

The debate over medical leadership is a distraction from the far more pressing issue of ensuring suitable training programmes are developed in public health departments accessible to all members of the multidisciplinary team. These programmes should train all members in exercising leadership in their area of professional expertise.

Beneath the surface of this debate may lie issues about reward and recognition. These issues are for society to decide. However, the reward and recognition for all members of the public health team would not come through the dilution of the professional framework established for public health doctors. This model ensures the delivery of a service to high professional standards and protects against the inappropriate exigencies of misplaced corporate and political demands. This principled approach would enable all public health professions and disciplines to work together to improve health to local populations throughout the United Kingdom.—Sarah Taylor and Edward Coyle

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Competing interests: ST was chairman of the Central Committee for Public Health Medicine and Community Health, 1998-2000, and EC is its current chairman.

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## Summarising economic evaluations in systematic reviews: a new approach

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Systematic reviews of healthcare interventions, which are aimed at informing health policy, increasingly include economic evaluations in addition to evaluations of clinical effectiveness.<sup>1-3</sup> The challenge reviewers face is collating, appraising, and synthesising economic evidence in such a way that it is clearly helpful in making decisions about the effects and costs of competing alternatives. However, the methodology for summarising the findings of economic evaluations is not as well established as that applied to structured summaries of clinical evidence. The aim of this paper is to illustrate and discuss the relative merits of commonly used methods and to offer a new approach that makes interpreting the evidence easier for decision makers who require a clear overview of the findings.

We describe well established methods that can be used to summarise the findings of a review of economic evaluations, namely narrative summaries, permutation matrices, and the cost effectiveness plane, and we give examples of how a permutation matrix has or could have been used in two published systematic reviews. Finally, a new method is described that presents the same information in a clear, concise, and hierarchical manner and which provides an effective tool for summarising the same results.

### Existing summary methods

The most elementary method of summarising the results of a review of economic evaluations is the narrative summary, which, in conjunction with a tabular approach to recording the results, provides a descriptive summary of the review.<sup>4</sup> The drawback to this method is that the gist of the findings is not always immediately obvious.

### Summary points

Systematic reviews of healthcare interventions are increasingly integrating clinical and economic evidence

Methods are needed to summarise and convey clearly the findings of these reviews

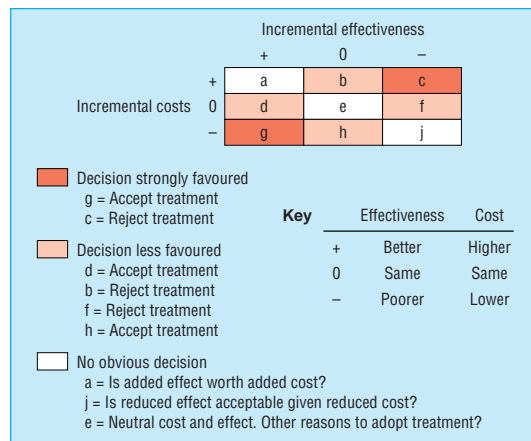
The methodology for summarising the results of economic evaluations is not well established

Methods for summarising the results of economic evaluations include narratives, tables, the cost effectiveness plane, and permutation matrices

A new hierarchical method offers an effective means of summarising the results of economic evaluations within a systematic review

An alternative system for summarising the findings of economic evaluations is the cost effectiveness plane; it presents the results in four quadrants.<sup>5</sup> This system is potentially useful because it presents the magnitude of the differences in costs and effectiveness as well as their direction. However, it is somewhat technical in nature, lacks common reference points that can be used across different economic evaluations, and has not been widely used in systematic reviews. Consequently, it is not discussed in this paper.

A more common approach is to use a framework for evaluating the possible outcomes of economic evaluations.<sup>6</sup> This is a form of permutation matrix that



**Fig 1** Permutation matrix for possible outcomes of economic evaluations for study of intervention v comparator.<sup>7</sup> In the original matrix numbers were used instead of letters

shows the nine possible outcomes in terms of costs and effectiveness. It has been developed further by the use of shading to show the relevant strengths of each permutation of costs and effects in terms of decision making.<sup>7</sup> A modified version of this approach, using letters instead of numbers to represent each cell, is summarised in figure 1. The matrix shows the permutations that indicate that a certain decision is strongly favoured (that is, it has better health outcomes and lower costs) if the decision were either accepted (cell g) or rejected (cell c). The situation in which a decision is less favoured (that is, either costs are lower or health outcomes are better) is shown in cells d, b, f, and h. The cases in which there is no obvious decision—that is, some form of financial or clinical trade off is required (cells a and j) or no differences are observed (cell e)—are also shown. The shading offers a means of more easily identifying the implications for decision making. The details of the economic evaluation can be put in the cells according to their permutations.

**Examples**

Two reviews of economic evidence illustrate the use of narrative and structured summaries with the permutation matrix. The first example is a review of the cost effectiveness of taxanes in the treatment of ovarian cancer.<sup>8</sup> In this study, economic evaluations were selected after an extensive search and assessment of quality. The results of these evaluations were tabulated and a narrative summary was provided as follows

Nine were cost-effectiveness and three were cost-utility analyses. The range of incremental costs per life-year gained (£7173-£12 417) found in the two UK studies is within the range reported for all studies comparing paclitaxel plus cisplatin to cyclophosphamide plus cisplatin (£3960-£13 660). The two UK studies used carboplatin rather than cisplatin in their analyses. In the cost-utility analyses the range of incremental cost per [quality adjusted life year] gained was £5273-£11 269.<sup>8</sup>

Although not included in this particular review, the matrix described above can be used to enhance the presentation of the summary (fig 2a).

The second example addresses community based care for chronic physical and mental health conditions.<sup>9</sup> This review used both a narrative description and a permutation plot, a modified version of which is

shown in figure 2b; the original version used roman numerals in each numbered cell to identify individual studies. A narrative summary of this review could be: “The main lessons from the 12 studies are that it is as effective or more effective and as expensive or less expensive to offer complete, proactive, community health services to people living with chronic physical and mental health problems than to provide focused services on demand on a piecemeal basis.”

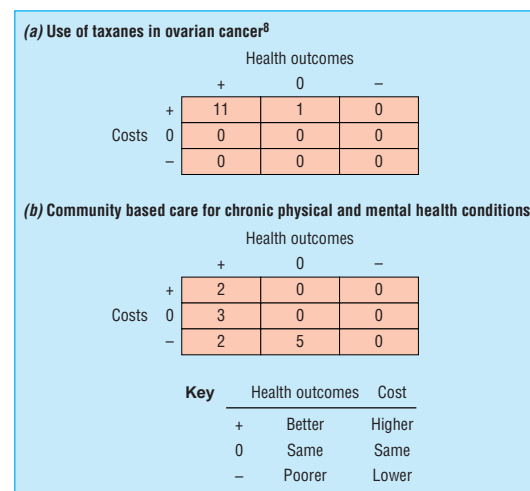
Although the approaches described here offer useful methods of summarising reviews of economic evaluations, they still require a degree of interpretation and an understanding of the underlying methodology.

**Hierarchical decision matrix**

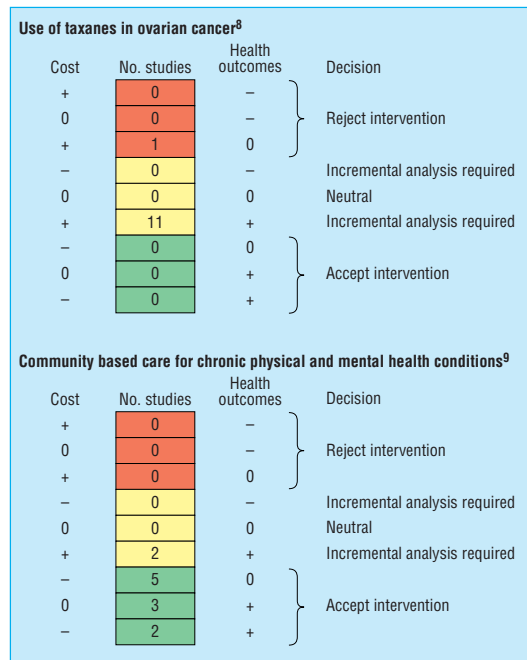
A hierarchical matrix using colour could further enhance the interpretability of reviews of economic evaluations; a model is illustrated in figure 3. The use of colour in clinical decision making is not new. It has been shown to be useful in helping clinicians make complicated decisions and has also been used, for example, in guidelines on cholesterol treatment.<sup>10</sup> Such a system has not been used before in health economics.

This method ranks all possible permutations (as described in figure 1) of costs and health outcomes and provides an instant visual summary of the findings and the likely action for the decision maker. For example, if the intervention is always favoured over the comparator (either strongly or weakly), then the evidence taken as a whole supports the use of the intervention. This is shown in the green (accept) areas of figure 3. An alternative scenario would be to conclude that the intervention is not supportable where it is less effective or equally effective and more costly, as depicted by the red (reject) areas of the figure.

However, if the intervention is not favoured (strongly or weakly), then an incremental (cost effectiveness or cost utility) analysis will be needed to quantify the cost of each additional unit of benefit or effectiveness. This will involve making a decision about trade offs in policy because the intervention will require additional funding either through the acquisi-



**Fig 2** Permutation plots summarising findings of economic evaluations for intervention v comparator. Numbers in cells are number of studies relevant to each permutation



**Fig 3** Hierarchical matrix used to summarise findings of economic evaluations for intervention v comparator. Numbers in cells are number of studies relevant to each permutation

tion of additional money or by cutting back on other services. The permutations for this scenario are depicted in the yellow areas of the figure.

Although it has not yet been possible to formally assess the views of researchers regarding the likely usefulness of the new matrix, feedback suggests that it will offer an approach that retains the advantages of existing methods but presents the findings in a concise, organised, and simplified manner for decision makers (seminar presented at the NHS Centre for Reviews and Dissemination, University of York, March 2001). The original permutation matrix in figure 1 could also be enhanced by adding colour in a similar manner and may be preferred by some researchers who conduct systematic reviews. However, the transition to a hierarchical design that uses colour is a more efficient development.

### Conclusion

Existing methods for summarising the results of economic evaluations within systematic reviews have some limitations for clinicians and policymakers

because the methods must be interpreted using the textual and diagrammatic summaries normally provided. Moreover, the methodologies and vocabulary of narrative summaries are often an impediment to understanding the results. The proposed hierarchical method provides an instant visual summary of the findings in terms of effectiveness or benefit and in terms of cost. Other methods, such as the cost effectiveness plane, offer a potentially more inclusive approach but are probably too technical for those charged with making the final decision about competing healthcare interventions.

The method we have proposed is analogous to a traffic light and the associations with its colours will be instantly familiar to most potential users who will understand whether to stop, go forward with the intervention, or take stock of the implications before making a decision. The process of rational decision making will be enhanced by presenting the findings of such reviews with greater transparency.

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### Words

#### Is it cracked, broken, or fractured?

Anyone who has worked in an accident and emergency department will probably have encountered the above question when dealing with a patient who has an injured bone. There are variations of course:

Doctor: "I'm afraid you've fractured your shin bone."

Patient: "Oh well, at least it's only fractured and not broken."

This may be viewed as a good opportunity for public education on some of the finer points of trauma terminology.

However, I was recently re-educated on this point by a non-medical friend of mine. "Oh no, they're completely different,"

he told me. Cracked is not too bad, just a little line halfway across (? greenstick fracture). Fractured is a bit worse, it goes right across the bone but the halves are still in the right place (? undisplaced fracture). Broken is the worst, clean through, the bits are in the wrong place, and completely apart from each other (? displaced fracture).

So now I know.

Martin Billington *paediatric registrar, Bristol*