Article

Ethical Precepts of Cost-Utility Analysis

Nancy Devlin
Department of Preventive and Social Medicine & Department of Economics
University of Otago

Paul Hansen
Department of Economics, University of Otago

Introduction and Summary

The prioritisation of health care expenditures cannot be done in a value free manner: the criteria that interventions are assessed on and the valuation of relevant effects rest on pre-judgments about their relative importance. A common criticism of *economic* methodologies (as opposed to non-economic ones), and cost-utility analysis (CUA) in particular, is that they embody a covert system of ethics, usually identified as utilitarianism. In this article we argue, first, that economic evaluation as a genus need *not* confine itself to this perspective; indeed any theory of justice (or 'equity') is capable of being recognised in CUA. Further, non-economic 'needs-based' technical approaches to rationing, in particular the recently adopted points system for elective surgery, also embody value judgments which, we would argue, are neither obvious nor explicit. For both CUA and the points system it is the responsibility of analysts to bring these underlying ethical precepts to the attention of the users of the information they provide.

The Inescapability of Health Care Rationing — a three stage 'optimisation' problem

It is difficult to imagine in these economically literate times, but in the 1970s health economists (including in New Zealand, Cooper, 1974) raised the ire of the medical profession and the general public with the notion that health care is scarce relative to our wants for it, and is therefore — like almost every other good you can think of — an *economic* good that must be rationed. Objection to these ideas — such as 'Rationing of health services smacks of limited cash, closed wards and worse, untreated patients' (*Star Weekender*, 'Singe Marks' column, 'Do your own amputations', 5/7/98) — can still be found in the media, but much less so than in the past. (The author cited here also asks whether 'health economist' is an oxymoron!)

Since health care is an economic good it follows that the money spent on a particular health service has an 'opportunity' cost of the other things the money could have been used for, including (but not limited to) the health gains that could have been enjoyed from other health services that were foregone. This reality necessitates that the virtually unlimited uses for the resources that are devoted to health care be prioritised. Although there will always be debate about *how much* should be spent on health care there is keen appreciation that whatever the amount it will always have to be rationed. With this acceptance, the focus of intellectual and popular attention has shifted to *how* we go about doing just that, deciding 'Who gets what?' (and by implication 'Who gets nothing?').

It helps to recognise three conceptual and practical stages (or 'margins') to the health care rationing problem. First, how many resources at the New Zealand economy-wide level should be devoted to producing health care (in toto) — given that the $7 billion voted to health in 1998 represents an equal amount *not* spent on other things in the economy? This amount ('Vote:Health') is determined by political processes, based on nebulous trade-offs by the members of the government and their constituents arising from the alternative Budgets under consideration. Economics has little to contribute to this 'grand' prioritisation exercise since a satisfactory measurement system enabling the *explicit* comparison of the outputs of the health care sector with, say, education or defence hasn't been invented yet.

The second stage of the rationing problem is the allocation of Vote:Health among the myriad health services competing for funding. More hip replacements or more grommets, more IVFs or more abortions? More heart surgery or more smoking prevention programmes? Once the quantities of particular interventions to be purchased by the Health Funding Authority (HFA) have been settled, the third and final stage is deciding which patients to give them to.

Technical and Non-technical Approaches to Rationing

Both 'technical' and 'non-technical' approaches abound for decision-making at the second stage (i.e. 'Which interventions to purchase?'), and increasingly at the third stage also ('Who gets them?'). Non-technical approaches at both levels tend to rely on political expediency and lobbying by stake-holders and *ad hoc* decision making usually favouring the status quo. In contrast, technical approaches, such as cost-utility analysis (CUA) and points systems, provide information aimed at making rationing decisions explicit, transparent and consistent (i.e. across different interventions and/or patients).

Not everyone regards consistency across interventions as being either possible or appropriate; for example, an *Otago Daily Times* editorial, echoing Evans and Price's 1999 report on *The Ethical Dimensions of the National Waiting Time Project*, argued that:

> to seek judgment on who would benefit most, a brain tumour patient or a heart patient, is a confused question and one that ought not to be posed. If we ask our clinicians to address such unanswerable questions we are on the road to institutionalising injustices. (10 March 1999)

While such questions are unpalatable to some people and may be confusing, ignoring them will not make them go away. These are the exact questions the HFA faces every day. The issue is not whether these questions ought to be posed, but how they ought to be answered.

To this end, the HFA is considering adopting a prioritisation process that is based on assessing the effects of shifting resources between services in terms of five 'principles': equity, Maori health, acceptability, effectiveness and cost. The overall process underpinning this prioritisation exercise is called Programme Budgeting Marginal Analysis (PBMA) (Scott et al. 1999). This is an economics-based decision-making framework which focuses on changes at the margin and the opportunity cost of shifting resources between budgets. CUA, involving the estimation of costs-per-QALY (quality-adjusted life year),[1] is the pre-eminent *economic* (as opposed to *non-economic*) approach by which the 'MA' part of PBMA might be pursued although PBMA does not *require* the use of CUA (HFA 1998; Devlin et al. 1999).

Generally-speaking, economic approaches set priorities by comparing the outcomes of alternative resource allocations with the explicit objective of maximising the benefits for a given cost — in short, maximising 'value for money'. In contrast, *non-economic* approaches typically entail 'needs assessment' whereby priorities are determined by identified health 'needs' (with all the difficulty attending the term), without regard to the relative costs of their being met (and sometimes without regard for which of the needs are able to be modified by treatment, depending how 'need' is measured). The points system for elective surgery introduced in July last year is the leading example in New Zealand of a non-economic technical approach to rationing at the third stage.

Several inconsistencies arise from the co-existence of CUA (if the HFA adopts it) as a determinant of *how many* treatments of a given type get funded with the existing needs-based points system to determine *which* patients get treated. Points are allocated according to the severity of the patient's (pre-treatment) condition in clinical terms whereas QALYs focus on a patient's potential to benefit from the treatment, including their increased longevity. Moreover, points reflect predominantly clinical criteria[2] whereas QALYs incorporate how people feel about the impact of the condition on their lives. This inconsistency may be important since, rather than being independent, decisions prioritising patients *interact* with decisions prioritising the services they are competing for. For example, since the resources devoted to a particular surgical procedure depend (at least partly) on the number of QALYs generated per dollar spent relative to other services, and if patient priorities are determined by points rather than QALYs, then the possibility exists that a re-ordering of patients could increase the QALYs generated from the existing budget, which, *ceteris paribus*, results in more resources being devoted to the procedure and more patients being treated.

Cost-utility Analysis and Value for Money — but what is *value*?

As is well-known, CUA is a refined form of cost-effectiveness analysis (CEA), which is itself a modified form of cost-benefit analysis (CBA). The modification is that instead of reductions in mortality and morbidity ('the benefits') being valued in monetary terms, they are left in their natural units of measurement (life-years, etc.), which are then quality-adjusted (i.e. to get QALYs) for CUA.

As already discussed, the defining (and desirable, we would assert) characteristic of CUA is its pursuit of 'value for money' as an objective. This is usually — but, as we argue below, *not* necessarily — interpreted as being the greatest number of QALYs from the money spent.

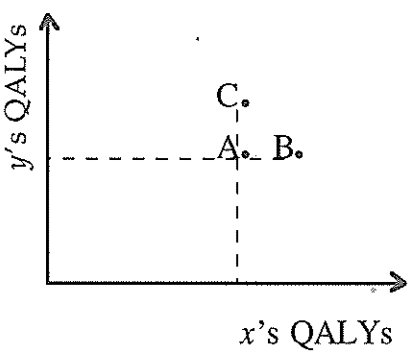
Naturally not everyone would agree that this objective is desirable. Recent research from Australia (Nord et al. 1995) suggests the general public did not support the idea of maximising health gain if it meant that the elderly or people with limited potential to improve their health had restricted access to services, although Mooney (1998, p. 1172) suggests that a problem with this research is that 'the respondents simply did not grasp the notion of opportunity cost'.

A key ethical concern about CUA, as it is commonly understood, is therefore the extent to which it matches people's ideas of what they regard as being 'fair and good and acceptable' in health terms.[3] We would argue however that the desirability of value for money as the objective of CUA does not necessarily correspond to the much stronger value judgement (as above) that QALYs ought to be maximised, that is, the doctrine of utilitarianism. In other words, CUA *is* capable, if it is properly specified, of matching people's ideas of what is 'fair, good and acceptable'. Our argument rests on the ethical foundations of CUA, to which we now turn.

Ethical Foundations of CUA

Although CUA is descended from CBA (cost-benefit analysis), it has a different objective. CBA maximises social welfare consisting exclusively of individual 'utilities' or welfare (however aggregated); in contrast, CUA is *extra*-welfarist in that it 'supplements or replaces the welfarist objective with externally observable objectives such as objective health status, empowerment and various equity objectives' (Richardson, 1998, p. 249).[4] Nevertheless, CBA and CUA both seek to rank alternative possible allocations of health care such that the 'best', in terms of social welfare or 'externally observable objectives' respectively, is chosen. Inevitably, such a ranking process requires value judgements concerning the relative desirability of the alternative allocations being compared.

The value judgement most widely used in economics for this purpose is 'Pareto' efficiency (after the economist Vilfredo Pareto).[5] In the present context, health care allocation B is said to be Pareto efficient compared to allocation A if at least one person is healthier and no one is less healthy under B than A. In other words, moving from allocation A to B (a Pareto 'improvement') results in at least one person's health being improved without anyone else's being harmed. This is easily illustrated in the diagram below, where the axes denote the health (in QALYs) of individuals x and y. Movement from QALY combination A to combination B represents an improvement in individual x's health at no cost to the health of individual y. (Analogously for movement from A to C.)



The appeal of the Pareto value judgement derives from its reasonableness. Who could disagree with it?[6] Practically, though, the Pareto efficiency criterion is useless for assessing the desirability of a shift in resources such that some gain and some lose in health terms. For example, in the diagram, it is impossible to say whether, compared to *A*, allocation *B*, in which individual *x* gains a QALY, is more or less efficient than allocation *C*, in which individual *y* gains a QALY. Neither does it allow us to say whether the move from *B* to *C*, which results in individual *y* gaining a QALY at the cost of *x* losing one, is desirable. (And vice versa.)

Clearly, as soon as there are distributional consequences (as in the example above) stronger (hence more controversial) value judgements than Pareto efficiency are necessary. What is required is a rule (or 'social welfare function') for aggregating QALYs that identifies trade-offs between individuals that are deemed acceptable — that is, 'efficient' as more broadly defined than under the Pareto definition (or 'equitable', as such aggregations are more commonly known). The ethical problem is this: from the infinite number of rules that are available, which one(s), in the language of the previous section, are 'fair and good and acceptable' and therefore ought to be followed?

The best known example of such a rule derives from the doctrine of utilitarianism (as presented by Bentham). In the present context, each QALY is regarded as being of equal value irrespective of whom it accrues to (i.e. QALYs are perfect substitutes). Thus, for a given amount of health care spending, the efficient allocation is judged to be the one that produces the greatest number of QALYs. This is the analogue in CBA of the value judgement of *potential* Pareto efficiency, whereby those who benefit *could* compensate (but need not actually do so) those who lose and still be better off (hence *net* benefits are to be maximised).

This is the ethical stance adopted in most CUAs.[7] Consequently, because utilitarianism reflects a peculiar rather than universally accepted ethical stance, CUA has been criticised as a quantitative algorithm that obscures the fact that arbitrary assessments of value are being made (Smith, 1987).

In fact, however, CUA is capable of recognising *any* desired distribution of QALYs. Any theory of justice (or 'equity') concerning alternative distributions of health can be incorporated into CUA by attaching weights to the estimated QALY gains and combining them in an appropriate social welfare function.[8] This could be incorporated in to the diagram above via what economists refer to generally as 'indifference curves' — in the present context, loci of combinations of individuals' QALYs that are equally valued by society.

For example, a CUA could proceed on the basis that a change in resource allocation is desirable if QALYs are gained by those with the worst QALY *starting points* (the equivalent, in QALY terms, of a Rawlsian perspective). 'The truth is ... that the QALY approach can be made to 'discriminate' (if that's the word you want to use) against or in favour of whomsoever one pleases' (Culyer, 1990, p. 18).

Current Developments in CUA

A key focus of contemporary health economics research, therefore, is the development of QALY weights to reflect a range of distributional and equity concerns (e.g. Mooney et al., 1995). This work includes attempts to develop weights for QALYs gained by particular groups (such as disadvantaged ethnic groups) and, more generally, attempts to develop a theoretical basis for distinguishing between people or competing claims in the allocation of health care resources (Mooney 1998, Williams 1997).

Although *in theory* CUAs need not be restricted to a utilitarian perspective, *in practice*, as already acknowledged, they usually are. Typically, CUAs are performed on unweighted QALYs that are simply added up, such that by default (or conceivably by design, although this is seldom acknowledged) the ethical stance is wholeheartedly utilitarian.

Notwithstanding this reality, there is increasing acceptance amongst economists that the single-minded pursuit of QALYs maximisation is unlikely to reduce inequalities in health. Williams (personal correspondence, 4/4/99), a strong advocate of CUA, expresses what appears now to be a widely held position among health economists, that 'both the overall health of the population, and minimising inequalities in its distribution within the population, are important and entirely ethical objectives for the health care system to pursue'.

This active pursuit of equity as an objective contrasts with the passive stance of (economists) Weinstein and Stason (1977, p. 718), for example, who, in their seminal article on the economic evaluation of health care reassure that 'over large numbers of programs and practices the inequities are likely to even themselves out and, with some exceptions, may be ignored.'

On the other hand, there is growing acknowledgment among those critical of the assumption that health maximisation is the *primary* objective of a health system that 'it would take a courageous stretch of the imagination to believe that it should not be *an* aim' (Pereira 1993, p. 37, emphasis added).

In conclusion, therefore, there is increasing agreement on the role of economic evaluations. At the very least, unweighted CUA provides information to policy makers that can be considered alongside evidence on equity, and helps to make apparent the sacrifices in total QALYs that may be required to achieve particular distributional goals. Unless CUA incorporates agreed QALY weightings based on some clearly articulated position about distributional justice, it is the responsibility of analysts both to caution policy makers that the absence of weights in itself represents the (embedded) ethical position of utilitarianism, and to emphasise the importance of considering equity issues alongside cost-effectiveness evidence.

However, in the absence of any consistent means of communities expressing their preferences about distributional matters, there is little economists or anyone else can do to guide policy makers in choosing between options where a trade-off exists, other than to inform the choice and predict the likely effects on the outcomes of interest. As Culyer (1980, p. 61) put it:

> It is of great interest in social policy to ask what is just, and why. And it is also interesting to ask what is efficient and why. It is, moreover, interesting to identify policies by their just and efficient characteristics. But neither philosophers nor economists have any guidance to offer decision makers as to how (or even whether) one set of characteristics ought to be traded off against the other — even though someone, somehow, may have to balance the two.

Finally, arguably the most significant limitation of CUA is it ignores systemic and process utility, that is, the preferences that patients have about how services are delivered, over and above the links that might exist between these preferences and service effectiveness and health outcomes. According to Dowie (1995, p. 233):

> the procedures by which the dimensions of health gain used in QALYs have been identified rule out questions of access to health services (as opposed to their use), information 'for its own sake' (as opposed to an input into decision-making) and decision-involvement (as a means of furthering patient autonomy). What if a population would rather have a more 'cuddly', information-providing decision-involving health service process ...?

This is well illustrated by in-vitro fertilisation. The (successful) treatment of infertility produces quality of life gains that for the most part are not health related and therefore would be difficult to capture using any of the standard health state classification systems[9] upon which QALYs are based. Consequently there is growing enthusiasm for other methods (e.g. 'conjoint analysis') of measuring benefits that go beyond narrowly defined health outcomes (see Ryan 1999).

CUA's focus on health outcomes highlights a further difficulty in regard to its incorporation of principles of equity. While we have argued that CUA can incorporate any theory of distributional justice with regards to the distribution of *outcomes*, it is less able to incorporate equity objectives framed in terms of equity of *access* (as is traditionally accepted in New Zealand).

Points Systems

As discussed above, because CUA is founded on theoretical constructs concerning efficiency and distributional justice, it is inescapably normative. Evans and Price (1999, p. 19) argue, in relation to QALYs, that 'the danger of such tools is that their alleged quantitative character will give them the appearance of objectivity and uncritical employment of them might produce distorted judgements about what should or should not be done in health care provision.' In our opinion, a similar criticism can be levelled at *non-economic* technical approaches, such as the points system for elective surgery, where numbers are assigned to clinical criteria and aggregated to generate a score that is used to make interpersonal comparisons of relative need.

Although, compared to the previous non-technical approach, points systems are explicit, transparent and capable of facilitating consistent decision-making about who should receive treatment, they are *not* free of value judgments. Not only do scores depend on which aspects of a clinical condition are judged to be important, but the choice of algorithm (usually linear) used to aggregate them is also subjective (Hansen 1998). Hence, we would warn that the potential for number-crunching to obfuscate subjective values in analysis is just as great here as for CUAs that do not explicitly acknowledge their ethical stance.

Conclusions

Sen (1992, cited by Mooney, 1998 p. 1179) argues that measurement can be taken too far and that '"waiting for toto" may not be a cunning strategy in a practical exercise.' The general observation that resources are scarce applies not only to health care but also to the time and expertise that are available for conducting prioritisation exercises. The costs involved in measuring and comparing outcomes are themselves relevant to the assessment of whether technical approaches to rationing are desirable compared to their non-technical alternatives. This is not to say however that a piece meal evaluation might not still yield significant insights and improvements in health service decision making. Even if CUA is used only to assess key marginal services (much as the HFA has proposed), rather than across the board, it will still provide information that can help at least identify the impact of shifting resources between services.

We have argued in this article that, because CUA (indeed, any attempt at technical rationing, e.g. points systems) depends on value judgements, it is the responsibility of analysts to make these and their implications for the interpretation of results explicit, and to caution the users of such analysis accordingly. This limitation means that the role of CUA is properly seen as being to *inform* decision-making, not to replace decision-making. While economic and other technical approaches do not provide a quick and easy 'technical fix' to complex social decisions, they can help to clarify the basis for decisions, to provide information about the trade-offs that are inevitable, and to facilitate open public debate about the inevitable choices we face. As Fuchs (1998, p. 29) reminds us:

> Economics is 'the science of means, not of ends' ... [I]t can tell us the consequences of various alternatives, but it cannot make the choice for us. These limitations will be with us always, for economics can never replace morals or ethics.

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Notes

1. We have assumed some working knowledge of QALYs by readers; for a succinct overview see Kawachi et al. (1990). For a review of the HFA's proposed use of CUA see Ashton et al. (1999).
2. This is true of the points systems for CABG and cataract surgery, although the points system for prostatectomy includes as a criterion 'If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel?', measured on a 6-level scale from 'terrible' to 'pleased / delighted'.
3. Our focus in this article is on ethical concerns peculiar to CUA. See Devlin (1996) for the wider set of ethical issues common to *all* forms of economic evaluation, including the implications of discounting, whether future consumption costs ought to be included, and discrimination against the elderly.
4. Richardson continues: 'In this tradition, the value judgment that consumers should be sovereign is replaced or qualified by a paternalistic judgment about what is desirable for the individual or society'.
5. See Williams (1996, pp 13-5), for a succinct history of this branch of economics, known as 'welfare' economics.
6. An egalitarian might. A reallocation of health care resources that makes someone who is already relatively healthy even more healthy might not be desirable, even if someone in relatively poor health is not harmed, since it increases the inequality of the distribution of health.
7. For example, Smith (1987) notes that 'A cost-effectiveness approach [and hence CUA] to the allocation of health resources presupposes a simple utilitarian or Benthamite theory of justice'.
8. See Boadway and Bruce (1984, ch. 5 and 6) for a review of alternative social welfare functions.
9. For a brief review of contemporary classification systems, see Ashton et al. (1999) and Weinstein et al. (1996). For a more comprehensive account, see Drummond et al. (1997) and Gold et al. (1996).

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