The perspective on the decision problem is different. The individual is formulating and reporting his or her preferences for different processes of care that will take place in real time, that will involve differing effects on health-related quality of life, and that will lead to outcome states that are themselves transitory. In this context it is very difficult to use conventional utility assessment approaches to elicit evaluations for these outcomes, since the standard gamble is less tractable for transitory treatment-induced health states. Furthermore, an individual's decision behaviour often is congruent not with the axioms of "rational" choice, but rather with the personal meaning he or she attributes to the situation (Fischhoff, Goitein, & Shapira, 1982; Llewellyn-Thomas, Williams, Levy, & Naylor, 1996; Schoemaker, 1980, 1982). Accordingly, one could challenge the validity of using the prescriptive technique of decision analysis to describe and support individualized decision-making. Given these concerns, it may be inappropriate to take techniques originally designed for formal decision analysis and use them to evaluate the effectiveness of individuals' actual decision-making or to serve as a clinical decision aid for individuals. The results generated by such a method/purpose "mis-match" may be irrelevant or, worse, misleading.

Elsewhere, an argument has been presented for using a different approach under these circumstances (Llewellyn-Thomas, 1994) when a patient wishes to be involved in shared decision-making about his or her care (Deber, Kraetschmer, & Irvine, 1996; Degner & Russell, 1988; O'Connor et al., 1995). This approach deliberately works with the fact that an individual patient in real time stands at the actual decision point of treatment selection, and, while figuratively looking down the decision tree, considers the side effects of the various treatment options, the possible outcomes of treatment, and the probabilities of obtaining those outcomes. We refer to this approach as the "probability trade-off technique" (Llewellyn-Thomas et al., 1996).

The Individual's Perspective:
Using the Probability Trade-off Technique

Steps in the Probability Trade-off Technique

The general characteristics of this approach are best outlined in the two-treatment situation. First, the patient is presented with descriptive and probabilistic information about the protocols, side effects, and potential benefits associated with two clinically reasonable alternatives — for example, treatments A and B. These "bits" of information are presented sequentially and arranged in pairwise columns to permit gradual assimilation of the information as well as clear comparisons. In addition, devices such as moveable pie charts are used to foster comprehension of the probabilistic information. In effect, once the full decision situation has been mapped out, the respondent is involved in learning about a combined process-and-outcome path that includes descriptions of what the treatments would entail, their possible outcomes, and the probabilities of encountering those outcomes.

Then the respondent is invited to indicate which treatment option would be preferable, given this "map." To illustrate, suppose the respondent initially chooses Treatment A. Next, the interviewer systematically either reduces the probability of benefit from Treatment A or increases the probability of benefit from Treatment B, until the respondent switches his/her stated preference to Treatment B. On the other hand, if the respondent originally chooses Treatment B, the interviewer either reduces the probability of benefit from Treatment B or increases the probability of benefit from Treatment A, until the respondent switches his/her stated preference to Treatment A. Usually, a visual sliding scale is used to demonstrate these imaginary increments/decrements in probability.

When this systematic alteration is carried out, the probability of benefit obviously becomes less and less clinically reasonable and more and more hypothetical in nature. This is made clear to the respondents, who are told that these alterations in the decision problem are a device for assessing how strongly they feel about their original choice. Thus one who highly values his original choice will not switch to the alternative until either the benefit from his original choice is considerably reduced or the benefit from the alternative is considerably increased.

It is critically important that the following points about this general procedure be emphasized. The benefit that is probabilistically altered (e.g., chance of symptomatic relief, reduced risk of an adverse event,

reduced risk of recurrence, or chance of survival), and the direction in which it is changed, are not determined by the interviewer on an ad hoc basis at the time of data collection. These design elements are established by the investigator beforehand, according to the clinical context and the particular nature of the research question.

For example, suppose the research objective is to quantify the strength of preference for one of the two treatment alternatives — let us say Treatment B relative to Treatment A. Such a situation would arise when Treatment A is the standard for care, Treatment B is a newly introduced mode of therapy, and it is important that patients' attitudes toward this new treatment option be determined. This kind of probability trade-off task is illustrated in Table 1, which uses an example from preventive lifelong medication for hypercholesterolemia. Note that in this particular example the procedure begins with a "dominated" choice, in that the standard Treatment A is preferable, since nothing is to be gained from Treatment B. The patient logically chooses Treatment A. Then the probabilistic risk of a future negative event is systematically reduced (thus in this context the probability of benefit is increased) until the respondent's preference switches from Treatment A to Treatment B.

The switch point can then be used as a measure indicating the "relative" strength of preference for Treatment B. (We use the term "relative" here to indicate that the technique determines the respondent's strength of preference for the option of interest [B] *in comparison to the other option* [A], rather than on an absolute scale anchored with "Good Health" and "Death.") Thus a person with a relatively weak preference for Treatment B will not accept it until the benefit has been greatly increased, whereas a person with a relatively strong preference will abandon Treatment A and switch to B as soon as a potential benefit is offered.

The above example refers to a preventive health-care situation. Another example would be a situation involving therapy for a life-threatening condition like cancer. In such a situation, the procedure also might begin with a "dominated" choice, in that the standard Treatment A is deliberately presented as preferable and the patient logically makes that initial selection. However, in this context the investigator might systematically increase the chance of long-term survival (i.e., in this context the probabilistic chance of a future positive event is increased) until the respondent's preference switches from Treatment A to Treatment B.

Table 1 *The Probability Trade-off Technique:*
An Example in Preventive Health Care

Treatment A	*Treatment B*
Protocol:	**Protocol:**
• Not eating foods high in saturated fat and/or cholesterol	• Not eating foods high in saturated fat and/or cholesterol
• No medication	• A medication without cost to you: 1–2 capsules taken 1–2 times/day now and for the rest of your natural life
• See your doctor and have your blood checked about 3 times a year for the first year and at least once a year thereafter	• See your doctor and have your blood checked about 3 times a year for the first 2 years and at least twice a year thereafter
Possible Side Effects:	**Possible Side Effects:**
None	*(many of which will lessen in time)*
	More frequent:
	(experienced by about 60 out of 1,000 people)
	– constipation, muscle aches or cramps
	Less frequent:
	(experienced by 10–30 out of 1,000 people)
	– diarrhea, heartburn, nausea, headache, dizziness, skin rash, unusual tiredness or weakness
Chance of Heart Attack:	**Chance of Heart Attack:**
40 out of 1,000 people may have a heart attack (which may or may not be fatal) at some time over the next 10 years	40 out of 1,000 people may have a heart attack (which may or may not be fatal) at some time over the next 10 years
	Treatment A initially chosen
	Chance of heart attack then lowered (i.e., to 35/1,000 ... 30/1,000 ... 25/1,000) until respondent switches to choosing Treatment B

Thus the particular clinical context determines the option of interest, the benefit that is probabilistically altered, and the direction in which the task proceeds. Therefore in each application of the technique (see below) the underlying preference scale is idiosyncratic to the original decision problem. This would be a serious liability if we tried to apply the probability trade-off technique to decision analyses of health-policy problems that require an absolute preference scale permitting across-disease comparisons. However, when the research problem requires us only to assess individuals' strength of preference for A relative to B, within the confines of the particular clinical context, the disease-dependent nature of the scale is not a concern.

Whether the measurement technique generates internally consistent results is of greater importance. In one context, test-retest reliability coefficients ranged from .78 to .94 (Percy & Llewellyn-Thomas, 1995); in another, Brundage, Feldman-Stewart, Groome, and Davidson (1995) report similarly high test-reset reliability coefficients. This evidence implies that, in situations in which the underlying values are not expected to be labile, patients report reasonably stable switch points. However, since the relative preference scales are uniquely determined by the particular trade-offs in each decision problem, we cannot talk in terms of *the* psychometric properties of the technique as if they were characteristics that carry across all applications.

Past and Current Applications of the Probability Trade-off Technique

This general approach has been adapted for research problems that required measuring the relative strength of preference scores for a variety of treatments. The therapies have included chemotherapy (Llewellyn-Thomas, McGreal, Thiel, Fine, & Erlichman, 1991; O'Connor et al., 1987), radiation therapy (Llewellyn-Thomas, Thiel, & Clark, 1989; Palda et al., 1994b), the "Do Not Resuscitate" order (Percy & Llewellyn-Thomas, 1995), and lifelong medication for hypercholesterolemia (Llewellyn-Thomas, Paterson, Carter, & Naylor, 1994) and hypertension (Llewellyn-Thomas, Carter, Paterson, & Naylor, 1995).

Note that different research questions underlay each of these unique contexts. An early chemotherapy application assessed the treatment preferences of respondents indicating whether they would enter a clinical trial comparing the therapies of interest. Such investigations are noteworthy because different treatment attitudes held by those who would refuse trial entry would have implications for the transfer of the results of the clinical trial itself into general clinical practice (Llewellyn-Thomas et al., 1991). Other studies have explored the potential of the

probability trade-off technique as an innovative approach to teaching about probabilities, in the process of obtaining informed consent for trial entry (Llewellyn-Thomas et al., 1989) and for end-of-life decisions (Percy & Llewellyn-Thomas, 1995). These applications indicate that the technique may be helpful in revealing hidden ethical dilemmas in value-laden health-care situations.

More recently, we have used the probability trade-off technique to make explicit the "demanded risk reduction" for cardiovascular events that patients with asymptomatic hypercholesterolemia (Llewellyn-Thomas, Paterson, et al., 1994) or moderate hypertension (Llewellyn-Thomas, Carter, et al., 1995) would want before they would consider lifelong cholesterol-lowering or antihypertensive medication to be worthwhile. These investigations indicate that a substantial proportion of each of the relevant populations wants more risk reduction than is actually achievable from medication, but is not aware of the discrepancies. The existence of such sub-groups points to the need for decision aids that can incorporate patients' individualized risk factors and make explicit their achievable risk reduction, given various modifications in their risk profile.

In all of these earlier applications, the probability trade-off technique was confined to dichotomous choices, because the investigators were determining the strength of preference for an option of particular interest relative to its alternative. Recently there has been increased interest in applying the technique to situations that involve three different treatments, because these situations are not uncommon (for example, medical treatment, PTCA, and CABG for angina) and their complexity is likely to generate decisional conflict (O'Connor, 1993, 1995; O'Connor & D'Amico, 1990). This three-way application of the probability trade-off technique has been attempted with men with benign prostatic hyperplasia (Llewellyn-Thomas et al., 1996). It was able to identify patient sub-groups with unique orders of preference for watchful waiting, alpha blockers, and transurethral resection of the prostate, as well as identify individuals who reported close preference scores and therefore could be liable to experience decisional conflict. (Note that O'Connor and D'Amico, and O'Connor [1993, 1995], have argued that the concept of decisional conflict is particularly germane to nurses in clinical practice who may be involved in helping patients cope with the tensions induced by having to make difficult health-care choices for either themselves or dependent others.)

Besides its potential usefulness for exploring the role of preferences in individuals' treatment choices, probability trade-off is a promising device for estimating the feasibility of clinical trials in which health-related quality of life is a serious consideration. We have used an example from cardiology to illustrate how the general approach could be adapted to the task of estimating clinically important differences from the patients' perspective (Naylor & Llewellyn-Thomas, 1994). The task could be readily structured so as to identify the point at which potential participants think that the chance of benefit offered by a new treatment would be worthwhile, given a particular level of toxicity or side effects. This information would, in turn, be used to help estimate how many patients would need to be randomized in a clinical trial for reliable detection of a meaningful difference in outcome, if it exists as a result of the new treatment. Thus patient-identified clinically important effect sizes could be used in the computation of overall sample sizes for treatment trials; given these estimates, one could then readily determine whether the accrual of such sample sizes would be feasible in the particular clinical situations.

This logic also could be flipped another way. The task could be structured so as to identify the point at which potential participants think that an increased probability of toxicity or side effects offsets the chance of greater benefit offered by a new treatment. For example, hormone replacement therapy (HRT) traditionally has been considered to be contraindicated for women with breast cancer. Recently, given the long-term survival of women with early-stage breast cancer, concern has been developing that these women should be offered the protective long-term benefits of HRT in terms of decreased chances of cardiac disease and osteoporosis. The dilemma has led to arguments for launching a clinical trial to specify the degree of protection available to these patients. However, it is not known whether the accrual rates for such a trial could be successfully achieved. Currently, the probability trade-off technique is being used to answer this question (Pritchard, Llewellyn-Thomas, Lewis, Franssen, & Sawka, 1996). It is designed to determine the "maximal acceptable risk increment" in the chance of recurrence that women with a primary diagnosis of early-stage breast cancer would contemplate before accepting HRT, given its putative benefits (Bluming, 1993; Pritchard, Roy, & Sawka, 1995). If the overwhelming majority of these women report they would accept no incremental risk at all, then the prospects for successful recruitment into a future trial would look dim; it would be helpful to learn about this possible problem prior to funding and launching a large clinical trial.

Future Applications of the Probability Trade-off Technique

Some of the pressures behind the current interest in assessing patients' treatment preferences have been outlined in the Introduction. These pressures are most keenly felt in clinical situations in which there is much at stake for the patient but, because the results of clinical research are inconclusive, there is a "grey zone" of uncertainty about what is the "best" treatment to select (Naylor, 1995). In these uncertain situations, efforts are being made to develop and test techniques to help patients who wish to become actively involved in decision-making regarding their treatment (O'Connor et al., 1995).

These techniques differ in a number of ways from traditional patient-education programs (Llewellyn-Thomas, 1995). The factual treatment information they present is tailored to the particular patient's characteristics and is embedded in judgement tasks that promote comprehension and "values clarification." These values-clarification tasks are designed to engage patients in the active formulation and articulation of their personal preferences so that they, in turn, become readily apparent not only to the patient but also to other members of the health-care team.

There are several kinds of values-clarification tasks, including Dolan's analytic hierarchy process (Dolan, 1995), O'Connor's balance scale (O'Connor et al., 1994; O'Connor, Tugwell, et al., in press) and the probability trade-off proposed here. Research programs focusing on the effectiveness of the trade-off task for fostering informed consent to either accept or refuse treatment have just got underway in Canada, beginning in the field of oncology (Brundage et al., 1995; Brundage, Davidson, & Mackillop, 1997). The initial steps have involved examining the stability of patients' responses to the task itself. To date, the results are encouraging; this team of investigators reports reliability coefficients ranging from 0.82 to 0.94 (Brundage et al., 1995). The next steps in this programmatic approach could be either basic or applied in nature.

Basic studies would ask research questions about the processes that occur when the patient engages in this kind of values-clarification exercise. For example, are patients' responses vulnerable to hidden biasing effects? In earlier work in the decision sciences, people have been asked to consider *simulated* health situations in which differential "frames" (i.e., "a 10% chance of death" is a negative frame, whereas "a 90% chance of survival" is a positive frame) are applied to *extreme probabilities*. The early experiments demonstrated that these different presenta-

tions can induce strong "framing" effects influencing the selection of a treatment option (McNeil, Pauker, Sox, & Tversky, 1982; O'Connor, 1989; O'Connor et al., 1985; O'Connor, Pennie, & Dales, 1991). Although no systematic attempts have been made to test for a framing effect in the probability trade-off technique, we could hypothesize that such an effect will not appear. This prediction is based on two inter-related points: (a) since the probability trade-off task is individualized for the patient, it works with *realistic* probabilities and is by definition *highly salient* to the respondent; and (b) there is evidence that, when patients are asked to consider differentially-framed information about realistic probabilities in highly salient decision situations, such framing effects will not emerge (Llewellyn-Thomas, McGreal, & Thiel, 1995).

The effect that is more likely to become apparent is an "anchoring bias," induced by the fact that the trade-off technique, in narrowing down on the switch point, requires a series of choices. In some clinical contexts, the trade-off procedure could move from either a loss position toward a relative gain or a gain position toward a relative loss. We have some evidence that the sequential direction taken to identify the switch point may induce a biasing effect (Percy & Llewellyn-Thomas, 1995); however, this effect emerged in a life-and-death clinical decision situation and may not hold in, say, a preventive decision for a chronic, non-life–threatening context. In any case, the evidence to date implies that care should be taken to achieve internal consistency in the sequential direction that is taken to identify the switch point — unless the investigator is primarily interested in deliberately generating and exploring such an effect (in which case it becomes a main effect rather than a "bias").

Cognitive scientists, for example, would be intrigued by these basic questions, which are concerned with the fundamental processes of interpreting probabilistic information and formulating preferences. On the other hand, clinical investigators and health-care policy-makers might consider these issues too esoteric, and be far more interested in study designs comparing the trade-off task to usual practice (and/or to the other formal values-clarification exercises), in terms of its effectiveness.

There are a number of key philosophical and methodologic issues to consider when designing such evaluative projects, not the least of which is the selection of the outcome variable to be used as a measure of effectiveness (Llewellyn-Thomas, 1995; O'Connor, Llewellyn-Thomas, et al., 1997). Various disciplines may have different views about the relative importance of behavioural, cognitive, or attitudinal

outcomes such as the patient's actual treatment selection and subsequent adherence to therapy, comprehension of the information provided, or satisfaction with the decision-making process and level of decisional conflict. In this regard, O'Connor's operational definition of "satisfactory decision-making" — that is, a decision process that is informed, consistent with personal values, and acted upon — has made a significant conceptual and methodologic contribution toward resolving this dilemma (see O'Connor, 1993, 1995).

Conclusion

This paper has attempted to provide an overview of methodologic work investigating patients' treatment preferences. A notable proportion of this body of work has been undertaken by Canadian scientists with nursing backgrounds, who have paid particular attention to the conceptualization, development, and application of one emerging approach to quantifying patients' relative treatment preferences. The approach is highly adaptable — provided that the relevant probabilistic information is readily available or can be estimated with some confidence — and therefore highly context-dependent. It can be structured to illustrate in a highly graphic way the actual complex dilemmas patients often face, and its procedures can be arranged so as to engage the patient in explicitly considering the trade-offs involved. Given these visual and interactive characteristics, it seems to be a particularly promising way to help patients who wish to engage in this process to comprehend important probabilistic information and then use that information to clarify and communicate their values. The future phases of this cumulative work will be devoted to testing hypotheses that the probability trade-off technique actually can fulfil this function.

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