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SPECIAL ARTICLE

Basic Principles of Health Economics for Obstetricians and Gynecologists

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ABSTRACT

In the last decade, expenditure on health care in developing countries has enormously risen, thus making economic assessment of interventions an integral part of decision making in health services. Because of increasing demands on limited resources, health economics is exerting an influence on decision making at all levels of health care. Health economics seeks to facilitate decision making by offering an explicit decision making framework based on the principle of efficiency. All obstetricians and gynecologists will need to have an understanding of its basic principles and how it can impact on clinical decision making. In this article, some of the basic principles of health economics and in particular economic evaluation were reviewed. It will allow obstetricians and gynecologists to understand better the common pitfall in economic evaluation, economic relations between their practice of medicine, the health-care sector, and the national economy.

Broadly defined, economics concerns how society allocates its resources among alternative uses. Health economics is the discipline of economics applied to the topic of health care. Economic evaluation is a commonly used tool to compare health-care services and treatments on the basis of costs and benefits, including many medical instruments or interventions in Obstetrics and Gynecology. In this article, some of the basic principles of health economics and in particular economic evaluation were reviewed.

Concept of economic evaluation

Health economics addresses the perspective of efficiency (maximizing the benefits from available resources). Equity concerns (a fair distribution of resources) are also recognized. The concept of economic evaluation supports efficiency choices in health care.[1] Economic analysis relates inputs (resources) to outputs (benefits and the values attached to them) of alternative interventions to facilitate decision making when resources are scarce. There are three principles that are an important part of any economic analyses.

Opportunity cost

When resources invested into one area, it will be at the expense of a loss of opportunity in another and resources should be valued in terms of "the opportunity cost".[2] For example, if the guideline dictates an increase in new chemotherapy prescribing, we should think carefully about what we are having to go without to provide the additional service and value it in terms of this lost opportunity.

Perspective

Whenever an economic question is being asked it is important to think carefully about the viewpoint of the analysis. This will dictate which costs and benefits are important. The perspective of the patient, physicians, health authority, and society may differ. Different perspectives will give different answers when deciding between treatment options and decision makers must be clear on the viewpoint that is taken.

Marginal analysis

The relationship between resources invested into an intervention and the obtained benefit is rarely linear. It is important to consider how increments in benefit change with increment in resource allocation and not the average obtained benefits by average costs. This is known as a marginal analysis.[3]

Economic evaluation

Limited economic resources are available to fund health care and health promotion programs. Consequently, difficult choice must sometimes be made between competing programs (defined broadly to include medical and therapeutic procedures and preventive interventions). Health care providers, public health officials, and other decision makers require accurate information about the economic efficiency, or 'cost-effectiveness', of different options in order to maximize the impact of health care spending.

Determination of Costs

Costs to be considered include direct medical costs, direct nonmedical costs, indirect morbidity and mortality costs, and intangible costs.[4-6] Direct medical costs are essentially expenditures for medical products or services. The types of direct medical costs usually considered include those of hospitalization, drugs, physician's fees, laboratory tests, and radiological procedures. When calculating direct medical costs, it is important to remember that charges are not the same as costs. The true cost of medical care is the money and resources that are consumed in providing care. Charges usually are set by the marketplace and may not reflect the cost of providing a service. However, the true costs of providing services are difficult to measure, so in most cost-effective analyses, charges are used as a surrogate for actual costs. Certainly from the patient's perspective, charges accurately reflect the cost of health care services. In addition to direct medical costs, other costs that are sometimes included in cost-effective analyses are direct nonmedical costs, indirect costs, and intangible costs.[5]

Direct nonmedical expenses include expenditures for food, lodging, and transportation resulting from seeking a medical treatment. These expenses can be substantial, particularly when services are not readily accessible. Indirect costs are those that occur because of a loss of life or livelihood and may result from morbidity or mortality.

Indirect costs would include lost wages or decreased earning potential that may occur while seeking treatment or due to disability. Finally, intangible costs are the costs of pain, suffering, and grief that may occur as the result of disease or medical care. Intangible costs are difficult to measure and have not been included in most cost-effectiveness analyses.

Types of economic evaluation

A basic principle of economic analysis of medical care is that choices must be made between alternative uses of resources, and these decisions must consider both cost and outcome.[1-3] Several types of economic analyses are performed commonly to aid in the decisions about allocation of resources for medical care. The types of economic analyses include cost minimization analysis, cost effectiveness analysis, cost utility analysis and cost benefit analysis.

There are different types of economic evaluation which take their name from the way in which benefits are measured (Table 1).

Table 1. Different types of economic evaluation[7]

Type of economic evaluation	Measurement and valuation of outcomes
Cost minimization analysis	Outcomes are assumed to be equivalent. Focus of measurement is on costs. Not often relevant as outcomes are rarely equivalent
Cost effectiveness analysis	Natural units (for example, life years gained, deaths prevented) that are common to competing interventions. This approach forms the bulk of published studies and will be of most relevance to practitioners.
Cost utility analysis	Health state values based on individual preferences (for example, quality adjusted life years gained). An approach which is gaining in importance due to the need to decide between different interventions at a national level and the importance placed on quality of life. Many methodological problems remain.
Cost benefit analysis	All outcomes valued in monetary units (for example, valuation of amount willing to pay to prevent a death). Rarely used due to methodological problems in valuing all outcomes in monetary terms.

Cost minimization analysis

Cost minimization analysis compares two or more interventions of equal value to a patient and assesses which is less costly. The analysis therefore focuses on costs alone, and the cheapest option is chosen. The results of cost-minimization analysis are expressed in monetary units such as bahts expended for each outcome. This type of analysis is rarely undertaken.[8]

Cost effectiveness analysis (CEA)

In cost effectiveness analysis (CEA), costs are measured in monetary units such as bahts or dollars, whereas outcomes are left in natural units such as cases prevented or live saved. Results of such analyses are summarized as a cost-effectiveness ratio, taking the form of cost per unit-of-health-outcome gained.[9] When the outcome are is identical, these ratios can be used to compare the relative value of different interventions. The total net costs, sometimes called incremental costs, of an intervention are calculated and then divided by the number of health outcomes averted to yield the total net cost per unit of health outcome (e.g., net cost or savings per death averted). A serious limitation of CEA is that there is no numerical valuation of the health outcome. For example, CEA can provide an estimate of the net cost of preventing a case of Down's syndrome birth but it cannot help a physician, a patient, or a society to value each averted case, even in a seemingly similar outcome. How might a community value the prevention of invasive cervical carcinoma in a 45-year-old women versus the avoidance of Down's syndrome birth?

CEA has been more widely applied to specialties other than Obstetrics and Gynecology, particularly in the area of monetary units spent per life-year saved. CEA is best used when comparing two or more strategies or interventions that have the same health outcome in the same population, e.g., comparing the relative costs and effectiveness of IVF versus tubal surgery for the treatment of tubal factor infertility.[10] CEA is the most common type of analysis and is used to compare drugs or programmes which have a common health outcome (for example, reduction in blood pressure, life years saved).[11] Results are usually presented in the form of a ratio (for example, costs per life year gained). For example, it has been estimated that coronary care units cost 350,000 bahts per life year saved compared with neonatal intensive care units at 800,000 bahts per life year saved. Often, intermediate or surrogate outcomes such as cases detected, reduction in cholesterol are measured and it is important to ensure that these

intermediate measures have clinical meaning in terms of long term outcome for patients.

Cost utility analysis (CUA)

Medical interventions often impact both on quality and quantity of life. A cost utility analysis (CUA) can be used to assess costs and benefits of interventions where there is no single outcome of interest and is useful comparing different programmes across different treatment areas.[12] CEA measures costs expended for a single outcome, often the number of life-years gained, while CUA measures the costs expended for improvement in quality of life and/or length of life. CUA is the most sophisticated form of economic analysis and typically incorporates utility values. The most frequently used measure is the quality adjusted life year (QALY). Benefits are measured based on impact on length and quality of life to produce an overall index of health gain. A health state is valued between 0 (worst health) and 1 (best health) combined it with the length of time in that state. For example, a drug that yields an improvement in health state value of 0.6 over a period of 10 years would yield 6 QALYs. It has been estimated that coronary artery bypass grafting costs 150,000 bahts per QALY compared with 85,000 bahts for hip replacement. QALYs reflect people's preferences for different health states but their use remains contested in a number of areas. Table 2 shows some examples of the tentative estimates of the cost/QALY of a range of interventions.

Table 2. Examples of the cost per quality adjusted life year (QALY) of competing therapies

Intervention	Cost per QALY (bahts)
Physicians advice to stop smoking	15,000
Antihypertensive therapy	70,000
Pacemaker insertion	80,000
Hip replacement	85,000
Value replacement for aortic stenosis	90,000
Coronary artery bypass graft	150,000
Kidney transplant	300,000
Breast screening	400,000
Heart transplant	550,000
Hospital haemodialysis	1,500,000

Cost benefit analysis (CBA)

CBA measures both the costs and the outcomes of alternative interventions in terms of monetary units. It compares the resources expended upon a health care intervention to those created as a result of the intervention. As an example, a disabled patient who undergoes coronary artery bypass surgery is able to return to work after the surgery. The monetary costs of the surgery are then compared to the monetary gain due to income from employment and not having to rely upon others for assistance with the daily activities of life. The results are typically expressed in bahts expended for bahts gained.

In its simplest form, a CBA lists all the costs and benefits that might arise as a result of an intervention up to a prespecified time. CBA is most useful under three circumstances. First, when a choice has to be made between two or more interventions, then the logical action is to give top priority to the intervention. Second, a CBA can indicate the economic effect of a single intervention. Third, CBA is useful because it can include an array of important benefits or costs not directly associated with a health outcome, such as time off from work taken by family members to care for sick relatives. In a CBA, all costs and benefits must be expressed in monetary terms, including the value of

human lives lost or saved as a result of the intervention. If the benefits are less than the costs then the intervention is acceptable.[13]

In CBA, outcomes as well as costs are expressed in monetary units. For example, if the primary outcome measure of an intervention is "life years saved," some valuation technique must be used to estimate the monetary value of a year of life.[9] The cost of the medical intervention needed to save a year of life is then compared with the monetary value of the year of life saved. Thus, the results of a CBA can be summarized as a single monetary value known as the net benefit of the intervention. This result allows one to assess whether the benefits of a program exceed its costs and to compare interventions with a variety of health outcome.[9]

Estimates of the value of human life can be obtained through the willingness-to-pay approach, which entails, for example, assessing what people would be willing to pay to reduce their chances of experiencing a life-threatening heart attack, or through the human capital approach, in which an estimate of the person's future earnings is used to provide a lower bound on the economic value of his or her life. However, quantifying all the benefits and costs is not easy. Furthermore, the data requirements for this approach are often large and methodological issues around the valuation of non-monetary benefits such as lives saved makes this method problematic. Therefore, relatively few cost-benefit analyses have been performed in Obstetrics and Gynecology. Good examples of cost-benefit analysis.

Using CBA may be problematic because of methodologic and ethical issues inherent in assigning a monetary value to human life. CEA allows policymakers to subjectively inpute the value of a health outcome without specifying a dollar value. Additionally, the use of quality-adjusted life years in CUA as the effectiveness measure allows for equal valuation of health benefits for all persons at all stages in life.[14] For these reasons, CEA and CUA are more commonly found in the medical literature.

In conclusion, difficult choices in health care are inevitable and there is an increasing emphasis on making decisions explicit and fair. Health economics suffers from a number of methodological limitations but it can offer us useful concepts and principles which help us think more clearly about the implications of resource decisions we make. An understanding of some basic economic principles is essential for all practitioners not only to understand the useful concepts the discipline can offer but to appreciate its limitations and shortcomings.

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