The role of cost utility in health care funding: policy dilemmas in Australia and the UK

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Paper Presented to Health Economists Study Group
Newcastle, January 2000

Abstract
Both Australia and the UK are considering how to improve the volume and quality of cost-utility evidence available to health care payers in making funding decisions about clinical technologies, especially costly new ones. This is a welcome step, because in principle cost-utility data can help governments allocate resources to where they will do the most good for society as a whole, in terms of improving total population health or reducing inequalities in health. This paper argues, however, that an improved cost-utility evidence base is unlikely to have much impact on decisions unless combined with radical political change and honest public debate about health care priority-setting. Medical politics in both countries is framed within a narrow clinical outcomes perspective as a relic of historical medical dominance in decision making. This may suit powerful vested interests like bureaucrats, the medical profession, pharmaceutical manufacturers, and certain patient associations. Cost-utility evidence is thus liable to be used selectively, as rhetoric to support decisions that have really been taken on grounds of clinical outcomes. Radical reform would be necessary to guarantee that, each time extra public spending on a new clinical service is announced, this really will come from reduced spending on other things which (according to cost-utility evidence) are less efficient at improving population health or reducing health inequalities. No such reforms are planned in Australia or the UK, because governments fear the political upheaval that might result from such apparently dictatorial action.

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1. Introduction

Policy debate about the evidence base for funding decisions about costly new clinical technologies is intensifying in all developed countries. The role of cost-utility data is one important part of this debate, which has recently gained prominence in both Australia and the UK. In Australia, the measurement of utility based quality of life has recently been reviewed by the Australian Pharmaceutical Benefits Scheme (PBS), with a view to expanding the (currently limited) role of cost-utility in decisions about new pharmaceuticals. And in the UK, the new National Institute for Clinical Excellence in England and Wales will be keeping a close eye on the role of cost-utility data, among other things, as it embarks upon its initially flexible work programme for appraising the comparative benefit and cost effectiveness of new and existing clinical technologies.

For the purpose of this paper, cost-utility evidence refers to estimated ratios of cost per generic health-related utility gain (e.g. cost per QALY) for health interventions, normally calculated under a range of different assumptions to allow for uncertainty. The distinctive feature of cost-utility data, as opposed to traditional cost-effectiveness data, is that outcomes are measured using generic utility indices designed to be comparable across disease areas and population groups. This means that, in principle, patient utility of health gains and losses in one disease area (e.g. heart disease) can be compared with those in another (e.g. cancer). If the utility gains correlate with health gains then it becomes theoretically possible to estimate changes in total population health or in population inequalities in health between different social groups. This cannot be done with traditional cost-effectiveness data, which measures outcomes using biomedical endpoints (e.g. cholestorol levels) or clinical endpoints (e.g. cancer survival rates) that are specific to the disease being measured. The only exception of course is death.

In the past, debate in Australia and the UK about the role of cost-utility data centred on various supposedly fatal objections to the use of utility information in decisions (refs). Over the last few years, as production of cost-utility data has become a reality for many new pharmaceuticals, the debate has turned to issues surrounding the measurement and interpretation of this data. The recent PBS review focused on issues of good practice in the measurement of utility data, and several recent UK studies have examined issues surrounding the understanding of utility data (or lack thereof) by decision makers (Freemantle and Mason 1999, Trueman 1999).

As production of cost-utility data becomes more widespread, debate will now increasingly turn to policy issues about the design of institutional structures and incentives to ensure that decision makers make good use of this data. The present paper is intended as a contribution to this next phase in the cost-utility debate. As such, it leaves open various key unresolved issues of methodology, for example the appropriate balance between trial data and observational data, or the best generic utility instrument to use. Instead it argues that, whatever methodology is selected, major institutional reform is required before cost-utility data could be optimally used to guide public spending on clinical technologies towards the goals of improved total population health and reduced inequalities in health.

Cost-utility evidence is unlikely to have much impact on population health outcomes under current institutional arrangements, because medical politics is framed within a narrow clinical outcomes perspective for a number of historic reasons. This may suit powerful vested interests such as bureaucrats, doctor unions, pharmaceutical firms and large patient interest groups. As a consequence cost-utility evidence is liable to be used as second tier evidence as political rhetoric to support decisions will continue to be couched in terms of clinical outcomes. Institutional reforms designed to prevent this from happening can only be developed if governments are prepared to engage in widespread and open public debate about health care priority-setting – and then only if members of the public decide they really do want health care spending to be directed towards improving population health and reducing inequalities in health, once they have a better understanding of the trade-offs involved.

2. Current use of cost-utility data in Australia and the UK

Cost-utility data is not routinely used in any health care funding decisions in Australia or the UK, but production of cost-utility data about new pharmaceuticals is starting to increase.

Over the last decade there has been a shift in many developed countries towards more systematic and sophisticated use of health economic data in the purchasing of costly new clinical technologies, such as pharmaceuticals and high-revenue medical devices. This has been driven partly by the increasing tension in health care between rising costs and rising expectations, and also partly by more general political pressures for increased transparency and accountability in all forms of public spending.

Many OECD countries now have formal systems in place requiring use of health economic data in public sector pharmaceutical purchasing decisions, including Australia, Canada, Denmark, Finland, Netherlands, Portugal, Spain, Sweden and the UK. The bulk of the economic evidence flowing through these systems is traditional cost-effectiveness data, which measures outcomes in terms of disease-specific biomedical or clinical endpoints. However, both Australia and the UK are now considering whether and how to increase the volume and quality of cost-utility data.

The shift towards systematic use of health economic data began relatively early in Australia, which was one of the first countries in the world to introduce a cost-effectiveness "hurdle" to public reimbursement of new pharmaceuticals. From 1990-3, an evaluation system was phased in, which required evidence of comparative effectiveness and cost prior to public reimbursement of new pharmaceutical services on the Australian Pharmaceutical Benefits Scheme (PBS). This evaluation system now covers almost all new prescription pharmaceuticals submitted for public subsidy in Australia. A distinctive feature of this system is that it requires cost-effectiveness data to be produced according to prescriptive methodological guidelines. In 1998, the scope of economic evaluation in Australia began tentatively to broaden, with the introduction of a second national health technology assessment system for non-pharmaceutical clinical services (such as surgery and diagnostics) covered by the Australian Medicare scheme of public health insurance. As yet, however, this second system has focused on evaluation of comparative effectiveness rather than cost-effectiveness, and use of cost-utility data is not on the agenda.

The shift towards more systematic use of economic data has started only recently in the UK, with the clinical governance reforms and the introduction of the National Institute for Clinical Excellence (NICE) in England and Wales in 1999 (NHS Executive 1998). This system covers England and Wales, and may later be extended to Northern Ireland. Scotland will have its own rather different system for translating economic evidence into clinical practice, centred around a new Scottish Health Technology Assessment Centre (SHTAC) and the pre-existing Scottish Intercollegiate Guidelines Network. Although SHTAC has not yet been set up, the early signs are that this Scottish system will give less weight to economic data than NICE.

NICE will appraise 30-50 new and existing clinical technologies each year, to advise on cost effectiveness, to develop national clinical practice guidelines, and to develop audit standards for implementing those guidelines. In early discussion documents, NICE envisioned a major role for cost-utility data and stated that "departures from incremental cost-utility analysis should be justified" (NHS Executive 1999). After further consultation, however, it was decided to adopt a flexible approach to evaluation initially, without prescriptive methodological guidelines, and to accept that "methodologies will vary with the technology, and with the advantages claimed" (http://www.nice.org.uk/appraisals/appraisals.htm).

The key difference in terms of how cost-utility data about pharmaceuticals is likely to be used in the future is that English GPs have greater incentives than Australian ones to take responsibility for cost effective prescribing at a local level, due to budget-holding in primary care. In contrast, Australian GPs are paid a fee per consultation. Fee for service reimburses the service, not its content, so a prescriber has an incentive to pass on risk i.e. to reduce the time of the consultation, and to speedily give way to patient requests for a particular prescription, without increasing the risk of service failure and therefore possible litigation. Hence responsibility for cost containment rests with central government and the PBS, which has spending growth targets although no explicit spending cap. Later in the paper, however, it is argued that this important difference in financing mechanisms between the two countries will not make much difference as far as cost-utility data is concerned: budget-holding gives GPs an incentive to contain costs and to improve clinical outcomes, but not to improve population health outcomes.

Neither country attempts to produce cost-utility data about macro-level funding decisions between regions or programmes. The UK Department of Health has recently commissioned methodological research into how a form of utility data (namely DALY data on the "avoidable" burden of disease) might be generated to inform regional resource allocation decisions (Hollinghurst, Bevan and Bowie 1999). To date, however, neither country has attempted to apply generic health output measures to macro-level funding decisions. Instead, performance is measured using process indicators, such as activity volumes, and sometimes disease-specific outcome measures, such as cancer death rates. Even when disease-specific outcome targets are set, both governments remain notably reluctant to evaluate the contribution of its own policies, rather than other factors, towards achieving those targets.

3. The purpose of cost-utility data

In order to assess how best to apply cost-utility data, we need some clarity about its purpose i.e. the policy goals it is supposed to serve. Politicians often use the umbrella term "quality" to describe their health care policy goals (NHS Executive 1998). However, this masks two fundamentally different kinds of policy goal which are often confused. These are:

(a) improved clinical outcomes.

(b) improved population health outcomes.

Clinical outcomes focus on outcomes for patients diagnosed as having a particular disease. Population health outcomes focus on outcomes for society as a whole, such as improved total population health or reduced population inequalities in health. Both are concerned with patient outcomes, and both can be referred to as aspects of "quality". The crucial difference, however, is that population health outcomes take a wider social perspective, allowing comparisons across disease areas and between health care and non-health care.

To avoid confusion it should be stated immediately that improving clinical outcomes is of course a laudable goal, and much broader and more relevant to patients than goals such as increased activity levels, or reduced waiting lists, or other surrogate performance indicators that are still often used to allocate health care resources. However, the point being made here is that there are broad population health perspectives which can be taken into account in allocating health care resources, and which do sometimes conflict with the clinical outcomes perspective. These are particularly relevant in constrained budgets.

The fundamental purpose of cost-utility data should be to serve the goal of improved population health outcomes. A cost-utility ratio expresses the cost per unit of utility gain from a health benefit, which allows comparisons between health gains and losses in different disease areas and for different sub-groups of the population.

Traditional cost-effectiveness data cannot do this, because it measures health outcomes in terms of disease-specific biomedical or clinical endpoints. If the goal is to measure changes in total population health, data showing an increment of 10 mmHg drop in blood pressure is unhelpful, as is "4 strokes avoided per 100 patients".

Consider a decision about whether or not to fund or adopt a new health technology. If the policy goal is improved clinical outcomes, then this health technology should be adopted for use if two conditions are satisfied: (1) it will lead to improved clinical outcomes for the disease treated by the technology in question, and (2) it will not cost so much that budget cuts lead to worse clinical outcomes in other disease areas.

If the policy goal is improved population health outcomes, by contrast, neither condition need be satisfied. This is because population outcomes may be improved by a change which improves clinical outcomes in one disease area but worsens them in another – so long as the gain outweighs the loss in terms of improved population

health and/or reduced health inequalities. So a costly new technology may improve population health even if it does cost so much that cheaper and less effective technologies have to be used in other disease areas. Alternatively, adoption of a cheap new technology may improve population health, even if it is less effective than existing therapies for that disease, by releasing money that can be spent on better technologies in other disease areas.

Confusion between clinical outcomes and population health outcomes arises for two reasons. First and foremost, people tend to associate better health care with better health, and hence to assume that improved clinical outcomes necessarily lead to improved total population health. However, this common assumption is wrong: there are numerous determinants of health, and the consensus among public health researchers (at least in the UK) is that health care is not the pre-eminent one (Acheson Report 1999). All sorts of vested interests within the health care industry have incentives to connive at this popular misperception, and to make claims about the benefits of particular clinical technologies in order to further their own special interests. The arrival of costly new clinical technologies is routinely trumpeted in the Australian and UK media, with media releases by those with a vested interest in seeing the technology funded, such as manufacturers or clinical specialists or patient interest groups (Moynihan 1998). It is therefore reasonable to give close scrutiny to any claims about the costs and benefits of a particular clinical technology in terms of population health: they may well of course be true, but they need examination.

A second cause of confusion is that data on utilities and data on costs can also be used to serve the goal of improved clinical outcomes. Generic utility data can be used to assess clinical outcomes for the disease being treated, and cost data can be used to assess how far adoption of this technology is likely to lead to spending cuts and hence worse clinical outcomes in other areas. However, cost-utility data proper (i.e. cost per QALY ratios) cannot be used to pursue the goal of improved clinical outcomes.

4. What cost-utility data cannot do

Of course, there are many other policy goals that health care payers may wish to take into account, as well as improved clinical outcomes and improved population health outcomes. The “rule of rescue” to care for those in immediate pain and ill-health is one. The protection and extension of liberty is another. However, cost-utility data does not address these wider policy goals. Instead, it leaves these goals as a matter for expert opinion, since methodologies do not yet exist which are capable of measuring these wider policy goals more accurately and more reliably than expert opinion.

In principle, cost-utility data can be used to allocate a fixed health care budget between health care programmes or between regions, as well as between clinical technologies. However, cost-utility data cannot set the health care budget as opposed to other areas of public spending (e.g. education, defence), whose output is not primarily measured in terms of population health outcomes. To do this, wider forms of economic evaluation would be required which allow comparisons between health and non-health outcomes, such as cost-benefit analysis or cost-welfare analysis (see Appendix A).

The major drawback in using cost-utility analysis, as opposed to full-blown cost-welfare or cost-benefit analysis, is that non-health benefits are left out of the calculation. To illustrate in a simple but extreme example in hypertension, reduced heart disease could be achieved best with enforced involuntary treatment of at risk patients. Alternatively treatment could be rationed to only very high risk patients as low risk patients should be dieting and exercising and getting themselves employed in less stressful occupations. Neither of these two options takes into consideration normal patient behaviour or patient needs. Both would be politically foolish.

Thus it is important to decision makers to know what patient perceptions are of the services that they receive, their preferences and the benefits that they gain, health or otherwise. If there is a gap between what is delivered and what is desired then this often results in media attention and ultimately political change.

In principle, therefore, cost-benefit and cost-welfare analysis have the potential to fill this informational need, by incorporating preferences for non-health outcomes. As yet, however, accurate and reliable measures have not been developed that can do better than expert opinion. The challenge is to design measures that allow for and include an informed assessment of non-health benefits received by patients. If that can be achieved then cost-benefit and cost-welfare analysis may in the future be a better means of informing funding decisions than cost-utility analysis. In the mean time, however, policy debate must focus on the role for cost-utility evidence about health outcomes, and leave wider non-health outcomes as a matter for expert opinion.

5. Why cost-utility data cannot be used properly in either country

Four institutional structures need to be in place before cost-utility data in a particular realm of public spending (e.g. national or regional pharmaceutical spending) can be used to improve population health outcomes. These are:

1. Financial structures to ensure that key decision makers at all levels have incentives for efficient cost allocation.
2. Managerial structures to monitor and enforce shifts of money between different health technologies.
3. Political structures to ensure that decision makers have the political willpower to improve population health outcomes at the expense of vested interests.
4. Public consultation structures to achieve ongoing public acceptance for sometimes controversial health care rationing decisions of this kind

Australia has none of these structures in place; the UK has only the first – i.e. cash-limited regional budgets for primary care, and in particular for pharmaceuticals. Neither country has any plans to put any of the other structures in place and so is unable to make appropriate use of cost-utility data.

The fundamental reason why this cost-utility data will not be used properly in either country is that governments fear the political upheaval that an explicit re-orientation of health care towards population health outcomes might bring. Making explicit cuts in some health care services in order to fund other services is an extremely radical step. That is why there are no plans to put managerial or political or public consultation

structures in place which are capable of explicit re-allocation of money away from one clinical technology and towards another.

Allocation of funds is deliberately left opaque, for the very simple reason that explicit health care spending cuts always lead to strong opposition from doctors, patients and others who have grown accustomed to acess. So, when deciding whether or not to fund a new clinical technology, health care payers have no idea what the real opportunity cost of the money is i.e. what the alternative use of the money would be and what health care services it would buy. Hence there is no guarantee that extra spending on a new health technology thought to represent good value for money (according to cost-utility analysis) will in fact come from spending cuts in existing health technologies thought to represent bad value for money.

Cost-utility evidence is thus liable to be used selectively, to support decisions make on other grounds. A consistent threshold cost-utility level is unlikely to be set; or if one is set, then all sorts of ways will be found around it – for example, by setting a loose threshold which most comparatively effective technologies can easily attain, by allowing non-reporting of cost-utility data in some cases, or by allowing selective biases to creep into the data by applying methodological standards more or less rigorously in different cases.

In its simplest terms, cost-utility data is supposed to tell us how much extra population health (i.e. how many extra QALYs) funding of a health technology will deliver relative to spending the money elsewhere. In practice, however, no-one knows the answer to the counterfactual question: what else would the money be spent on? So in fact it is impossible to predict whether or not a funding decision will improve population health outcomes on the basis of cost-utility data, or to monitor this prediction after the event. In these circumstances, decision makers cannot use cost-utility appropriately, and will be tempted to use cost-utility data as a spurious rationale for funding decisions made on other grounds.

As well as this fundamental problem of payer incentives to mis-use cost-utility data, there are two further reasons why cost-utility data is unlikely to be used appropriately, which relate to systematic biases in the cost-utility evidence base. First, suitable data for cost-utility analysis are not routinely collected for a wide range of existing clinical and non-clinical health technologies (Smith 1999). Most collection of cost-utility data is done by commercial suppliers, and hence is narrowly focused on a relatively small number of highly profitable new technologies. So even if it was known what existing technologies would be cut back to fund a new technology, the relevant changes in indirect costs and in utilities could not be calculated. Second, most cost-utility calculations are based on data from strictly controlled trials under idealised settings, rather than pragmatic trials or observational studies of the technology in realistic settings. One key issue is the exclusion of high-risk patients from trials, ostensibly on grounds of ethics and/or reduction of confounding factors: trials on otherwise healthy patients tend to bias results in favour of the new technology. Another is the issue of inappropriate utilisation: cost-utility studies typically assume that the clinical technology will be used appropriately (as in the randomised control trial), and make no allowance for provider behaviours such as inappropriate prescribing. This suits doctors unions and pharmaceutical companies alike, both of which wish to encourage

clinical freedom and to discourage bureaucratic monitoring of prescribing behaviour (although for slightly different reasons). As a result, cost-utility data for some clinical technologies (i.e. those likely to sustain high volumes of inappropriate use) are systematically biased towards finding an unrealistically low cost per QALY.

6. Arguments against the use of cost-utility evidence

There are four main ways to argue against the use of cost-utility evidence in funding decisions about particular health technologies:

1. Population health outcomes should not be the concern of public policy
2. Population health outcomes should not be the concern of health care policy
3. Population health outcomes should be dealt with in macro-level health care funding decisions, not decisions about particular health technologies
4. Cost-utility evidence about population health outcomes is no better than expert opinion supported by cost-effectiveness data on clinical outcomes

It can be argued that the very idea of "population health" is either meaningless or unacceptably authoritarian, and that governments should eschew any attempt to define and measure quality of life and instead focus on inputs into quality of life (or "primary goods") such as income and individual rights. This argument has been made by the world-famous liberal political philosopher, John Rawls (Rawls 1982). However, there is at least one world-renowned intellectual heavy-weight on the other side of the argument: Amartya Sen has argued that quality of life measures, including population health indicators, can fruitfully be used to inform democratic debate without unacceptably authoritarian overtones (Sen 1993).

A second, more practical line of argument is that health care has limited influence on population health, and that population health outcomes should be the concern of those areas of social policy which have the greatest impact, such as sanitation, housing, social welfare, crime, transport, environment, and education. However, most governments reject this argument, and improving population health is typically high on the list of health care policy goals (e.g. the NHS Performance Framework lists health improvement as the first priority area). Furthermore, NICE has chosen to appoint a board with at least one member who has in the past argued that improving population health should in fact be the primary goal of the NHS (Culyer 1998).

A third, related line of argument is that individual health technologies have relatively minor impact on population health outcomes, and hence consideration of these outcomes should be left to macro-level funding decisions between regions or disease areas or programmes.

The fourth argument, that cost-utility evidence about population health outcomes is no better than expert opinion, has recently been made by Freemantle and Mason (1999). These authors argue that cost-utility evidence is based on so many hidden subjective assumptions that the results conceal more than they illuminate. Instead, they argue in

favour of traditional cost-effectiveness analysis which measures clinical outcomes in physical units that senior doctors and managers can readily understand. These clinical outcomes can then be used as a platform from which to inform expert opinions about population health outcomes.

This argument is supported by interview-based evidence that senior doctors and managers in the UK are indeed unable or unwilling to understand and apply cost-utility evidence (Trueman 1999). However, this may be a function of current training and institutional incentives, which emphasise clinical outcomes at the expense of population health outcomes. It is not known how far changes in the training and institutional incentives of senior doctors and managers could succeed in helping them to understand and apply cost-utility evidence. This research question merits prompt attention, given the likely expansion in the cost-utility evidence base in coming years.

7. Conclusion

If more cost-utility evidence is to be produced in Australia and the UK, it seems a pity not to use it properly. This paper has argued, however, that cost-utility data will not be used in either country to improve total population health, or to reduce inequalities in health, because medical politics is framed within a narrow clinical outcomes perspective which suits powerful vested interests like the medical profession, pharmaceutical manufacturers, and patient associations. Instead, cost-utility evidence is likely to be used selectively to support decisions that have really been made on the basis of clinical outcomes. If health care payers in both countries are serious about improving population health and reducing inequalities in health, they need to give more thought to the design of public health care funding structures which are capable of switching money away from technologies with unfavourable cost-utility scores.

This argument has been made in the context of funding decisions about clinical technologies, but might equally well be applied to macro-level resource allocation decisions between regions or programmes. Even if methodologies can be developed for doing measuring utilities in this context, for example using “avoidable” DALYs, it will be hard to implement this information in macro-level resource allocation decisions.

Arguments about cost-utility evidence are generally left as arcane methodological matters for technical experts to discuss. This is a pity, because the issues surrounding the role of cost-utility data are in fact fundamental to the future of health care in publicly funded systems. Given increasing health care expectations and costs, it seems inevitable that all public health care systems world-wide will continue to move in two directions: first, an increasing role for private care, and second, an increasing role for explicit evidence-based rationing of public health care – including use of cost-utility evidence. Choosing the right balance between these two trends will be the recurring theme of health care debate in the next century.

Appendix A: Economic evaluation terminology

Four types of economic evaluation have been distinguished in this paper:

1. Cost-effectiveness analysis (health outcomes expressed in physical units)
2. Cost-utility analysis (health outcomes expressed as generic utilities)
3. Cost-benefit analysis (all possible outcomes expressed in money units)
4. Cost-welfare analysis (all possible outcomes expressed in welfare units)

The first three follow fairly standard textbook usage from Drummond et al. 1998. Cost-effectiveness analysis defines efficiency in terms of biomedical or clinical outcomes. It includes two special cases: (1) cost-minimisation analysis, which demonstrates equivalent clinical outcomes and then focuses on costs only, and (2) cost-consequence analysis, which lists several different kinds of clinical outcome. Cost-utility analysis defines efficiency in terms of population health outcomes, and cost-benefit analysis in terms of all possible health and non-health outcomes expressed in terms of individual willingness to pay. Cost-welfare analysis is a useful term introduced by the authors of the Australian report on utility measurement (Richardson et al. 1999). It refers to valuations which attempt to capture all possible health and non-health outcomes, but express these outcomes in terms of welfare units rather than willingness to pay amounts.

There has in the past been sometimes spirited debate among health economists about the definition of "efficiency" implied by cost-utility analysis (Birch and Gafni 1993). Part of the dispute is purely terminological in nature, and focuses on whether cost-utility analysis is a matter of "technical" or "allocative" efficiency. According to at least one leading health economics textbook, technical efficiency is about producing as much output as possible from a given set of inputs, whereas allocative efficiency is about choosing the best combination of inputs given prices and preferences (Folland, Goodman and Stano 1997). However, the meaning of this depends on whether "output" is measured as:

1. Quantity of goods and services,
2. Biomedical outcomes,
3. Clinical outcomes,
4. Total population health,
5. Total population welfare (from health and non-health outcomes), or
6. Something else.

In most industries, output is measured as the quantity of goods and services produced. If this is done, then technical efficiency in health care can be measured without reference to health outcomes data of any kind. In health care, however, output is often defined in terms of health outcomes for patients i.e. is seen from a quasi-consumption perspective, with health care services as an intermediary input. If health outcomes are defined in terms of biomedical outcomes then technical efficiency can be measured without reference to data on preferences or utilities. If they are defined in terms of clinical outcomes, however, then measurement of technical efficiency may require disease-specific utility data in order to assess patient quality of life. If health outcomes are defined in terms of total health, then measurement of technical efficiency requires generic utility data, in order to compare health gains and losses of different kinds and to aggregate across individuals to get total health. Allocative efficiency then requires

even further measurement of preferences, in order to ascertain preferences between increased total health and other valued outcomes. Finally, if health outcomes are defined in terms of total welfare, then technical and allocative efficiency converge: maximising production of total welfare is then the same thing as choosing the best combination of inputs given costs and preferences.

In summary: if output is defined in terms of activity levels or in terms of biomedical or clinical outcomes, then cost-utility analysis is about allocative efficiency, but if output is defined in terms of total health or total welfare, then cost-utility analysis is about technical efficiency.

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