Economics notes: Opportunity cost

Stephen Palmer and James Raftery

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Notes

outcome, and the baseline risk of the patients for whom the number needed to treat is thought to be applicable should be described.

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Economics notes

Opportunity cost

Stephen Palmer, James Raftery

The concept of opportunity cost is fundamental to the economist's view of costs. Since resources are scarce relative to needs,[1] the use of resources in one way prevents their use in other ways. The opportunity cost of investing in a healthcare intervention is best measured by the health benefits (life years saved, quality adjusted life years (QALYs) gained) that could have been achieved had the money been spent on the next best alternative intervention or healthcare programme.[2]

Opportunity cost can be assessed directly with cost effectiveness or cost utility studies. When two or more interventions are compared cost utility effectiveness analysis makes the opportunity cost of the alternative uses of resources explicit. Cost effectiveness ratios, that is the £/outcome of different interventions, enable opportunity costs of each intervention to be compared.

Although the concept of opportunity cost is fundamental, incorrect conclusions can result from difficulties in applying the concept. Firstly, the study perspective (societal, patient, etc) is critical since it determines which costs and effects to include in the evaluation.[3] A societal perspective incorporates all the costs and benefits regardless of who incurs or obtains them. More restricted perspectives may mask the fact that costs are simply being shifted to another sector rather than being saved.

Secondly, the choice of comparisons can play a crucial part in cost effectiveness analysis, affecting the measurement of opportunity cost. Ideally an intervention should be compared with all relevant interventions, including doing nothing. Without a "do nothing" baseline, the best of two generally undesirable options may be chosen. Sometimes, however, the do nothing option may be unethical, such as when a new treatment is being compared with one that has been shown to be beneficial. Partly for this reason, many studies compare

Term	Definition
Opportunity cost	Benefits forgone by particular use of resources
Cost effectiveness ratio	Ratio of costs to outcomes
Incremental cost effectiveness ratio	Ratio of change in costs to change in outcome

Health Economics Facility, Health Services Management Centre, University of Birmingham, Birmingham B15 2RT

James Raftery, *professor of health economics*

These notes are edited by James Raftery (J.P.RAFTERY@bham.ac.uk)

particular interventions with existing practice[1] which may or may not be well defined. Failure to select an appropriate comparator may make the intervention appear more cost effective than it should, leading to wrong estimates of the opportunity cost.

Thirdly, the incremental rather than average cost effectiveness ratio should be estimated. The average cost per benefit (calculated by dividing the total cost of an intervention by the total benefits) may be less appropriate than the incremental ratio (derived by dividing the additional (incremental) costs by the additional (incremental) benefits).[4] A recent study showed that the incremental cost effectiveness ratio for maternal age screening was 27% higher than the average ratio and concluded that the failure to consider incremental ratios could mislead decision markers about the opportunity cost of screening in Down's syndrome.[4]

Resources used in economic evaluations should be valued at opportunity cost, but doing this is difficult (especially in health care, where there is no perfect market),[5] so unit costs tend to be used instead, based on the costs of the various inputs.

Accounting practices do not aim to measure opportunity costs.[6] Opportunity costing generally requires comprehensive, disaggregated data at the individual patient level. Even then, the allocation of overhead and fixed costs is difficult since the cause and effect relation between resources and different users is difficult to determine. Since many economic evaluations use accountancy cost data, the results should be treated with some caution. The prices of pharmaceutical products may be poor estimates of their opportunity cost because the retail price reflects the patent, the regulation of profits by governments, and the sunk research and development of both successful and unsuccessful products. In practice, very few studies attempt to estimate the opportunity costs of drugs, relying instead on prices.

Finally, valuation of resources for which no market exists, such as informal care, or patient time costs, requires methods to derive what economists call "shadow prices"—the true social value (or opportunity cost) of non-marketed resources, such as time and informal care.[7]

Health economists disagree about the most appropriate technique for measuring the opportunity cost of time. The best valuation of the opportunity cost of time for working age adults is the wage they are, or could be making, in paid work,[1] varying according to whether the time lost involves lost work or leisure time[8] and the likelihood of being unemployed.[9]

If resources are to be allocated efficiently, then the value of using these resources in alternative ways needs to be made explicit. Despite the importance of this concept, the complexities of its application mean that few studies are even completely explicit about their estimates of opportunity costs. Greater clarity about the perspective of the study could help in clarifying the range of opportunity costs included.

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A memorable patient
The one neither of us saw

It was a long time ago. In those days I was a surgical registrar—I retired three ago—and our colleagues in the laboratory were called laboratory technicians. I had been nine years in Africa, come home and done the fellowship, and was mother of the mess.

On a Friday morning I was working on the ward when I was called by one of the technicians. "First of all, would you tell the housemen that there is a slide absolutely packed with malarial parasites of *Plasmodium falciparum* if any of them would like to come and have a look. More urgently I want your advice. I was asked to look at this slide by one of our girls who has never seen malaria outside the classroom slides. It is a patient from Dr X, and when I rang him he said it was all right because he was seeing the patient on Monday."

I collected some housemen and we went upstairs to the laboratory while I thought. The technician had spent seven years in east Africa, and I had spent nine in west Africa, so both of us were well aware that the man might quite likely be dead by Monday without treatment. While the juniors looked at the slide I said quietly, "Suppose I ring him up, say you asked me to see the slide and that I am not happy about it, and that I think we should refer the patient to the tropical diseases hospital for another slide?"

So that was what we did, having rung the hospital to let them know the man was coming. He made a good recovery and called in later to thank us. Neither the laboratory technician nor I were brave enough to tell the consultant surgeon for whom I worked, or the consultant in charge of the laboratory, what we had done. We had taken refuge in what Donald Berwick calls "mitigated communication," so while we had ensured the safety of that particular patient, the chance of teaching the general practitioner was missed.[1] What happened to the next patient he had with malaria I do not know. The general practitioner and his defence organisation never realised what a narrow escape they had had.

Anne Seymour, *retired consultant in accident and emergency, South Shields*

1 Berwick DM. You cannot expect doctors to be heroes. *BMJ* 1998;316:1738.

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