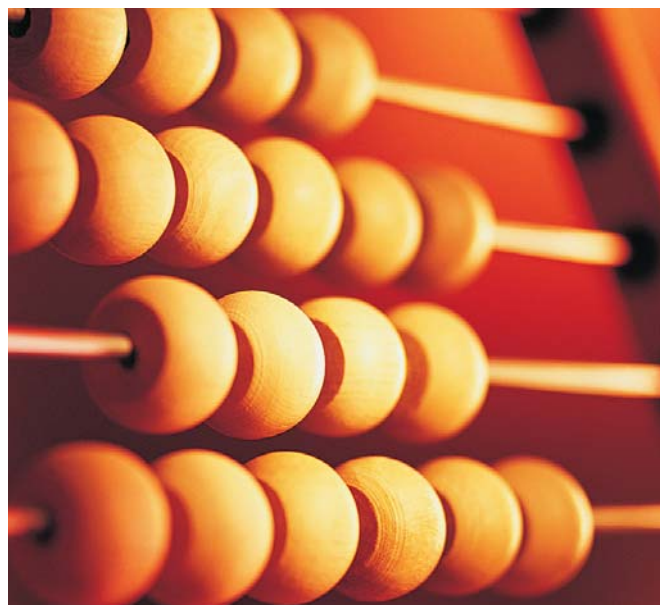


Health economics

— an introduction to the methodology

By **Mark Greener**, BSc, and **Julian Guest**, PhD

An understanding of health economics is essential for pharmacists to make informed decisions when evaluating evidence bases, designing formularies and setting budgets. This article provides an introduction to the nature of health economics and the main types of analyses performed



DIGITAL VISION

Health economics is now as influential as efficacy, safety and quality in determining prescribing practices. Pharmacists' growing influence on formularies as well as their involvement with many drug and therapeutic committees makes understanding the strengths and weaknesses of health economic studies essential. Furthermore, the National Institute for Health and Clinical Excellence's deliberations as well as drug companies' marketing strategies invariably include health economic arguments. Against this background, this series of three articles introduces health economics, including the main types of studies, a brief review of the nature of health economics and an examination of some fundamental principles.

— Nature of health economics

No country can afford to provide optimal medical and surgical treatment for every patient immediately. As a result, purchasers and providers need to decide how to allocate resources. Pharmacoeconomics (the aspect of health economics dealing with medi-

cines) is about more than the acquisition cost of a drug. A cheap generic may cost the NHS more if it is less effective or causes a greater number of expensive-to-treat side effects than a new branded agent. Therefore, health economists use monetary terms to value and compare resource use. These are then related to the corresponding outcomes, such as improved health related quality of life (HRQoL), morbidity and mortality, thereby allowing analysis and evaluation to support decision-making.

Economists attempt to determine the optimal allocation of finite resources to maximise health status.¹ Critically, while health economic studies often suggest that a particular treatment produces savings, the overall health care budget does not change, since purchasers reinvest resources that are released by using a particular treatment in other areas of health care. These investment choices are dynamic and the clinical evidence base that forms the foundation of health economic analyses is continually evolving.

Changes in political and cultural priorities also affect resource allocation. Culture has been defined in this area as encapsulating a set of public decisions about how much money should be invested in hospitals rather than weapons, what kind of problems constitute emergencies, and even what kinds of

suffering and complaints can be resolved.² For example, the government might decide that investing more resources in tackling heart disease will win votes. Unless the money is new (ie, raised in the UK by increased taxation), improving heart disease services may mean investing less in another area such as fertility treatment. However, raising taxes is politically difficult. Thus, changes in political priorities influence the value society places on certain outcomes, which, in turn, alters the optimal allocation.

Cultural and political factors help explain why, for example, blood screening services continue to implement new approaches to reducing the risk of blood-borne infections and prions, already at low levels, despite being relatively cost-ineffective. A specific example of this is the use of nucleic acid testing to screen whole-blood donations for HIV and hepatitis B and C viruses, which costs between \$4.7m and \$11.2m per QALY saved.³ This cost per QALY is much greater than most other interventions that purchasers and providers regard as being cost-effective.

In summary, the results of health economic studies are relative rather than absolute. They can only guide rather than dictate resource allocation. Nevertheless, some health economic analyses address equity issues. These studies, which aim to ensure a

Mark Greener is a consultant for and **Julian Guest** is director of Catalyst Health Economics Consultants

fair distribution of resources, are far less common than effectiveness analyses.⁴

— Opportunity costs

Health economic studies generally aim to define which drugs or programmes produce most health gain per pound invested. This requires a common measure that translates health gains into a monetary value despite different diseases, conditions, outcomes and interventions.¹ The QALY (which will be considered in more in detail in the next article, p45) is the most widely used of these common measures.

By way of introduction, death or a year in a coma is, by definition, zero QALYs. A year in perfect health is one QALY. Critically, QALYs can capture subjective information, such as HRQoL (see p45).

QALYs allow purchasers, providers and policy makers to compare various interventions. The cost per QALY for GP advice to stop smoking was £270 at 1990 prices (equivalent to £449 at 2003 prices). This compares with a cost per QALY of £940 (£1,563) for antihypertensive treatment, £4,710 (£7,838) for a kidney transplant, £7,840 (£13,035) for a heart transplant and £21,970 (£36,527) for hospital haemodialysis.⁴

Policy makers, for instance, may use QALYs to compare the relative merits of investing in a programme to prevent sexually transmitted infections (STIs) in teenagers, a new biopharmaceutical that offers marked symptomatic relief in advanced prostate cancer and greater primary prevention of heart disease using statins. If they decide to fund greater use of statins as primary prevention, they may decide to reduce spending on the new cancer biopharmaceutical and not instigate the educational programme.

Economists describe such decisions in terms of opportunity costs. The cost of funding heart disease prevention is the opportunity to treat more prostate cancer patients and to prevent a proportion of the STIs in teenagers. However, such choices are rarely black and white. Usually, purchasers decide to expand or contract existing services, which affects patients at the margins. For example, a new heart disease prevention programme may include people with a 15 per cent risk of suffering a cardiac event in the next five years, rather

than a 25 per cent risk. Therefore, using average benefits and average costs is inappropriate. Rather, economists quantify the extent to which an incremental change in investment produces an incremental change in outcomes. This analysis is described as marginal analysis.⁴

— Types of cost

Health economic studies can include three main types of cost. First, the NHS incurs direct costs while organising and delivering a health care programme. Direct costs may include physician time, the costs of tests and drugs, hospital accommodation, etc. Often studies focus on direct costs to the health care system. However, patients can also incur direct costs, such as expenditure on travel and prescription charges.

Indirect costs express the costs to society, for example, lost or gained productivity in the workplace. Often the indirect costs impose a heavier burden on society than direct costs. There are other indirect costs, such as those arising through lost interest and costs incurred by carers. As a result of the budgets for social care, health care and general taxation being separate, analyses based on indirect factors may be less influential in formulating decisions than direct health service costs.

Finally, intangible costs refer to emotional outcomes, such as pain, broken relationships and lost potential. Clearly, it is hard to put a monetary value on, for example, the pain of terminal cancer or the lost potential that arises from schizophrenia. As a result, intangible costs are rarely expressed in monetary terms.

— Main analyses

Once purchasers and providers agree to cover the cost of a health care programme, economic analyses identify the most cost-effective approach from a range of choices.¹ For example, we recently published a study showing that carboxymethylcellulose dressing was cost-effective relative to gauze for exuding venous leg ulcers.⁵ Based on this, it could be argued that carboxymethylcellulose dressing should replace gauze on the formulary.

In another recent study, we compared the resource implications of using strong opioids in patients with advanced cancer.⁶ We found that rather than being competitors, slow release morphine and transdermal fentanyl seem to be used in different situations. Thus, pharmacists might want to ensure that both opioids are included in the formulary.

Burden of illness Burden of illness studies aim to capture costs incurred by a health service or society more widely. For example, we estimated the annual cost of blood transfusions during 2000/01, updating a study we

performed in 1994/95. The cost of providing and transfusing blood products was £898m during 2000/01. This represented a 256 per cent increase in real terms compared with the earlier study. The number of whole-blood donations increased by only 2 per cent over this time. The introduction of leucodepletion to improve blood safety accounted for much of the increase in cost.⁷ As mentioned above, this increase in costs reflects political and public concerns over blood safety, rather than clinical priorities alone.

Burden of illness analyses also allow economists to quantify direct costs to patients, such as the expenses incurred attending hospital, as well as indirect costs. In the study mentioned above, blood donors incurred a direct cost of £8.1m a year. Lost leisure time and lost productivity accounted for £3.1m and £7.2m, respectively.

Cost-effectiveness Cost-effectiveness analyses, the most widely used health economic approach, compare programmes that produce the same absolute outcomes, such as symptom reduction or lower mortality, but show different levels of effectiveness. The ratio between the two (incremental cost-effectiveness) allows purchasers and providers to compare the value for money offered by the two regimens.

In many cases, patients experience symptom reduction or an improvement in survival, but at a financial cost. For example, we recently estimated the cost-effectiveness of venlafaxine XL relative to diazepam in non-depressed patients suffering from generalised anxiety disorder (GAD).⁸ Starting treatment with venlafaxine XL instead of diazepam increased the expected probability of remission by 83 per cent at six months (from 16.8 per cent to 30.7 per cent). The expected probability of relapse at six months fell by 79 per cent (from 16.9 per cent to 3.5 per cent). The costs of using venlafaxine XL and diazepam to treat GAD were £353 and £311, respectively. Therefore, despite costing more, the superior clinical outcome when treating GAD with venlafaxine XL instead of diazepam means using venlafaxine XL is the cost-effective strategy.

Cost-minimisation When the programmes under investigation produce identical effectiveness levels, economists can use cost-minimisation models. Such analyses aim to identify the treatment strategy that achieves the same outcome for the lowest cost. Although cost-minimisation analyses are the simplest economic evaluations, few agents produce the same outcomes. Nevertheless, a cost-minimisation analysis may be appropriate when comparing two related calcium antagonists, non-steroidal anti-inflammatory drugs or bisphosphonates and other drugs where the outcomes measured are the same.

Suggestions for future special features

If you would like to suggest a topic for a future special feature in *Hospital Pharmacist*, or if you are a specialist clinical pharmacist interested in writing about your area of practice, please contact Hannah Pike (telephone 020 7572 2425, e-mail hannah.pike@pharmj.org.uk) or Haley Hill (telephone 020 7572 2419, e-mail haley.hill@pharmj.org.uk).

For example, we recently estimated the cost-effectiveness of using pamidronate relative to zoledronic acid in the prophylactic management of skeletal morbidity among breast cancer patients in the UK.⁹ Initiating treatment with pamidronate among patients receiving chemotherapy produced a health care cost of £6,046 over 12 months compared with £6,981 for zoledronic acid. In comparison, for patients receiving hormonal therapy, initiating treatment with pamidronate was associated with a health care cost of £5,401 over 12 months compared with £6,043 for zoledronic acid. Therefore, pamidronate is the preferred first-line intravenous bisphosphonate for breast cancer patients receiving either chemotherapy or hormonal therapy who have at least one bone metastasis.

Cost-utility analyses Cost-utility analyses are becoming increasingly important in health technology assessments by NICE and other regulatory and purchasing authorities. These analyses aim to assess a patient's well being, perhaps using a HRQoL measure that assesses subjective improvements or activities of daily living. Performing a cost-utility analysis allows economists to derive a cost per QALY, and to measure the cost per QALY gained. These are discussed in more detail in the next article (p45) along with some of the methods used to produce health economic analyses.

Cost-benefit analyses Cost-benefit analyses evaluate all or as many as possible of the costs and consequences associated with a health care programme in monetary terms. Cost-benefit studies include direct and indirect costs and evaluate all gains, benefits and losses associated with the competing treatments. However, assessing all the costs and consequences in monetary terms is difficult. As a result, cost-benefit analyses are relatively uncommon in health care.

— Conclusion

Health economics is increasingly important politically, for purchasers, providers and pharmacists. Health economics studies offer an insight into the relative costs and outcomes of competing strategies. However, they are only one of many tools available to pharmacists evaluating evidence bases, devising formularies and setting budgets. Health economic studies can facilitate the best possible use of available resources in a rational decision-making context, in order to accrue maximum benefits from scarce resources.

— References

1. Szucs TD. Health economics in the genomic age. *Recent Results in Cancer Research* 2005;166:299–313.

2. Trostle JA. *Epidemiology and culture*. 1st ed. Cambridge: Cambridge University Press;2005.
3. Jackson BR, Busch MP, Stramer SL, AuBuchon JP. The cost-effectiveness of NAT for HIV, HCV, and HBV in whole-blood donations. *Transfusion* 2003;43:721–9.
4. Kernick DP. Introduction to health economics for the medical practitioner. *Postgraduate Medical Journal* 2003;79:147–50.
5. Guest JF, Ruiz FJ, Mihai A, Lehman A. Cost effectiveness of using carboxymethylcellulose dressing compared with gauze in the management of exuding venous leg ulcers in Germany and the USA. *Current Medical Research and Opinion* 2005;21:81–92.
6. Guest JF, Ruiz FJ, Russ J, Gupta RD, Mihai A, Greener MA. Comparison of the resources used in advanced cancer care between two different strong opioids: an analysis of naturalistic practice in the UK. *Current Medical Research and Opinion* 2005;21:271–80.
7. Varney SJ, Guest JF. The annual cost of blood transfusions in the UK. *Transfusion Medicine* 2003;13:205–18.
8. Guest JF, Russ J, Lenox-Smith A. Cost-effectiveness of venlafaxine XL compared with diazepam in the treatment of generalised anxiety disorder in the United Kingdom. *European Journal of Health Economics* 2005;6:136–45.
9. Guest JF, Clegg JP, Davie AM, McCloskey E. Costs and consequences of using pamidronate compared with zoledronic acid in the management of breast cancer patients in the UK. *Current Medical Research and Opinion* 2005;21: 805–15.