

Chapter 22

Economic Evaluation in Infection Prevention and Control

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Key points

- Given rising healthcare costs, decision-makers increasingly rely on clinical effectiveness and economic efficiency when making decisions.
- Infection prevention and control (IC) is not immune to this rise in cost-consciousness; thus, IC professionals should ideally learn the basic tenets of economical evaluation.
- Cost-effectiveness analysis - the most common economic analysis used in healthcare -- quantifies the trade-off between increased expenditure and improved outcome and measures the cost required to achieve a given clinical benefit.
- When reading an economic evaluation within IC, several important criteria can be used to judge its validity.

Introduction

Healthcare costs are rising and decision-makers increasingly rely on both clinical effectiveness and economic efficiency when making health care decisions. There is sound rationale for economic analysis: resources are scarce and choices must be made.

The traditional evaluation of new interventions includes safety (are the side effects acceptable?), efficacy (can it work?), and effectiveness (does it work?). The economics-based term, "efficiency" should also be considered. This helps answer whether or not the extra cost of an intervention is worth it.

Several types of economic analysis can be employed including: cost minimisation, cost effectiveness, cost benefit, and cost utility analysis. Cost minimisation (identifying the least costly alternative that leads to equivalent outcome) is rarely used because the clinical consequences of different interventions are rarely equivalent. Cost benefit analysis (placing a monetary value on both the costs and the benefits) is also used rarely because it is difficult to place a monetary value on health. Cost utility analyses are useful when there are no expected mortality differences between interventions, only differences in physical well-being which can be expressed as quality adjusted life years (QALY).

Cost-Effectiveness Analysis

A cost-effectiveness analysis quantifies the trade-off between increased health care expenditure and improved outcome and measures the cost of a given clinical benefit. An example is assessment of an intervention to reduce catheter-related bloodstream infections using antiseptic-coated vascular catheters. The cost of the antiseptic catheter is usually more than a standard catheter, however this can be compared with the clinical benefits it provides.

Thus, a cost-effectiveness ratio would be generated, which would be the total cost of the intervention divided by the number of cases of catheter-related bloodstream infection prevented. If the antiseptic catheter produced superior benefits but at an increased cost, then an incremental cost-effectiveness ratio - the amount of money needed to produce an additional clinical benefit - could be calculated. However, if the

intervention led to an actual reduction in overall costs while improving health outcomes, it would be called a "dominant" intervention, since it would provide both clinical and economic benefits.

Table 22.1 helps decide when a cost-effectiveness analysis is appropriate. In general, there are four possibilities when comparing two interventions, A and B.

Table 22.1. Choosing Among Alternative Interventions in a Cost Effectiveness Analysis

	A < B	A > B
A > B	A is Dominant Cost-effectiveness analysis unnecessary	Incremental Cost-effectiveness analysis useful
A < B	Incremental Cost-effectiveness analysis useful	B is Dominant Cost-effectiveness analysis unnecessary

A = Intervention "A"; B = Intervention "B"

Firstly A is more effective and costs less. Thus, A is the dominant strategy and should be used without further analysis. Likewise, when B is more effective and costs less than A, B is dominant and a cost-effectiveness analysis is unnecessary. However, as is more common, when A is more effective than but costs more than B, it is helpful to perform an incremental cost-effectiveness analysis to quantify the clinical and economic consequences of intervention A.

Examples of such analyses include antiseptic-coated vascular catheters to prevent catheter-related bloodstream infection¹ and silver alloy urinary catheters to prevent urinary catheter-related infection.² Such studies have been performed and have found the intervention is likely to be worthwhile in certain patient groups. An incremental cost-effectiveness ratio is interpretable only when compared with one examining the same health outcome. For example, the cost-effectiveness of preventing local vascular catheter-related infection cannot be directly compared to the cost-effectiveness of preventing urinary catheter-related bacteraemia.

Measuring Effectiveness and Costs

Effectiveness and Cost Estimates

Economic evaluations of health care interventions depend upon solid clinical evidence of effectiveness in order to establish benefits and risks. The validity of the clinical data is crucial to the analysis. Many economic evaluations rely on a single randomised trial or a single observational study to estimate clinical benefit. Some studies rely on less rigorous or non-scientific sources of information such as clinical opinion or expert panels. Estimates derived from large-scale, multi-centre trials are widely considered the "gold standard," however these data often are not available. In addition to effectiveness estimates, the analyst must also estimate the cost. Often, however, cost is poorly defined for different IC interventions as well as for healthcare-associated infections.

Meta-analysis

Meta-analysis is a "quantitative approach for systematically combining the results of previous research in order to arrive at conclusions about the body of research".³ Meta-analysis is used to statistically pool the results from individual studies (usually randomised trials) to obtain an estimate of the summary effect. The summary measure from a meta-analysis is often used to derive the probability of treatment success in a cost-effectiveness analysis.⁴ Even if the benefit of an intervention could be demonstrated in every clinical setting, the cost-effectiveness ratios would vary considerably depending on local economics. Thus, an intervention that may appear "cost effective" in one country or hospital district (e.g., with a cost-effectiveness ratio less than \$50,000 per life year saved), may be considered too expensive elsewhere.

Economic evaluation of IC can be performed in a rigorous and straightforward manner but several barriers exist to its routine introduction. First, since economic evaluation is not widespread in IC, terminology must be used correctly. Often, when medical directors and other decision-makers say, "cost effective" they imply cost savings. However, "cost effective" technically indicates that we are spending an additional amount of money for an additional clinical benefit and is based on the explicit comparison of one strategy with another. Cost savings imply that we are getting an equivalent or greater clinical benefit and actually saving money; this scenario is rare.

The cost-effectiveness of intervention A compared with intervention B can range from cost saving, cost neutral, cost effective to cost ineffective. Another important issue within IC is that the attributable morbidity, mortality, and costs of healthcare-associated infection are difficult to assess.

Evaluating an Economic Analysis

There are several important criteria by which economic analyses should be judged. (See Table 22.2) The first question is whether or not a well-defined research question was posed. This is of fundamental importance, since a research question that is not worth answering is usually not worth answering well. Second, it is important that all the legitimate and reasonable competing alternatives be evaluated. Third, the effectiveness of the intervention must be clearly established, since an intervention that is not effective will certainly not be cost-effective. Finally, it is critical that all the important and relevant costs and consequences of the intervention are identified and considered, depending on the perspective of the analysis.

Table 22.2. Cost effectiveness decision process

Questions that should be answered when performing or reading a cost-effectiveness analysis⁵	
1.	Was a well-defined question posed?
2.	Were all the competing alternatives evaluated?
3.	Was the effectiveness of the intervention established?
4.	Were all the important and relevant costs and consequences for each alternative identified (depending on the perspective)?
5.	Was uncertainty in the estimates adequately evaluated?

References and Further Reading

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