Acceptable mental health care? A new decision-making tool for cost-effectiveness analysis

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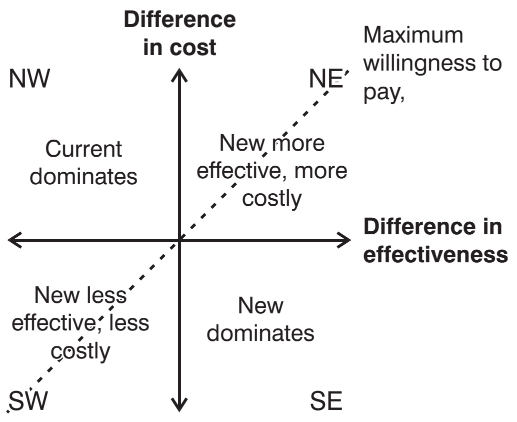
Introduction

Scarce resources in health care systems mean choices must often be made between new and existing treatments. When a new intervention is found to be both more effective and more costly than the existing treatment, the choice between the two options is not straightforward and must involve a judgement concerning the maximum willingness to pay for an improvement in health status. This paper explores the role of cost-effectiveness acceptability curves in this decision-making process.

The cost-effectiveness plane

Figure 1 The cost-effectiveness plane



When comparing a new with an existing intervention, four possible eventualities arise, which are depicted on the cost-effectiveness plane in figure 1. One treatment can dominate another — in the SE quadrant the new treatment dominates the current treatment and in the NW quadrant the opposite is the case. Frequently, however, one treatment is both more effective and more costly — this is the case for the new treatment in the NE quadrant and for the existing treatment in the SW quadrant. In such situations, the decision to switch to the new treatment depends on the value placed on the associated change in effectiveness. This chosen value, or maximum willingness to pay, is depicted by lambda ( ) on the cost-effectiveness plane. On any point to the left of the current treatment is considered more cost-effective and should be chosen, whilst on points to the right of the new treatment is preferred.

Incremental cost-effectiveness ratio

Economic results are often summarised in terms of incremental cost-effectiveness ratios (ICER) — the ratio of the difference in costs (cost of new minus cost of existing treatment) divided by the difference in effects (effect of new minus effect of existing treatment). Resources can then be directed towards those interventions that achieve a lower ICER than a society's maximum willingness to pay for such an improvement in effectiveness, within the constraints of existing budgets.

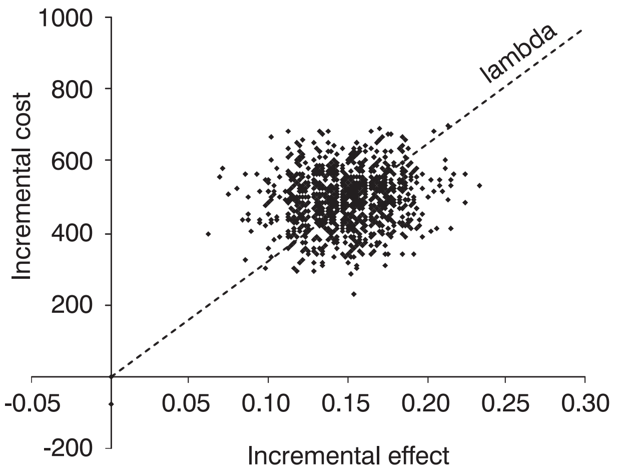
The use of ICERs, however, has been limited by a lack of understanding on the part of decision-makers (Hoffman and von der Schulenburg, 2000) and statistical problems with the use of ratios, in particular problems of representing statistical uncertainty (Briggs and Fenn, 1998; Briggs and Gray, 1999; Stinnett and Mullahy, 1998). These statistical problems have led to the development of various methods of representing the uncertainty surrounding ICERs, including confidence boxes, confidence ellipses, Taylor series expansion, Fieller's theorem and non-parametric bootstrapping (Briggs and Gray, 2000). In all of these methods, however, problems of statistical interpretation and clarity in presentation persist.

Cost-effectiveness acceptability curves

Attention has recently turned to the incremental net benefit (INB) approach and the use of cost-effectiveness acceptability (CEAcc) curves (Van Hout et al., 1994; Glick et al., 2001). CEAcc curves are a graphical representation of the probability that a particular intervention is cost-effective, over a range of possible values for the maximum willingness to pay for a unit improvement in health outcomes, (Fenwick et al., 2001).

To illustrate, the cost-effectiveness plane in figure 2 displays hypothetical bootstrapped replications* of the incremental cost and incremental effectiveness results of a clinical trial. The data points are concentrated in the NE quadrant, where the new intervention is more effective yet more costly than existing treatment. If represents the maximum willingness to pay, the area to the right of the line is the acceptability surface where the increase in cost of the new intervention is acceptable given the gain in effectiveness achieved. To the left of , the new intervention is rejected as the gain in effects is not considered worth the increase in cost.

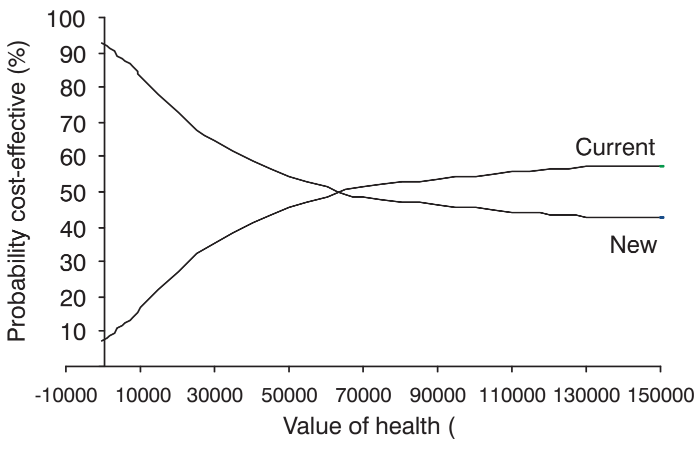
Figure 2 Bootstrapped replications of incremental costs and effects



* Bootstrapping is a statistical procedure based on repeatedly sampling from the observed data generated in an evaluation (Efron and Tibshirani, 1993). Bootstrapping is advocated because it does not rely on parametric assumptions of the distributions of costs and effects, such as normality (Barber and Thompson, 2000). This is of particular importance when dealing with cost data, which are often highly skewed.

However, given that the value of is unknown, the probability that the new intervention is relatively more cost-effective than existing practice is presented for a range of levels of willingness to pay. Thus a CEAcc curve is created by varying the value of from zero to infinity. In effect, this involves the rotation of from the horizontal position, where the new intervention dominates (see figure 1), to the vertical position where the existing treatment dominates. The resultant curve, shown in figure 3, represents the proportion of the data that lie on the acceptable side of for every given value of .

Figure 3 Cost-effectiveness acceptability curves



CEAcc curves therefore move away from the traditional reliance on arbitrary decision rules regarding statistical significance, which are being increasingly criticised as irrelevant in a decision-making context (Claxton, 1999). The decision to adopt one intervention over another is based on the expected cost-effectiveness of the intervention, or the probability of making the correct decision, irrespective of the statistical significance of the differences in costs and outcomes.

Conclusion

Whilst avoiding many of the statistical problems associated with ratios, CEAcc curves are able to quantify graphically the probability that an intervention is cost-effective compared to an alternative intervention in a manner that can be made clear to decision-makers. Lucid presentation of results can aid well-informed decision-making and thus CEAcc curves represent an important advance in reporting economic analyses.

Despite the plethora of methodological research attesting to the usefulness of CEAcc curves and recent attempts to increase their use in decision-making (Pedram Sendi and Briggs, 2001), few economic evaluations have employed this methodology (Fenwick et al., 2001). There have been no published studies where CEAcc curves have been generated in the mental health field, although we know of two that are currently in press (Byford et al., 2003; Scott et al., 2003). With increased familiarity and understanding, however, this decision-making framework is likely to become more common.

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