HEALTH ECONOMICS

(2)

The basis of economic evaluation

No matter how rich and powerful a nation becomes, the amount of resources it devotes to health is, and always will be, limited and in competition with other possible uses.

Economic evaluation methods are not meant to substitute the decision-making process. They are only some of the tools available and are useful in clarifying choices and making such choices explicit. They are used to help us make the best possible use of available in a rational decision-making context, when we want to accrue maximum benefits from our scarce resources.

In health care there are many different types of decision to be made. For instance, we may need to decide across many programmes which is the most worthwhile, or which is the best mix of programmes. For example, a health authority may have to decide on whether and at what level to fund teenage health clinics or day centres for the elderly. Alternatively, we may have already decided that something is worth doing and we want to define the best way of achieving it.

The conceptual framework of economic evaluation differs according to the type of decisions in question and the viewpoint of the decision maker. In the health services, consequences of interventions are numerous and complex. For instance there are preventive interventions which can avoid the very onset of a disease (for example, polio immunisation), or curative interventions which lengthen survival (cancer treatment), others that modify the quality of survival (pain relief) and others still that modify both (kidney transplants). Some interventions can have negative effects or no effects. Some effects take place on both the patients and his/her family or other patients, or in a more indirect manner on society as a whole, for instance, causing productivity losses through sickness.

In order to make comparisons between the options it is necessary to find a common unit of value for each of the health care interventions. If it is relevant for the type of evaluation being conducted, the health consequences are also valued in common unit.

Many studies of use of resources in health care do not make explicit comparisons between options for care. These are not economic evaluations, but nevertheless

can be considered as economic studies and can contribute to our understanding. For this reason we shall include a description of **cost-of-illness (COI) studies**.

Methods of economic evaluation

All methods of economic evaluation have one principle common: they examine one (or more) possible interventions and compare the inputs or resources necessary to carry out such interventions with their consequences or effects.

The various methods of economic evaluation differ in the way they itemise and value inputs and consequences. Such differences reflect different aims and viewpoints of the decision-making problems.

Cost-minimisation analysis (CMA) - when the consequences of the intervention are the same, then only inputs are taken into consideration. The aim is to decide the cheapest way of achieving the same outcome.

Cost-effectiveness analysis (CEA) - when the consequences of different intervention may vary but can be measured in identical natural units, then inputs are costed. Competing interventions are compared in terms of cost per unit of consequence.

Cost-benefit analysis (CBA) - when both the inputs and consequences of different interventions are expressed in monetary units so that they compare directly and across programmes even outside health care.

Cost-utility analysis (CUA) - when interventions which we compare produce different consequences in terms of both quantity and quality of life, we express them in utilities. These are measures which comprise both length of life and subjective levels of well-being (the best known utility measure is the quality-adjusted-life-years or QALYs). In this case, competing interventions are compared in terms of cost per unit of utility gained (for example, cost per QALY).

All methods of economic evaluation value inputs and consequences following the same three-stop road.

1. We must identify inputs and consequences.
2. They must be measured using appropriate physical units.
3. We must value them.

Problems are encountered in all three phases. Some items are difficult to identify as some health care interventions have hidden or unknown costs and consequences. Not all costs and consequences can be measured in appropriate physical units as some interventions have intangible consequences, such as the reduction of pain or the increase in the quality of one's social performance. Other programmes use inputs which are equally difficult to quantify, such as hi-tech know-how.

Values of resources are assigned by defining costs. These are considered by economists to be the benefits of opportunities foregone, i.e. the best possible alternative use of the same resources (opportunity cost). Such a definition of cost carries several implications.

1. Costs do not equate with expenditure, as all that can be used in an alternative manner is a cost. Even thought appears freely available and there does not appear to be a market for it (such as fresh air, or a voluntary worker's time).

2. Values, and hence costs, vary according to value judgements another factors (such as timespan) which depend on individuals, society, scarcity, and need. Valuing inputs and consequences is the most difficult aspect of conducting an economic evaluation as, in reality, the only readily available measures of value, prices, exist of health inputs and consequences.

Inputs and consequences of a health intervention accrue at different times especially for chronic disease and population-based programmes to deal with them. In this case we cannot directly compare the inputs of a programme starting today with its consequences which will accrue in 30 year's time. So economists adjust the valuation of such consequences to take account of the difference in time by using a technique called *discounting* which allows the calculation of the present values of inputs and benefits which accrue in the future. Discounting is based mainly on a time preference which assumes that individuals prefer to forego a part of the benefits if they accrue it now, rather than fully in the uncertain future. The strength of this preference is expressed by the discount rate which is inserted in economic evaluations. The choice of the discount rate and the choice of which items it should be applied to are a matter of intense debate among economists.

The comparison between inputs and consequences does not happen in a vacuum, its context influences the comparison itself. For instance, production costs are dependent on numbers of units produced. For example, as production rises, cost may decrease if fixed costs (those that do not vary with the production) are divided by a larger number of units and no other investment is necessary. Often the choice is not about whether to carry out a certain intervention or not but about

varying the volume of services currently provided of shifting resources between services. The comparison then must be based on inputs necessary at that level of variation and the change in consequences that results from that variation of inputs. This type of logic is called *marginal* and is at the basis of all the costing procedures which economists use. All comparisons made within the framework of an economic evaluation are based on marginal logic.

Evaluations are models which attempt to capture and summarise reality. However, the effects of health care are often uncertain and our models tend to be based on real data (epidemiological, clinical, or resource data) which are often either incomplete or of dubious quality, or are simply not there. Where data are absent or uncertain, the gap may have to be filled by assumptions. In order to deal with uncertainty and carry on with our decision-making process, economic evaluations use a range of techniques, called *sensitivity* analysis, which repeats the comparison between inputs and consequences varying the assumptions underlying the estimates. In other words it tests the robustness of the conclusions by varying the items around which there is uncertainty.

Research steps for economic evaluation

- Specification of the question, and baseline comparison group
- Specification of the viewpoint, type and coverage of economic study
- Specification of key outcome and estimation of effectiveness
- Specification of method for valuation of health outcomes
- Definition of costs to be estimated
- Estimation of differences in quantities of resource use
- Estimation of unit costs of elements of resource use
- Specification of analytic model
- Taking account of time preference
- Summarise economic result
- Sensitivity analysis.