Cost-Value Analysis in Health Care

Making Sense out of QALYs

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Maximizing Value in Health Care

1.1 INTRODUCTION

This book is about the potential use of a numerical economic evaluation model called the QALY (Quality Adjusted Life Year) model in setting priorities in insurance plans for health care. Such plans may be either public or private. The former are tax-financed. They generally aim at providing access to necessary health care to all members of society regardless of their income. People who elect to have such schemes do so out of a combination of self-interest and a desire to help fellow members of society who happen to fall ill. Public schemes include national health services in countries all over the world, as well as, for instance, the Medicaid system in America. Private insurance plans are financed by premiums paid either directly by individual members of the plans or by the individuals' employers. Membership is voluntary and motivated by self-interest. In the United States the majority of health insurance is privately financed, whereas in most other countries private plans are supplementary to a national health service.

The point of both public and private insurance plans is to have members prepay for statistically predictable consumption of health care. Copayments made by patients at the point of consumption of health care are small or nonexistent. With such a payment arrangement, patients will tend to demand even such services as are of little or modest value simply because it costs them very little to do so. However, members of insurance plans are not interested in having their money spent on covering low-value services for other people. Nor do they consider it important for themselves to be insured in such a way as to receive such services free of charge. They are mainly

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interested in being part of an insurance plan that covers *important* health needs, particularly important needs that are costly to accommodate.

In recognition of these preferences, there is general agreement that a health-care insurance plan, be it public or private, should not aim to provide all the care that its members might want. Rather, it should strive to be *as valuable as possible* to its members given the resources that these members have made available. This is the same as saying that it should give priority to activities that have a favorable ratio between benefits and costs. For brevity, I shall hence forth refer to this aim as *maximizing membership value*. When other writers speak about ''societal values'' in health care (see, e.g., Gold et al. 1996), it is usually such ''membership value'' to which they effectively are referring. To accord with common parlance, I shall in many places use the term ''societal value'' synonymously with ''membership value'' (exploiting the fact that societies can also be private). The question being studied in the book is whether a numerical economic evaluation model can aid administrators of public and private health insurance plans in maximizing membership or societal value. By ''administrators'' I mean, then, doctors in administrative positions, health bureaucrats, and health politicians.

1.2 THE RATIONALE FOR NUMERICAL MEASURES OF VALUE

A necessary (but not sufficient) condition for judging whether or not membership value is maximized is knowledge of which factors affect people's valuations of different health-care activities. This may vary across communities. However, from public debate in recent years on priority setting in health care in countries such as Holland, New Zealand, Norway, Sweden, and the United States, the following have emerged as potentially significant determinants of value:

1. The number of people helped by the activity.
2. The severity of the patient's condition in terms of loss of quality of life
3. The degree to which the service reduces symptoms and improves functioning
4. The degree to which the service increases the patient's subjectively perceived quality of life

5. The number of years the patient gets to enjoy improved health and/or quality of life (including increased life expectancy)
6. The age of the patient
7. The distance in time until the gain in health materializes (future gains may be valued less than present ones)
8. The patient's responsibility for his/her own illness
9. The patient's responsibility for caring for others
10. The effect of care on a patient's productivity

Factors like sex, race, education, and income, on the other hand, have generally been deemed irrelevant to determining the value of health outcomes.

To be able to maximize membership value, health insurance administrators further need to know the relative importance that members attach to these various factors. Governments in Norway (Norwegian Priority Committee 1987), Holland (Dutch Committee on Choices in Health Care 1992), New Zealand (Campbell and Gillett 1993) and Sweden (Swedish Health Care and Medical Priorities Commission 1993) have chosen to lay out this information in terms of *verbal guidelines for priority setting*. For instance, the Norwegian government, with the approval of Parliament, stated that the most important criterion for prioritizing among patients is the severity of the patient's state of illness, subject to the condition that effective treatment is available, whereas, for instance, the patient's age and responsibility for his own illness were explicitly classified as being of little importance. In our terminology, this is the same as saying that the most valued activities in the Norwegian National Health Service are those which help the most severely ill, and that, for example, heart operations provided to seventy-year-old smokers and to fifty-year-old nonsmokers are regarded as equally valuable.

Although verbal guidelines may be helpful to decision makers, they lack precision. For instance, the Norwegian guidelines suggest that treating a few severely ill people is regarded as just as valuable as treating a considerably greater number of moderately ill people. But how much greater is ''a considerably greater number of people''? It could probably mean anything from five times as many to a hundred times as many. Now assume that, in a given decision situation, the cost of treating one severely ill person were having to refrain from treating fifty moderately ill people. It would then be difficult to tell, on the basis of the *verbal* guideline, whether or not the greater value

of treating the severely ill person was sufficient to justify the opportunity cost (i.e., the failure to treat the fifty moderately ill people).

It therefore seems quite sensible and legitimate to ask whether it is possible to elicit preferences from members of health insurance plans in a way that would allow decision makers to estimate the value of different health-care activities more accurately, that is, in terms of numbers. This is precisely what health economists are trying to achieve.

The problematic part of this effort is, of course, whether it really is possible to represent complex value judgments in numbers that are sufficiently on target – not only to be helpful to decision makers but to be more helpful than verbal guidelines. In other words, how well can such numbers predict the choices that members of insurance schemes would make if they were asked directly to rank, in terms of value, different ways of using a given amount of resources? To what degree are there biases in these predictions; and to what degree do they have random error? These are the crucial questions we need to address when evaluating numerical models for assessing the value of health-care services.

1.3 AVAILABLE NUMERICAL MEASURES OF VALUE

A number of approaches are available for estimating the societal value of health interventions at a numerical level. I review them briefly here. Later I shall present in greater detail the approach that is the focus of this book, namely cost-utility analysis based on the concept of the Quality Adjusted Life Year (QALY).

In *cost-effectiveness analysis (CEA)* in the original narrow sense, health outcomes are expressed in *natural units* such as number of cases of disease prevented, number of lives saved, or number of life years gained. Such measurements are useful in comparing alternative programs the outcomes of which are similar in kind – for instance, programs all of which lead mainly to the prevention of premature deaths. The attractiveness of CEA lies precisely in its use of natural outcome units, which most people can easily understand and intuitively accept as measures of value. Its weakness lies in the inability of the approach to allow comparisons of programs having outcomes that are different in kind – for instance, programs that lead to different kinds of functional improvements or symptom relief. The measurement of value in terms of natural outcome units hence does not allow for a calculation

of the total value of a health insurance scheme that covers life-extending procedures as well as a wide range of health-improving procedures.

Cost-utility analysis is a special variant of cost-effectiveness analysis. It uses the concept of a QALY to overcome the problem of comparing outcomes that are different in kind. In this approach, any state of illness or disability may be assigned a numerical score reflecting the *utility* – that is, the goodness – of the state to the individual concerned. Utility is expressed on a scale from zero (the utility assigned to the state of being dead) to unity (the utility assigned to being in full health). The value of a health outcome for an individual is calculated as a product of two factors: the increase in the utility of the person's state of health as measured on the 0–1 scale, and the number of years the person gets to enjoy this improvement. The measurement of outcomes in terms of QALYs in theory allows comparisons of cost-effectiveness ratios across all kinds of conditions and interventions, and also permits calculation of the total membership value of different health plans.

In *cost-benefit analysis (CBA)* the value of different health outcomes is measured in terms of subjects' willingness to pay to obtain the various outcomes in question. An advantage with this approach is that it allows comparisons not only of health outcomes that are different in kind (as the QALY approach does) but also comparisons of health outcomes with other goods and services. It therefore has the potential to inform decisions regarding the allocation of resources to health care as opposed to other areas of consumption. The QALY approach does not allow this, inasmuch as health care is the only area in which QALYs are used as a measure of value.

There are a number of problems associated with measuring people's willingness to pay for health care (Olsen 1997). This may be a reason why cost-benefit analysis has played a modest role in health economics hitherto. However, further research may draw more interest to this approach in the future (Johannesson and Jönsson 1991).

The World Health Organisation is organizing a large international collaborative enterprise called the *Global Burden of Disease Project* (Murray and Lopez 1996). The idea behind the project is to aid priority setting in health care at the global level by collecting statistics on the degree to which different diseases represent a burden to mankind in terms of the number of people affected, life years lost, and losses in quality of life. Burden of disease is estimated by assigning disability

weights to different kinds of illness. The weights use the same 0–1 value scale as the QALY approach, except that the scale is turned around, so that zero represents ''no burden'' and unity, ''maximum burden'' (equivalent to ''as bad as being dead''). The weights are used in combination with age weights to translate individual life scenarios into a number of Disability Adjusted Life Years (DALYs).

Apart from the age weighting, DALYs are conceptually equivalent to QALYs, inasmuch as they combine reductions in morbidity and mortality in a single value index. However, disability weights for DALY calculations are, since 1995, based on a procedure for preference measurement that is quite different from those used in the QALY field. An important part of the criticism of QALYs presented in this book therefore does not apply to DALYs. On the other hand, there are other problems with DALYs that are worth looking into more closely. I briefly discuss what I perceive as a major problem in the final chapter. For an extensive discussion of DALYs, readers are referred to Anand and Hansson (1997) and Murray and Acharya (1997).

In the following chapters I focus on cost-utility analysis. I show that a policy of maximizing health gains in terms of QALYs disregards highly significant societal concerns for fairness in health care. The QALY approach furthermore uses the concept of cardinal individual utility, which is not only difficult to measure in an understandable and verifiable way, but also unnecessary to measure when the ultimate goal is to estimate *society's* valuation of health-care outcomes. I suggest a model for such valuation that differs from most existing models for QALY calculations in that it compresses mild and moderate states of illness to the upper end of the 0–1 value scale. The result is that severity of illness receives much greater weight in the assignment of value, and discrimination against patient groups with lesser potentials for health is significantly reduced. The model also restricts the use of health-state values so as to allow for the equal valuation of life-extending programs for healthy and disabled people. I suggest *cost-value analysis* as a suitable name for this approach.

Before I go into the details of QALYs, I wish to make three basic points, which the reader should keep in mind throughout the rest of the book, concerning the need to distinguish between different decision contexts in health care and what priority setting in health care essentially is about.