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"BEGINNING TO CHANGE"! ECONOMIC EVALUATION IN DENTISTRY

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ABSTRACT

Economic evaluation is now an accepted method for the appraisal of health care programmes.Although it is used widely in medicine,its use in the field of dentistry is only just beginning to achieve popularity-"Beginning to change".When alternative therapies are available,patients want the choice of treatment to be based on process that are cost effective and have proven outcomes.It is likely that there will be an increased demand for economic analysis of dental interventions by public as well as by Government authorities funding healthcare and third party payers as evidence for their better value for money in the future.This can be achieved only by improving research in economic evaluation and improving planning in management systems.It is important that those involved in health care should have a full understanding of the cost utility methods in current use.Increase number of clinicians should involve in the field of research.Clinical trials aid as a natural vehicle for economic analysis and results of these trials can turn into a lifetime benefit from an intervention.Allocation of available resources should be made by proper resource identification, measurement and valuation.Programme budgeting should be made by decision makers to maximize the impact of health care resources on the health need of a local population.Existing government should structure broad decisions in allocating amount of money to health care.Community organisations with a membership should aid in policy decisions and development of guidelines. This paper intensifies application of the principles

of economic evaluation to design health services that produce the best health care for the community based on available resources.This will make an impact on promotion of health, multiplying effect of health expenditure extending to the next generation and long run reduction in cost of medical and dental care.

KEYWORDS: Cost-Benefit,Cost-Effectiveness, Cost-Minimization, Cost-Utility, Health Economics

INTRODUCTION

*'We never will have all we need. Expectationwill always exceed capacity . . . This servicemust always be changing, growing andimproving, it must always appear inadequate.'**Aneuryn Bevin, 1948.***

It is well established that economics has animportant part to play in the evaluation ofhealth and health care interventions (Shiell et al,2002). When a politician has to decide whether to adopt a new public health measure, suchas a ban of advertisements for alcoholic beverages, a law obliging cyclists to wearhelmets or an educational programme on healthy nutrition in primary schools, he orshe should ask two questions: *Does it work?*, and *Is it worth it*? Finding the answersto these questions is the task of evaluations by public health professionals andeconomists (Schmidhauser et al,2009).

WHAT IS (HEALTH) ECONOMICS?

Economics:economics has been described in variousways, but most commonly as "*the study of choice", "the study of resource use", "the scarcity discipline"* or, more depressingly*, "the dismal science".*Of course, all of these definitions arerelated. It is because of resource *scarcity* that wehave to make choices about different ways ofusing resources. If one accepts this premise, thena dismal realisation follows: that by choosing touse resources in one way, those same resourceswill not be available for other potentially beneficialpursuits.

The following quotation from the Nobel Prizewinning economist, Paul Samuelson, aptly illustratesthe above points. Samuelson, definedeconomics as:

> "*The study of how men and society end up choosing, with or without the use of money, to employ scarce productive resources that could have alternative uses, to produce various commodities and distribute them for consumption, now or in the future, among various people and groups in society. It analyses the costs and benefits of improving patterns of resource allocation*." (Samuelson,1948)

Health economics can be defined as,

'*the study of the application of economic theory to health and health care.*' (Daly,2002)

ECONOMIC EVALUATION

Economicevaluation may be defined as

'the comparative analysis of alternative courses of action in terms of both their costs and consequences'. (Drummond, 1996)

It involves two main areas,first, the costs and consequences of programmesand, second, choices which haveto be made in allocation of resources.

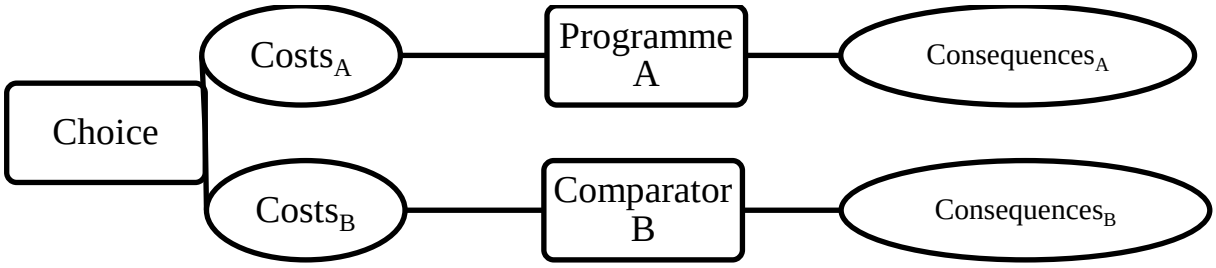


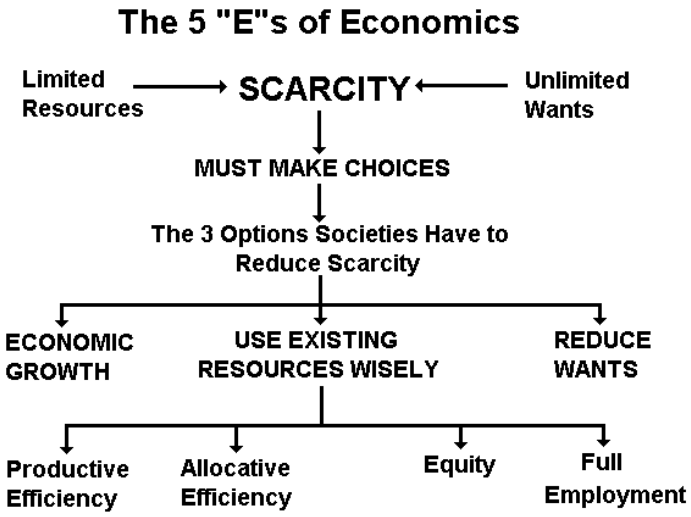
Fig.1. *Comparative analysis of alternative courses of action in economic evaluation*.

ECONOMIC EVALUATION IN DENTISTRY

'When alternative therapies are available,patients want the choice of treatment to bebased on processes that are cost-effectiveand have proven outcomes.' (Feine, 1998). It is likely there will be an increaseddemand for economic analyses of dentalinterventions by the public and by those funding healthcare. Both the Government and private companies arelikely to demand increased evidence of valuefor money in the future. This is particularlyimportant in areas which may be perceivedas 'cosmetic'.Economic evaluation is still used less frequentlyin dentistry than in medicine. However,this is ***beginning to change***.

The cost utilitymethod would be particularly useful in thefield of dentistry because treatments frequentlyproduce improvements in quality oflife. In addition, QALY based investigationsin dentistry would also allow some methodof comparing dental interventions withother forms of medicine.

One role of health economics is toprovide a set of analytical techniques to assistdecision making, usually in the health care sector,to promote *efficiency* and *equity*. Another role, however,is simply to provide a way of thinking abouthealth and health care resource use; introducing athought process that recognises *scarcity*, the needto make choices and, thus, thatmore is not alwaysbetter if other things can be done with the sameresources. Ultimately, health economics is aboutmaximising social benefits obtained from constrainedhealth producing resources.

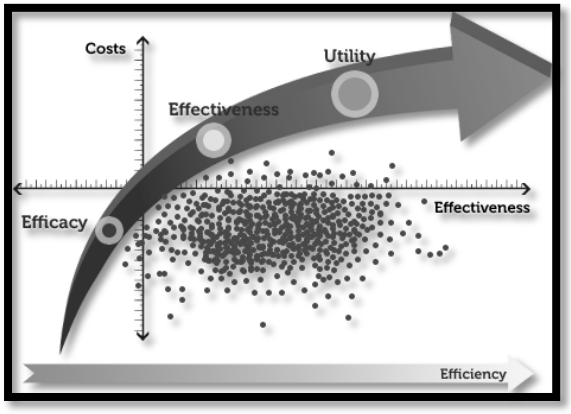


Health economics has been applied to answering questions about the justification for using resources. Health economics does not and should not make decisions for health professionals. Health economics aims to support health professionals by providing structured and symmetrical analyses that enable them to make better and more informed decisions.

Health economics is, therefore, about resource management – what is affordable and desirable and what is not. When resources are scarce, decisions need to be made as to how best to allocate them. If resources are scarce then it is usually not possible to provide all care that is desired and some form of rationing is introduced.

Drummond *et al.*(1997) stated that economic evaluation should come after three other questions are asked of any intervention. These questions are:

- Can the intervention work?(The efficacy of the procedure)
- Does it work in a real-life situation? (Evaluation of effectiveness)
- Does it reach those whom it is meant to reach? (Availability of the service).



It can thus be seen that health economics should be closely related to evidence-based dentistry. Once the effectiveness of an intervention has been determined, economics may help in deciding between two or more interventions. In order to make comparisons a considerable amount of information is needed. Firstly, it is necessary to identify whether there are two

alternatives that can be compared and is illustrated in Fig.1. Only by having as complete information as possible can a full range of analysis be undertaken. Economic analyses are concerned with two major factors. Drummond stated that it deals with the *inputs or costs*, and the *outputs or consequences* of actions. The second factor that is involved is an element of choice.

All health economic evaluations should attempt to identify measure and value all relevant costs. Cost measurement in health economic evaluations follows three stages (Pine, 2007)

Resource identification	Identifies the resources that will be consumed as a consequence of use.
Resource measurement	Quantifies each resource, for example, the amount of drug, number of staff hours and quantity of other resources consumed.
Resource valuation	Applies appropriate costs to each element of resource consumption

ALLOCATION OF RESOURCES

Healthcare and government agenciesmust decide how to allocate their resourcesfor a wide range of very different health careinterventions. This involves making difficultjudgments regarding the importance ofcertain health states. A number of argumentshave been proposed in terms of'need' for healthcare and/or 'right' to treatment.Goold proposed that the only fair wayof resource allocation is to have two levels oforganisation (Goold,1996). The first, based on the existinggovernment structure, should beresponsible for making broad decisions,such as the amount of money allocated tohealth care. The second level, made up ofcommunity organisations with a membershipwhich represents a wide range of healthrelated interests, would be involved in themaking of policy decisions and the developmentof guidelines.

The questions which shouldalways be asked are —

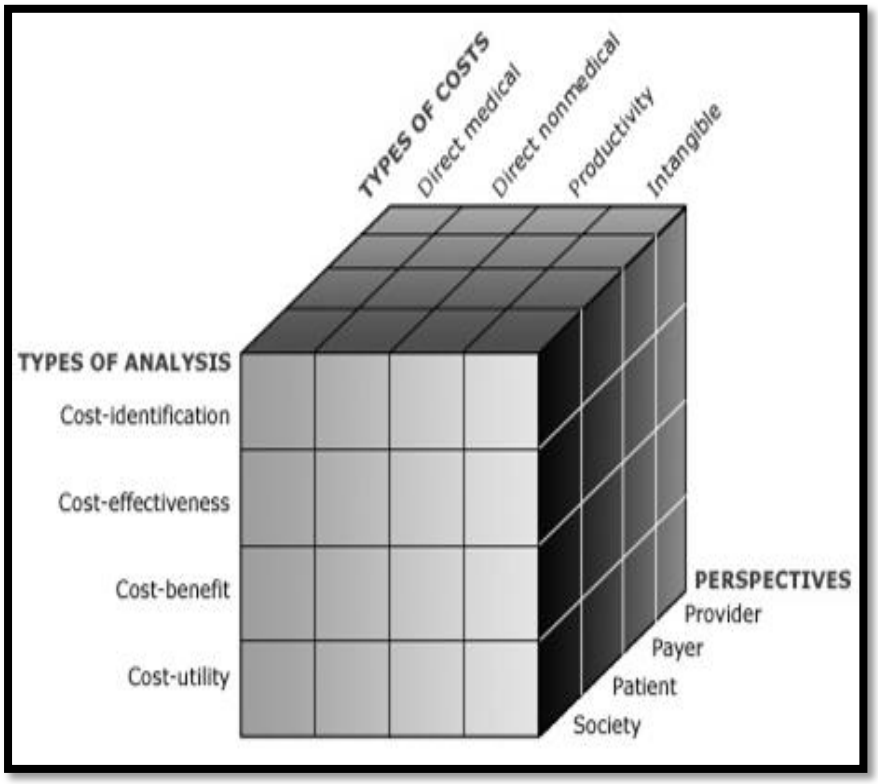
- *Is the allocation of healthcare resources efficient?* and,
- *Is the allocation equitable?*

Healthcare is limited by the total amountof resources available as well as throughcompetition with other areas, such as housingand education and it is difficult to determinewho should be responsible for the'rationing' of healthcare. When rationing ofresources becomes necessary, some procedurehas to be set up to allow the mostappropriate allocation.

There are three main theorieswhich have been proposed to assist the allocationof resources, none of which is withoutfaults (Veatch,1976). Although these theories areunlikely to be useful on an everyday basis,they may aid the development of guidelines:

1. The Utilitarian Theory.	Argues that healthcare should be distributed so as to maximise the health of society (eg increase life expectancy; reduce infant mortality) without regard to how that good is actually distributed.
2. The Egalitarian Theory	Based on the concept that everyone has a claim to the amount of healthcare resources which gives them a level of health equal to that of others.
3.The Rawlsian Theory(Rawls, 1971)	Proposes that each person has an equal right to the system and when making social and economic choices, those who are least advantaged should have maximum benefit.

Benefits may be divided into gains inhealth status (direct benefits) as well asother indirect benefits (eg productiongains). Costs may be divided into directmedical costs (eg costs to the NHS), directnon-medical costs (eg family expenditure,social services) and indirect costs or productivitycosts (eg changes associated withtreatment such as time off work, earlierreturn to work). One term which is particularlyimportant is 'opportunity cost', or thevalue of a resource in its best alternative use,and evaluations therefore aim to compareopportunity costs with the improvement inhealth as a result of the intervention underexamination.



The types of benefit commonly used in each method of economic evaluation.

Method of economic evaluation	***Comparing benefits of treatment A with benefits of treatment B***
Cost-minimisation analysis (CMA)	Outcomes are assumed to be equivalent and can take any form. E.g. number of cases detected, years of life saved.
Cost-effectiveness analysis (CEA)	Outcomes are measured in common natural units. E.g. life years gained, death prevented.
Cost-utility analysis (CUA)	Outcomes are measured in similar health state values based on individual preferences. E.g. quality adjusted life years gained, healthy years equivalents.
Cost-benefit analysis (CBA)	Outcomes can be measured in similar or different units and are always valued in monetary units. E.g. amount willing to pay to prevent a death, amount willing to pay to reduce risk of exposure to a hazard.

How do these aid decision-making?

- C-M-A tells the most technically efficient way to achieve an objective
- C-E-A tells the cost per unit of outcome, without valuing different outcomes.
- C-B-A tells whether or not an intervention is worthwhile.
- C-U-A can provide a framework for priority setting – QALY

How health economics differs from other economic evaluations of goods and services?

In economic theory the consumer has a central position in the evaluation of goods and services. It is not possible to trade health but it is possible to buy and sell health services. The economic evaluation of healthcareshows certain important differences whencompared with other commodities (McGuire,1988).

Economic evaluation of health care differs from other economic evaluations of goods and services in four key aspects (Cunningham,2000).

1. There is an assumption that a consumer makes a choice after receiving information. However, consumers are not always able to collect or process information in relation to health care.

2. The person providing the information is usually the supplier of the health care. This does not happen in other fields.
3. There is an assumption that once health care is consumed benefits in terms of improvements in health status will occur.
4. It is assumed that health is the only outcome of value for consumers. Consumers do not voluntarily engage in consuming health care. However, it has been argued that this may not be the case for dentistry.

The following are the classical examples of economic evaluation in dentistry:

Klock	CBA and CEA of a preventive programme (including oral hygiene, fluoride application and fissure sealants) and found that in spite of a reduction in caries activity; the programme was uneconomic compared with traditional dental care.
Morgan et al.	The cost-effectiveness of a preventive programme in two non-fluoridated regions of Australia and concluded that the introduction of a preventive programme was an efficient use of resources. They also stressed the need for systematic evaluation of a full range of dental prevention and treatment programmes
Mjör	The cost-effectiveness of restorative materials for two and three surface restorations undertaken in Norway and found amalgam to be the most cost-effective, followed by composite and then gold.
MacEntee and Walton	Looked at the costs associated with implant retained prostheses and conventional dentures.
Jacobson et al	Undertook one of the few utility based dental investigations in which implant retained prostheses and conventional dentures were compared using a rating scale method. They concludedthat this was a reliable measure ofpatients' preferences and the implant grouprated a successful implant-supported prosthesisas higher than a functional, fitting,aesthetic conventional denture, in spite ofhigher costs and longer periods of non-function.
Fyffe and Kay	Assessed the average utility values for four different 'tooth states' which it was hypothesised would have different values. They found that the highest mean utility values were for the restored tooth and lowest values for the decayed and painful posterior tooth.
Downer and Moles	Studied the influence of relevant factors on health gain from restorative treatment

O'Brien et al	Undertook the only example which was found of utility analysis in orthodontics. They developed a TTO scale questionnaireusing the aesthetic component of theIndex of Treatment Need and found thatpatients seeking treatment gave lower utilityvalues than those not wanting treatment.However, with the visual analoguescale there was no significantdifference. Itwas proposed that this method could alsobe used as a method for predicting patientcompliance.
Downer et al	Used the Standard Gamble method to elicit the public's perceptions of different oral cancer states — precancer, small cancer and large cancer and found utility values of 0.92 for precancer, 0.88 for stage 1 cancer and 0.68 for stage 2 cancer. These values then allow the QALYs gained and the cost per QALY involved in the treatment of such lesions to be calculated.

One of the major problems in dentistry is taking the results of a clinical trial and trying to turn that into a lifetime benefit from an intervention.

THE FUTURE

Only by improving research in economicevaluation and by improving planning andmanagement systems will the health serviceprogress. It is becoming increasingly obviousthat demands for treatment cannot bemet and that choices need to be made.Alongside this, governments and thirdparty payers have intensified their searchfor better value for money.

The demand for health economics analyses is bound to increase with both public health services and private insurance companies looking for evidence of value for money in a field where some therapies can be seen as providing 'cosmetic' treatment. It is likely that the number of economic evaluations will only increase if the quality of the underlying scientific evidence improves. Methodological developments aimed at incorporating an equity dimension into current economic evaluations are needed, and this is seen as research priority.Where inequalities in oral health are of concern in a country like India, the discipline of health economics may prove to be a useful tool in addressing the issue in the future.

CONCLUSION

Health economics can be a useful tool to help assess the value of different interventions. In dentistry the number of robust studies using these techniques is relatively small and generally limited to preventive techniques. As with many tools, health economics is limited by the quality of the data available to the analyses. Health economics cannot provide a complete

answer as to which intervention to use but can provide very useful data which will inform a decision.

Summary of main points

- Health economic evaluations do not have a 'gold standard' methodology. This is in sharp contrast to clinical evaluations where the double-blind, randomised placebo-controlled trial is widely acknowledged to produce the most reliable form of evidence.
- As a result, economic analyses may be left open to bias, particularly with respect to the choice of comparator, the nature of the assumptions made or, perhaps, the selective use of medical evidence.
- Decision-makers need to be aware of the potential for, and sources of, bias in economic evaluations. Evaluations must be critically appraised to ensure that they are of good quality, appropriate and relevant.
- It is important for dentists to recognise that health economics is still in its infancy and is developing as a speciality in its own right. The quality of its science can only be refined by application, and as the science improves, so too will the value of health economic analyses to those responsible for allocating resources within the field of dental care.

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